

**T.C.  
ISTANBUL AYDIN UNIVERSITY  
INSTITUTE OF SOCIAL SCIENCES**

**THE EFFECTIVENESS OF OPTIMUM CURRENCY  
AREAS WITHIN A MONETARY UNION: THE CASE OF  
THE EUROZONE IN THE RECENT 2008/2009  
FINANCIAL CRISES.**

**M.Sc. THESIS**

**Lawrence MAISHU NGALIM**

**Department of Business  
Business Management Program**

**THESIS ADVISOR: Assistant Prof. Dr. Zelha ALTINKAYA**

**JUNE 2015**

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İSTANBUL AYDIN ÜNİVERSİTESİ  
SOSYAL BİLİMLER ENSTİTÜSÜ MÜDÜRLÜĞÜ

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Not: Öğrencinin Tez savunmasında **Başarılı** olması halinde bu form **imzalanacaktır**. Aksi halde geçersizdir.

Dedicated to my dad , Felix NGALIM NJONG (of blessed memory) and also to the  
deceased members of Njong's and Wirkwa's family.

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**JULY 2015**

**Lawrence MAISHU NGALIM**

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## ABBREVIATIONS

<b>AIC</b>	:Akaike's Information Criterion
<b>ADF</b>	:Augmented Dickey Fuller
<b>ATM</b>	:Automated Teller Machine
<b>ARCH</b>	:Autoregressive Conditional Heteroskedasticity
<b>ARDL</b>	:Auto Regressive Distributed Lag
<b>ARMA</b>	:Autoregressive moving average
<b>ARIMA</b>	:Autoregressive Integrated Moving Averages
<b>BWS</b>	:Bretton's Woods System
<b>CEMAC</b>	:Central African Economic and Monetary Community
<b>CUSUM</b>	:Cumulative Sum
<b>CUSUMQ</b>	:Cumulative Sum of Square
<b>EA</b>	:Euro Area
<b>ECCAS</b>	:Economic Community of Central African States
<b>ECB</b>	:European Central Bank
<b>ECT</b>	:Error Correction Term
<b>ECU</b>	:European Currency Unit
<b>ECSC</b>	:European Coal and Steel Community
<b>ECT</b>	:Error Correction Term
<b>EEC</b>	:European Economic Community
<b>EMU</b>	:European Monetary Union
<b>EMS</b>	:European Monetary System
<b>ESCB</b>	:European Systems of Central Banks
<b>EU</b>	: European Union
<b>ERM</b>	:Exchange Rate Mechanism
<b>OCA</b>	:Optimum Currency Area
<b>OCR</b>	:Optimum Currency Region
<b>GDP</b>	:Gross Domestic Product
<b>HICP</b>	:Harmonized Index of Consumer Prices
<b>IIT</b>	:Intra Industry Trade
<b>IMF</b>	:International Monetary Fund
<b>MIP</b>	:Macroeconomics Imbalance Procedure
<b>OCA</b>	:Optimum Currency Area
<b>OCR</b>	:Optimum Currency Region
<b>OLS</b>	:Ordinary Least Square
<b>OECD</b>	:Organization for Economic Cooperation and Development
<b>PIIGS</b>	:Portugal, Italy, Ireland, Greece and Spain
<b>ROI</b>	:Return On Investment
<b>SBC</b>	:Schwartz Bayesian Criterion

**SIC** :Schwartz Information Criteria  
**VAR** :Vector Autoregression  
**USD** :United States Dollars

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**THE EFFECTIVENESS OF OPTIMUM CURRENCY AREAS WITHIN A  
MONETARY UNION: THE CASE OF THE EURO ZONE IN THE RECENT  
2008/2009 FINANCIAL CRISES**

**ABSTRACT**

Since 2008, it's argued that the financial crisis in the Euro zone has demonstrated that the region was not mature enough to adopt the euro as a currency. A retrospect on the Maastricht convergence criteria and on the Optimum Currency Criteria put forth, clearly points out the deviations in the fulfillment of these criteria in the conception and functionality of the so-called euro area. The goal of this research is to measure the effects of the 2008 financial crisis in the Eurozone by considering exchange rate volatility (risk) on trade flows between the United States and the Eurozone. The null hypothesis being that exchange rate volatility affects trade flows and consequently renders monetary policies ineffective was tested against the alternative hypothesis.

This research is prepared in two main parts; in the first part, a review of relevant literature of optimum currency areas is considered, followed by a careful track-down of the euro area monetary systems. The first part concludes in finding out if truly the euro area is an example of a currency area. The second part is the technical frame of the research; an econometric model is applied on trade flows and exchange rate variations, in order to test the Eurozone as an optimal currency area the study employed a conditional autoregressive distributed lag model as its empirical methodology, which verifies co-integration between variables and further differentiate the short and long run impacts. The selection of the appropriate model or the lag length is based on Schwarz Information Criterion and Akaike Information Criterion. The data is a quarterly time series data from 1999 to 2014, which provides enough observations for the time-series econometric model. The last part pays special attention to the Greek economy vis-à-vis the on-going financial turmoil. An analysis on the future of the European monetary system is equally evoked while incorporating the newest reactions/debates as regards the on-going crisis in the Euro zone.

After the technical analysis of trade flows, exports were found to be more sensitive than imports to exchange rate volatility. The short run causality effects were generally minimal and the speed of recovery back to the macroeconomic equilibrium

was higher in exports. In definitive, the euro area is not a perfect example of a currency club as pointed out by the transfer of asymmetric shocks to members.

**Keywords:** Eurozone, Euro, Exchange rate volatility, Monetary regimes, Optimum Currency Areas, Trade flows, Maastricht convergence criteria, Monetary policy.

**PARASAL BİRLİK İÇİNDE OPTIMUM PARA ALANI ETKİNLİĞİ :**  
**2008/2009 FİNANSAL KRİZİ İÇERSİNDE AVRO ALANI**

**ÖZET**

2008 yılından itibaren Avro Bölgesinde yaşanan krizler üzerine yapılan tartışmalar, Avro Bölgesinin henüz Avro kullanımını için yeteri kadar olgunlaşmadığı fikrini ortaya çıkarmıştır. Bu dönemde, Maastricht Kriterleri ve Optimum Para Alanı kurallarının, Avro Alanında bağlam ve işlevsellik açısından kriterlerin tam anlamıyla uygulanması hususunda şüpheler yaşanmış ve hiç şüphe yoktur.

Bu tezin amacı, döviz kuru oynaklığının ABD-Avro alanı arasındaki ticaret akımlarına, 2008 finansal kriz ve sonrasındaki etkilerini ölçmektir. Tezin temel hipotezi döviz kuru oynaklığının ticaret akımlarını etkilediğini iddia etmektedir. Bu ekiler, para politikaları da etkisiz hale gelmektedir.

Bu araştırma iki temel bölüm olarak hazırlanmıştır: birinci bölümde, konu ile ilgili olarak optimum kur bölgesi göz önüne alınarak literatür taraması gerçekleştirilmiş, akabinde özenli bir takip ile Euro bölgesi parasal sistemleri incelenmiştir.

İlk bölüm, Euro alanının gerçekten kur alanı için bir örnek olup olmadığı konusunda bulguları içermektedir.

İkinci ve son bölüm araştırmanın teknik kısmını oluşturmaktadır; ticaret akışları ve kur değişimleri varyasyonları üzerine otoregresif dağıtılmış gecikme modeli uygulanarak Euro Alanının optimal para alanı olup olmadığı ekonometrik bir test ile ölçümlenmiştir. Bu testte şartlı oto-regresive modeli kullanılmıştır. Zaman serilerinde kullanılan veriler 1999-2014 döneminde çeyrek dönem bilgilerini içermektedir. Bu sayede, ekonometrik modelin tutarlı olması sağlanmıştır.

Sonuç kısmında, devam eden mali çalkantılara karşı Yunan ekonomisinin durumuna dikkat çekilmiştir.

Avrupa para sistemlerinin geleceği üzerine bir analiz aynı ölçüde dikkate alınmıştır.

Ticaret akışlarının teknik değerlendirmesi sonucunda, döviz kurundaki aşırı dalgalanmaların ithalata kıyasla ihracatta daha fazla olduğu belirlenmiştir. Kısa dönem nedensellik etkisinin genellikle minimal olduğu ve makroekonomik dengeye



geri dönüş hızının ihracatta yüksek olduğu tespit edilmiştir. Ekonomik açıdan farklılıklara sahip üyelerin bulunduğu Euro alanı, kur alanı açısından mükemmel bir örnek teşkil etmemektedir.

**Anahtar Kelimeler:** Euro Bölgesi, Euro, Kur Değişim Riskleri, Kur Değişim Rejimleri, Optimum Para Alanı, Ticaret Akışları, Maastricht Yakınlaşma Kriterleri

## **1. INTRODUCTION**

After the 2008 global financial crisis, devastating consequences spread to Europe. The fiscal problems or financial crisis that resulted from the 2008/2009 global crises has affected the present day European Union (E.U.) thereby compromising the future of the Euro area (E.A). Since 2008, the European Central Bank (ECB) has adopted strategies aimed at stabilizing and closing macroeconomic disequilibrium in the euro club. The breadth and continuity of the crisis since 2008, echoes and highlights the urgency of this issue.

Europe as well as the euro area is facing crisis, which has led to financial instability. The sovereign debt crisis in euro area has raised doubts about the viability of European Economic and Monetary Union (EMU) and the future of the euro and its monetary system.

While the launch of the euro on the 1st January 1999 created a lot of interest in regional monetary integration and even monetary unification in various parts of the world, the present financial crisis has had the opposite effect, even raising expectations of a breakup of the euro-group. The current debate on Greek economy highlights the possibility of a brake-up. The crisis has underlined the problems and tensions that will inevitably arise within a monetary union when imbalances build up and become unsustainable.

Uniting Europe was one of the principal factors of the creation of the euro currency. Countries at war tend to do less business with each other. Europe had lots of political boundaries that made business difficult coupled with the different currencies that existed in Europe. So the philosophy of uniting Europe had to do away with these boundaries and so many currencies. After the World War 2, the fastest way to re-

build Europe was to remove all these and institute a unified Europe with a single market. The Maastricht Agreement<sup>1</sup> in 1992 lay down guidelines for the future E.U. With these guidelines or framework, business became vibrant, movement of goods, persons and capital was highly mobile and accelerated, and various economies were revived in the European Union.

In spite the improved business and economic climate, there was a major difficulty emanating from so many currencies, where business was slowed down because of the differences in currencies. In January 1999, the euro was introduced and adopted by countries in the Euro Area<sup>2</sup>. The central bank was referred to as European Central Bank (ECB). The bank defined and coordinated the monetary policies of the Euro Zone. The euro zone then had a unified monetary system but different fiscal policies. This has been argued by many, as the root cause of the present financial instability in Europe. Monetary policy is the control of how much money is in supply and how to regulate its supply and demand using its designed instruments or tools. Fiscal policies were there to investigate how much money is being collected from taxes and how much each government spends. Depending on the government, they could opt for a budget deficit or surplus with respect to their macro-economic objectives. When a country budgets for a deficit, it means, it is spending more than it collects in taxes, this therefore means they have to borrow. Before the euro, countries like Greece borrowed at a very high rate. With the introduction of a common currency, they had cheap access to borrow as much as they desired and at a cheaper rate. Politicians took advantage of this accessibility to credit and could accumulate to create new jobs. The capacity to repay these credits became weak and the borrowing continued, leading to unbalanced fiscal policies. In Ireland and Spain, cheap credit

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<sup>1</sup> On the 7th of February 1992, the leaders of 12 E.U countries met in Holland, Maastricht to lay the criteria for the formation and launching of an Economic and Monetary Union. The treaty introduces the idea of European citizenship, strengthened the powers of European parliament

<sup>2</sup> The Euro area is also known as euro zone or euro land. This region is a league of European member countries that has adopted the euro as their currency. The area started with 11 members; Austria, Germany, France, Finland, The Netherlands, Belgium, Italy, Spain, Ireland, Luxembourg and Portugal.

filled the housing bubbles just like in the USA. The economy of Europe became highly and tightly intertwined, companies opened their doors and business boomed in a fast but efficient way.

In late 2000s, a credit crisis swept the globe and brought borrowing to a stop. Consequently, economies like that of Greece could not function; she could not borrow money to pay for the new jobs created, she could not borrow new money to even pay up the accumulated debts. Because Europe had a unified monetary policy, it became the preoccupation of the entire euro zone. To help stamp this threat out, someone needed to pick up this debt from Greece in order to avoid it from spreading to other countries since trade and economies in Europe were in sharp intercourse. Equally, most of European countries were surviving from the spending spread and had huge debts to settle too. Consequently, Germany as the strongest economy of Europe reluctantly accepted but however gave strict austerity measures. Austerity measures meant, slashing debts, slashing spending, borrowing less but paying more debts. This was really difficult to implement, because in reality, no government wants austerity measures because when in every society, the government spends highest, and they cut spending, this means that they are cutting the hands of its citizens and sending them to the streets. When they lay off workers, the tax income becomes less leading to a circle of continues instability. This default gradually collapsed the economy of Greece and soon followed that of the Ireland, Portugal, Italy and Spain commonly referred to as the PIIGS. Things went so bad that huge macroeconomic disequilibrium was felt in the zone. By the end of 2008, the Euro area had registered the worst ever growth rate of -2.1, less than 8% unemployment rates, increased price levels, huge government debts and negative current account balances (European Central Bank, 2008) . The period of 2008/2009 saw a deterioration of balance of payment position, exchange rate volatility or variation between the euro area and its partner, the United States in the last quarter of 2008 and first quarter of 2009, heightened, with a rate of approximately 1.6% with respect to the United States dollars. Exports and imports especially in the last quarter of 2008 and first quarter of 2009 registered a decline. These macroeconomic indicators registered disequilibrium in the euro area in a general but in an asymmetric manner.

This asymmetry of shocks pushed researchers to ask questions if truly the euro zone is optimal. This thesis is therefore interested to investigate the optimality in the euro area currency zone within a monetary union.

### **1.1 Purpose of this Thesis**

Euro zone being one of the key players in global economy (especially as there are arguments suggesting Greece might leave the euro area with adverse consequences) will be the area under consideration. Trade flows with the United States and the Euro Area partner will be studied to see how changes in exchange rate has affected trade through imports and exports. Studies have demonstrated that the 2008 economic crisis transmitted asymmetric shocks to the various sovereign Euro Area (E.A) states via various channels. One of the transmission mechanisms was via trade. This research is set to see how the euro area monetary policies are coordinated, to see how practical the optimum currency area criteria are implanted. How optimal the euro area is faring despite the 2008/2009 downturns. Thus, seeking to find out if the euro area should continue or brake-up, will be primordial as well a special reference and evaluation of the Greek economy will be analyzed.

Existing empirical write-ups have largely pointed out a significant relationship between exchange rate and other variables like imports and exports. Very limited has been done when it comes to evaluating the gap existing between exchange rates variations or changes and its measured impacts on trade flows in the euro area.

In order to better state the purpose of this thesis, it will be better to coin research questions as follows;

- Why did the 2008 financial crisis extend to Europe?
- How is it affecting the euro area economy?
- What is the role of the ECB and ESCB in the fight against this crisis?
- Can the European Monetary Union work effectively without a fiscal union?
- What exchange rate system is most appropriate for the euro group?
- Is the euro area an optimal currency area?

- What impacts did exchange rate variations exert on trade flows?
- What was the impact of currency depreciation on 2008 on trade flows?
- In spite the negative effects of the on-going crisis, why are members not leaving the Euro area?
- What is the future of European Monetary System?
- Is the euro an irreversible currency?

## **1.2. Methodology of the thesis**

The method used here is based on the availability of data and the nature of data. Data used is a quarterly time series sample; the dependable variables are Imports and exports of the United states and Euro Area and the independent variables are Exchange rate parity, Gross domestic product as a proxy for income and finally, exchange volatility or risk. An Auto-Regression Distributed Lag (ARDL) analysis is applied in two separate equations, that is, for exports and imports. The choice of this method is based on its appropriateness to test to co-integration between variables. ARDL model is also known as bound test and is used to verify long run relationship existing between variables and also has the advantage of using a regression analysis to measure the impacts both in the short and long runs.

### **1.2.1. Data and sources of this Thesis**

The dependent variables are imports and exports; imports from the United States and exports to the United States from the euro area. The independent variables or explanatory variables are Exchange rate values between the Euro and dollars, the Gross Domestic Product (GDP) was used as a proxy for income since it measures the growth rates, exchange rate Volatility was considered as the standard deviation of exchange rates. Exchange rate data were retrieved from ECB statistical warehouse, GDP rates were retrieved from Organization for Economic Co-operation and Development (OECD) and imports and exports values were retrieved from the United States census Bureau. The period under consideration is 01/01/1999 to

31/12/2014; the data is expressed on quarterly basis with total observations of 64. This large study period will permit us to see the influence of exchange rate changes on trade flows over a long period of time since 1999 and especially in 2008/2009 crisis and from there we would be able to make future predictions on how the future will look like.

Null Hypothesis = Exchange rate variations in the euro area affect imports from the United States and exports from the E.A to the U.S. under fixed exchange rate regime and consequently sterilize the effectiveness of monetary policies.

Alternative Hypothesis =Exchange rate variations in the euro area does not affect trade flows between euro region and the United States under the fixed exchange rate.

The above hypotheses are put forth in order to permit the research reduce and simply the research questions. Some of the research questions are going to be appreciated in a qualitative way while some while will be analyzed using the econometric methodology. The ultimate of goal of this research is to understand the pattern of exchange rate fluctuations in the 2008 financial crisis, which will prepare the groundwork to understand the exchange rate system and monetary policies thereby evaluating the effectiveness of optimum currency regions.

In the null hypothesis, we suggest that exchange rates hamper the use of monetary policy and consequently the effectiveness of Optimum currency area. This is because the economic literatures suggest that exchange rate is the main drivers of exports and imports. It will be of interest to confirm this especially in the recent financial crisis.

## **2. THEORITCAL BACKGROUND**

The literature survey is going to dwell on optimum currency area. An exploration of literature will be broken into old and recent theories that will permit us to better appreciate the evolutions and contributions. The last part of the literature review will attempt to analyze and discuss the contributions so far advanced in the light of present day Euro area.

### **2.1.Theoretical Exploration of the Framework Relevant to the Research**

It's been almost half a century since the classical authors propounded literature on Optimum Currency Area (OCA) or Optimum Currency Regions (OCR). To better understand the theory, a selective approach will be used to review the classical theories and also, attention will be paid to the contemporary or new theories. The groundwork will be used to search for characteristics that will be used to define OCA. Weaknesses or drawbacks of the Optimum Currency area theory will equally be looked at and discussed where need arises in the light of Europe's optimum currency area which is being rocked by a financial turmoil.

The review of this is going to help this research in answering the research questions. The purpose of this review is to cite the major conclusions of the old and new theories of optimum currency area, the findings, and methodological issues related to the goal of our research in the knowledge of chapter one. This work is written for knowledgeable peers and from easily retrievable 21st century sources that are recent. In order to better understand contributions to this theory, we will break the review into; Old or traditional theories and modern or new (contemporary) theories.



## **2.2. Old or Traditional Theories**

In this section, a careful survey of classical authors are taken into consideration, their contribution to the growth and development of OCA will be reviewed. The reference period of these old authors dates back to the 1960s and up to the mid 1970s In this section, a review of the works of pioneers will be examined and the second phase will continue with the second group of classical or traditional authors who contributed greatly to the development of what is known today as OCA.

### **2.2.1. First category of Optimum Currency Area authors**

Here, a review of the works of the main figures of Optimum currency region theory will be analyzed. Their works came into existence in the 1960s.

#### **2.2.1.1. Mundell and Mobility of labor as a criterion for setting up an OCA**

As far back as the 1950s, during the era of the Bretton Woods System<sup>3</sup>, the famous economist Milton Friedman, in 1953 published ‘‘*The Case for Flexible Exchange Rates*’’ his contributions dwelt on the costs and benefits of flexible exchange rate. So many papers were published at this time justifying the choices of exchange rate systems but the first person to have coined and designed the phrase ‘‘Optimum Currency Area’’ was the Canadian Economist Robert Mundell in 1961 in his seminal paper entitled ‘‘A Theory of Optimum Currency Areas’’ Mundell defined optimum currency area as a geographical unit closely integrated through international trade and factor movements such as labor and capital. The theory stated that fixed exchange rate systems are most appropriate for these areas.

Mundell (1961) identified the effects of adopting a currency in an area and also advocated the formation of a common and harmonized fiscal authority to ease the transfer of resources amongst members of that OCA facing different or asymmetric

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<sup>3</sup> The system covers International Monetary Fund and World Bank founded in 1944 to manage exchange systems.

macro-economic disequilibrium or shocks when mechanisms such as the wage and price flexibility and labor mobility fail to achieve the desired goals. One of the main failures of the euro zone and that has plunged the area to macroeconomic instability at this point is the inability to create an institution that will discipline fiscal policies within members of the currency region (Alojzy & Yochanan, 2012).

Mundell (1961) tried to respond on when members should adopt a single currency. His thoughts revolved around labor mobility in forming an optimal currency area. According to Mundell, if the exchange rate variations provoke unemployment or inflation in one part of the OCA, then the regime is not optimal. As a solution, he underlined that if there is imbalance in international trade because of price and wage rigidity resulting to inflation and unemployment under fixed exchange rate, there should be an adjustment mechanism through labor mobility. To Mundell, the mobility of labor will re-adjust the flow in trade, that is, there will be a correction/amelioration of balance of payment position. Furthermore, mobility of labor absorbs inflation as well as unemployment thereby making it unimportant for each member to have different exchange rate; In such a case a single currency is highly recommended. Therefore high labor mobility within a currency area and a fixed exchange rate regime towards others members of that region and a flexible exchange rate regime with the rest of the world will ensure the proper functioning of an OCA (Mundell, 1961).

Labor mobility was to act in that, when for example, there is unemployment just like how it was in Greece, Spain, Portugal, Italy and Ireland, this will provoke and attract acute disequilibrium that render prices unstable, leading to inflation and unemployment. To remedy this meant that unemployed citizens of these countries could travel to France, Germany, and Italy and to the rest of any euro area country and look for a job there -that is being mobile. By doing so, the gaps or deviations will be corrected.

Lanyi (1969) advanced important literature supporting and advocating for labor mobility. This theory was however weakened by differences in language and culture, which slowed down the total integration of currency areas like the case of Eurozone

in integrating the European markets. The importance of flexibility in prices and wages was underlined as instruments of tackling negative or asymmetric demand shocks. If salary flexibility and labor mobility are well manipulated, there will be no significance in the variation of exchange rate changes (Tower & Willet, 1976).

#### **2.2.1.2. McKinnon and degree of openness as a criterion for setting up an OCA**

McKinnon (1963) drew inspiration from the drawbacks of Mundell (1961), theory. McKinnon centralized his studies on factor immobility between regions. According to him, each area within the currency area has its own specificity and specialized industries. This makes difficult to differentiate immobility emanating from geographical perspective with that arising from inter-industrial. If there is asymmetric shock or negative shock for example in France which leads to a fall in the demand of Peugeot cars, if France can develop the German-Mercedes cars for which there is an increasing demand, the need for factor movement will not be significant. However, if France can't develop the German-Mercedes Cars, labor mobility from France to Germany can't serve as a corrective mechanism to absorb a fall in wages in France (McKinnon, 1963).

According to McKinnon (1963), economies with high ratio of tradable to non-tradable should focus more on fiscal and monetary policies and not on exchange rate regime to solve the macroeconomic balance of payment disequilibria. Hence, countries that trade highly will find extremely beneficial to join an optimum currency area. Again, in the extensive analysis carried out by Horvath (2003), he explains that the analysis of McKinnon (1963), are based on the assumption that such a trade will be beneficial only if the outside price level are stable as equally supported by the arguments of Ishiyama (1975), which says that if these prices are not stable, the external economy is going to transmit shocks to the domestic economies via fixed exchange rate in the supposed small and open economy.

The theories of Mundell (1961), and that of McKinnon (1963), conclude in affirming that factor mobility is a vital parameter in constructing an Optimum Currency Area.

Exchange rate regime does automatically adjust deficits in balance of payment positions between areas (countries of a currency area) they might exits employment in one part as well as inflation in another part of the currency area. We therefore suggest here that a flexible exchange rate system is not desirable by countries in an Optimum Currency Area (Tanja, 2005).

### **2.2.1.3. Kenen and Degree of product diversification as a criteria for setting up an OCA**

In 1969, the criterion of factor mobility earlier discussed by Mundell (1961) was expanded via product diversification by Kenen (1969). He suggested that if labour is mobile, and production also diversified, there will be an optimal functioning of the region. The definition of a region should not be based on geographical or political motive but rather on the activities. Kenen (1969) went further to explain that perfect inter-regional labor mobility requires perfect occupational mobility. This is realized when nature of job (labor) is a similar skilled labor.

Kenen (1969) introduced the idea of product diversification as a vital criterion. It's often very unreasonable in terms of resource allocation for a small economy to engage in the production of all what she needs. The theory of international trade suggest that led countries produce what they have a comparative advantage A larger and opened economy is usually self-sufficient and usually only a small portion of its GDP is dedicated to external trade. Therefore, exchange rate volatility affects only a minimal portion of its economy because of greater product diversification that can't attack all sectors simultaneously.

According to Kenen (1969), diversity in a single country may be more relevant than labor mobility; if an economy is not diversified in its products and produces only a single product which she exports, if a negative demand shock attacks that product, the country's terms of trade will deteriorate leading to a drop in revenue that can not be reconciled or solved by a flexible exchange rate regime. This is because a drop in exports will reduce the demand for domestic currency and in-turn provokes a depreciation of the exchange rate regime. But if the economy is under fixed exchange rate system, this mechanism will not function and adjustments might be

done only via reduction of wages and prices or increase unemployment levels (Kenen, 1969).

Furthermore, according to the analysis of Horvath, (2003) in the light of Kenen's work, Horvath demonstrates that, a well-diversified economy also has a diversified export sector. And each of the industries in the economy can face a shock. If those shocks are uncorrelated, a positive shock in one industry and a negative shock in another industry would result in the cancellation effect on the total export, making it more stable (but there must exist adequate occupational mobility to absorb idle labor and capital), if the economy is hit by some macroeconomic perturbations, then the whole export sector will be affected and diversification will not help. Diversified economies that are well adapted to diversification will accommodate minimal costs of abandonment of their national exchange rates and benefit from a currency region. Still, diversified economies are usually large economies that are more self-sufficient than small economies and hence have a smaller export sector (Horvath, 2003).

Kenen (1969) maintains that product diversification reduces the possibilities of asymmetric shocks and equally reduces their negative effects; hence fixed rates are acceptable to a well-diversified economy. He equally argues strongly that positive changes in exports goods will act as automatic stabilizers that counteract negative changes when demand for some goods fall the demand for others equally increases and well diversified economy will not feel this since there is an offsetting mechanism. A country that produces more goods feels the effects less when faced with external perturbations (Kenen, 1969).

Exchange rate volatility generally has less effect on trade flows that eventually produces generally weak effects on the economy. So, one could say that smaller economies that are less diversified have to be more opened in order to be able to import products that they need and export products in order to acquire money to reconcile for their imports and also have a favorable BOP position. According to Tanja (2005), Kenen's diversification criterion can be translated into McKinnon's openness criterion. Kenen underlined one more important viewpoint; he suggested

that if adverse shock hit a common currency area, fiscal integration between regions could wipe or offset the impact via fiscal transfers between regions.

The conclusion of Kenen (1969) revolved around a diversified economy is diversified, the stronger the reasons for a fixed exchange rate. Therefore, a large and well-diversified economy with a small foreign sector can opt for a fixed exchange rate regime while the small and open economies should go for floating regime.

The works of Melitz (1991), attacked Kenen's arguments and suggestions saying that a country with a diversified production/output benefits highly from the flexibility in exchange rates.

In the optimum currency analysis of Horvath (2003), he pin-points that adhering to currency area will generally empower the usefulness of money; the vitality of this consideration will be real if the economy in question is small and open. This is true when considering the effects on the efficiency of resource allocation and on each of the various functions of money - its usefulness as a medium of exchange, unit of account, store of value, and standard of deferred payments. Furthermore, the focus on the use of discretionary macroeconomic policy shows that joining a currency area weakens the independent use of policy in achieving internal balance in times of crisis (Horvath, 2003). In support of this logic, Mintz (1970), points the importance of political willingness of stakeholders to surrender national currency and pursue a joint monetary policy.

### **2.2.2. Second category of authors**

The second category was separated from the first just to underline and distinguish the pioneers from those who later on contributed to the development of the theory. Here, some of the literature related to the thesis is cited.

Corden (1972) sees single currency regions as just an exchange rate region. Adhering to a currency union means total loss of control over monetary and exchange policies. This means that any negative shock can't be counteracted with the use of monetary or exchange policies in the short run, thus, the country might be forced to adjust via

reducing nominal wage and price levels and thereby provoking unemployment via budgetary policies. He however concludes that wages and price flexibility should be central in forming a common currency area while considering inflation differentials as costly and dangerous in such an endeavor ( Corden, 1972).

In the 1970s, Mundell (1973) re-surfaced to reiterate factor mobility by stressing that in a single currency area and asset diversification in sharing international risk. This signifies that, regions or areas in an OCA affected by asymmetric shocks suffer quite less perturbations since each member is holding the assets of each. This is quite fundamental because mobility is easier in finances than in labour, which is physical. Adopting a single currency reduces international reserves, which is an added advantage for the members within the union (Mundell, 1973).

Ishiyama (1975) is credited for being the first to caution that prospective single currency union members should make a cost-to-benefit analysis before adhering to such a union. Ishiyama (1975), raises some other criteria to be preconditions for joining such as inflation differences, wage packages and even social preferences. Just as indicated earlier by Corden (1972).

Furthermore, Tower and Willet (1976), indicated that considering new or extra criteria indicates that the OCA theory is not just a theory but also an approach, which verifies the costs and benefits of exchange rate systems, that is, fixed and flexible rates. This again underlines clearly that joining a single currency area makes the use of money more useful and meaningful. These authors (Tower & Willet, 1976) dwelled too on the manipulation of money by monetary authorities on the execution of discretionary macroeconomic policies and tried to prove that the joining OCA weakens the use of discretionary macroeconomic goals of internal equilibrium.

### **2.3. Contemporary or Modern Theories of Optimum Currency Areas**

Optimum currency area theory came to the lame-light in 1960s and early 1970s. After this period there was a slow-down in research about this theory. This slow-down in research was attributed to lack of a practical monetary union in the real world. This theory however re-surfaced in the 1990s following the birth of a European Monetary Union, Central African Monetary Union just to name a few, when more and more researchers took keen interest again in the theory. As there was significant improvement and development on the international monetary scene, Tavlas (1993), introduced another important factor in the revival of interest in the OCA theory. According to Tavlas (1993), these developments allowed the original optimum-currency-area approach to be cast a new light. Due to significant progress in research, OCA theory had to be reviewed and revised. De Grauwe (1992) termed these theoretical developments the “new” theory of optimum currency areas.

The simple difference between the classical and new view is that old view focused more potential costs, while the new one is more prone which has rather complicated the old suggestions to this theory. The “new” OCA theory sterilized crucial assumptions of the “old” one, which rather gave room for contradictory models that gave practically no guide for deciding who should adhere to a currency area and who should not. So, as the “new” OCA theory is not actually a properly and well-established theory, it should be seen as a set of loosely connected ideas (Tanja, 2005).

Significant contributions came from Tanja (2005), he analyzes views and reactions of authors; gives recommendation and suggestions with respect to the euro area. Another paper was that of (Tavlas, 1993) which stands out to be one of the most exhaustive write-ups on optimum currency area theory.

Another significant contribution to the new theories in the 1990s was report of Commission of the European Communities in 1990, which outlined the advantages of a single or one-currency area. That is “One Market, One Money” in which authors raised difficulties likely to erupt from such a union, but did not hesitate to



recommend further integration via monetary unification. There are many issues that the “new” theory of OCA takes keen interest in such as:

### **2.3.1. Monetary Policy effectiveness**

As concerns effectiveness of monetary policy, interesting reactions are noticed; Corden (1972) underlined that joining and adhering to a single currency union, sterilizes the direct control over monetary policy and exchange rates. In contrast with such thoughts, we refer to the work of Alesina, Barro and Tenreyero (2002), who advocated strongly that, the cost of giving up monetary independence are lesser when compared to shocks amongst members Melitz (1991), diagnosis and argues that members of an OCA facing similar shocks or asymmetry of shocks might not necessary use the same monetary policy, there could use different monetary policy because their initial economic situations were not equally same. In 2002, another argument was raised by Calvo and Reinhart (2002), indicating the stakes and challenges of a floating rate. In their judgment, if a member is not able to manipulate its monetary instruments adequately, the loss of monetary policy or the loss of independence over monetary policy won't be a significant disadvantage or cost.

According to Tanja (2005), the analysis of Calvo and Reinhart (2002), leads to deliberate manipulation of monetary policy instruments, which later helped in coining literature on discretionary monetary policy as well as credibility of the said policies. Maiden works, constituted the literature that of (Barro & Gordon, 1983). Both works tried to demonstrate how the control of money was being manipulated in a discretionary manner while maintaining credibility on the expectation of economic agents. Credibility that there will be suppressed levels of inflation rates, that there will be reduced rates of unemployment, as demonstrated in the short run as demonstrated by <sup>4</sup> Philip's curve. In trying to maintain this credibility, the government could opt and adopt a completely fixed exchange rate or adhere to the currency region to better handle the macroeconomic disequilibrium of inflation and

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<sup>4</sup> Philips curve presents the twin problem in trying to resolve inflation and unemployment in the short run, that is, in an attempt to solve unemployment, the authorities are sharply confronted with inflation.

unemployment. To them, if a country reduces its inflation rate, they can join the currency area if the members share the same level of inflation rates. In the early 1990s, Gandolfo (1992) refutes the idea completely by suggesting that identical rates in inflation could emanate from adhering to a common currency area but however concludes that it's not a necessary condition.

### **2.3.2. Endogeneity vis-à-vis Specialization Hypothesis of OCA**

Interesting debate was advanced as regards specialization and endogeneity. Frankel and Rose (1997) explain that increased trade in an OCA could heighten and get highly stimulated and thereby leading to specialization between members operating in an OCA. In this regard, increase specialization would lead to synchronization of business cycles resulting from intra-trade of industries as equally supported by the literature of international trade/economics. Inspiration was drawn from the simple Lucas critique<sup>5</sup>. It was believed that there was strong correlation of income when countries or members trade amongst them and in such cases; the joining of OCA was highly solicited. Frankel and Rose (1997), contrasts the consideration of the OCA criteria of McKinnon (1963), and income correlation of prospective members separately because the correlation of business cycles depends on trade integration.

Frankel (1999) argued the old OCA criteria of openness as not being static or fixed without adjustments. If prospective members are evaluated on endogeneity hypothesis, then those criteria could be varied to respond to policies in a discretionary manner as well as those criteria could be adjusted due to external factors. These adjustments will return to equilibrium when there will be further trade integration which increase incomes (Frankel, 1999).

In line with effects of greater trade integration in an OCA, specialization will arise and each member will focalize on the products in which they have a greater comparative advantage in its fabrication. This means that prospective members can satisfy OCA ex post though it was not satisfied ex-ante. Tanja (2005) supported this

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<sup>5</sup> Lucas argued that its senseless to make previsions on policymaking based on the relationship of passed data.

idea in explaining there are certain conditions that are satisfied when members are already in an OCA.

### **2.3.3. Conditions of Optimum Currency Area**

Analysis on the so-called endogeneity hypothesis of the OCA intensified. Some dangers or problems were raised by Mongelli (2002) who interpreted endogeneity as being associated with the process of under many OCA criteria that are vital for a smooth functioning of a monetary union. Such a process may not show a linear relationship. According to his reaction, endogeneity of OCA should lay emphasis only on trade integration or income correlation. Hence, in this line, De Grauwe and Mongelli (2004) attempted analysis on endogeneity of economic integration as well as financial integration.

### **2.3.4. Correlation and variation of shocks; nature of shocks**

Here, Alesina, Barro and Teneyro (2002), studied stabilization policies and correlation of shocks. The study maintained that the disadvantages of losing monetary independence on the manipulation of monetary policy instruments were less and insignificant; the greater the link of shocks between the prospective members of a currency union. In fact the variance of the prospective member is important since it is expressed in function to its output. The variance is calculated partly from the correlation of output while considering the variations of shocks. For example in the euro zone, Slovenia's output may be highly correlated with Germany's output. But if Slovenia's variance of output is greater than that of Germany, then Germany's monetary policy will still not be proper for disciplinary purposes.

In another optic, Berger, Jensen and Schjelderup (2001) sought to find out if symmetric shock were important. They suggested purchasing power parity and the model of standard one period to solve the issues of credibility in monetary policy instruments. In this model, economic agents expectations on inflation are put forth early enough before shocks are experienced. After observing and experiencing the

shocks, the monetary authorities manipulate monetary instruments in a discretionary style to equilibrate the dangers noticed. Thus, according to these authors, the degree of influence of shocks between members and prospective OCA members leads us to the following. Negatively correlated shocks should opt for fixed exchange rate; secondly, a positive change (increase) in standard deviation of shocks decrease the need for a fixed exchange rate and finally the proxy for adjusting nominal rigidities (these proxies indicated the real effects of real effects). Empirical as well theoretical research depict that after fixing exchange rate, nominal rigidities arise together with negative-correlated-shocks (Berger, Jensen & Schjelderup, 2001).

### **2.3.5. Effectiveness and efficiency of exchange rate adjustments**

Mongelli (2002) elaborated exchange rate adjustments and tried to find out if this rate were really effective. According to Mongelli, if this mechanism is not, then the cost endured in losing the exchange rate mechanism is not important and significant; hence, nominal exchange rate variations favors the adjusting mechanism and affects too the Balance of Payment (BOP).

Furthermore, in the views of the new theories, optimum currency area criteria analysis revolves around the synchronization of business cycles. In ordinary sense, if a member of the currency union synchronizes its business cycles, there is going to be no major need in relying on monetary policy to curb macroeconomic disequilibrium. Besides the criteria advanced by recent authors, synchronization of business cycles stand very prominent as seen in the research works of endogeneity of OCA criteria, (Frankel & Rose, 1997), and specialization hypothesis (Krugman, 1993).

### **2.3.6. Synchronization of business cycles and political influences**

Notwithstanding, political influence determines a country's decision to adhere to a single currency area. The state has the possibility to manipulate in a discreet manner the economic aggregates to suit the goals and objectives in place. This at times helps the government to manage the twin objective of price stability, that is, bringing down inflation and that of managing unemployment. The prospective member may be

reluctant to surrender such sovereignty to a union because doing so; they will be bound to stay under a particular exchange rate system, which might contrast to their long-term discretionary measures (Edwards, 1996).

#### **2.4. Analysis on Literature Review**

The significant advancement in currency areas theory according to Krugman (1995), is based on fixed and flexible exchange rate regimes and the balance of payment adjustments that is purely macro-economic worries. The huge deviation between macroeconomic benefits and microeconomic benefits are still untouched (Krugman, 1995).

To some, there are no veritable write-ups on an appropriate and resounding pathway to adopting a common currency. The analysis of Bayoumi and Eichengreen (1992) shows signals of high symmetry of shocks in the heart of the euro area. In analyzing the different approaches of methods, the difference existing between the central (those at the heart) and the periphery becomes smaller or even disappears. With such results, Scheik (2001) maintains that the classical theories of OCA around 1960s were not appropriate in explaining economic phenomena as they over simplified a complex reality.

In an article of OCA, Alesina and Barro (2000), predict the future by looking at the growth of independent countries willing to form an OCA. As time goes on, some other countries gain sovereignty, which will mean that many countries, many currency areas and also many currency areas. The analysis was based on two variables; on how trade and changes in production (output) and prices would behave in the presence of a currency union. Each country's decision should be based on these two factors before they can join a currency union (Alesina & Barro, 2000). Nevertheless, the paper of Alesina and Barro (2000), ignores labour productivity and mobility, cultural differences, economic growth and strength of the participating countries vis-a-vis the prospective member, sector diversification. In the case of Eurozone, these factors can't be neglected, as they need attention and consideration.

Larosière (2012) outlines the current crisis facing the Eurozone as a great differences that arise from the heavy exporting countries like Germany, Austria, Netherlands and heavy importing countries like Greece, Portugal Spain, Italy. This type of difference according to him renders an OCA open to negative shocks and results then to macroeconomic imbalances in one zone and thus the effects spread to another country. This supports the arguments of Mundell (1961), that countries of desperate economic conditions, like differences in GDP per capita, labor or output productivity differences in economic growth rates or development could render an optimum currency area less optimal or even expose the region to danger in finances and its markets. Larosière (2012) attributes the present Euro area downturns to the gross imbalances in the economic strength of members of the euro currency area and which is further marred by cultural and political differences that practically block the labour mobility functioning.

Larosière (2012) model based on European dichotomy, this Export led vs Import led economies brings to the lame-light some questions; this models investigates why the differences or dichotomy in various economies is not always checked at the beginning by policy markers. Also, the model tries to know why market experts only discover the differences only after or during the implementation of the Eurozone? Many of these discussions were more theoretical and had no practical cases; the theory of optimal currency areas came to existence in 1961 by Mundell, who argued that certain benefits to a shared currency can outweigh the inevitable costs. On the other hand, he is quick to advice that the reverse is also possible.

Mundell's theory did not identify a currency area as consisting of more than just one country, instead, he used regions or provinces that are in or outside an independent country. According to Mundell (1961), the idea of Optimum Currency Areas is *"purely academic, since it hardly appears within the realm of political feasibility that national currencies would ever be abandoned in favor of any other arrangement"*. Again, the period when he wrote and the type of exchange rate system also matter. Mundell wrote his paper during the era of Bretton Woods Institutions and the global economy had not confronted serious deregulation in trade

barriers and international transactions in finance. The global economy had not been threatened, as it was the case before the coming of the Maastricht Treaty in 1992. Mundell failed to predict at the time of write-up that his piece of work would be an ultimate kick-off point for the European integration, he rather went ahead to warn against expansion and cautions that desperate country or countries in a currency union can cause economic crisis. All these thoughts had no practical or real world cases.

## **2.5. Discussion related to the Theoretical Background**

The dream of one-market, one-money had to be realized by abandoning national currencies for the euro. By January 1999, the euro was introduced; how ready they were for a single currency raised interesting questions for the future political and economic directions of the euro area. Would the economic integration of the euro-zone countries lead to a political union? Or can the countries effectively share a common currency while still functioning as distinct states? Conversely, could economic pressures arising from regional differences between European countries lead to the disintegration of the euro monetary union, and what would this mean for Europe?

The main drawback of the “new” OCA theory is that it ignores completely political choices and interests of the participants in a currency area, which are absolutely crucial and central for its smooth functioning and performance.

Another drawback is that it does not pay enough attention to one of the most important currency area properties, which is fiscal and monetary stability. Strong public finances and a disciplined and well-coordinated monetary policy are essential for the present euro zone to function. This confirms the study of Alojzy and Yochanan (2012), who advocate the failure of the Eurozone in the recent financial crisis as lack of veritable institutions to discipline fiscal gaps. In our research context (the European Area), it took several decades of intense bargaining over economic integration and mutual fiscal constraints before the field was cleared for the

European Central Bank to credibly issue a common currency. Again, such an argument will be irrelevant without the political will of the neighboring countries the “new” theory does not take these aspects into account, it is of rather limited relevance for the real-world problems. It remains rather a pure scholastic theory. However, it’s not completely irrelevant. It can provide some guidelines in the framework of specific problems with respect to the establishment of a currency area. Thus, it can be a helpful tool in deciding whether to join an existing currency area or whether to permit other neighboring countries to enter.

Recent theories are unable as of now to sustain definite responses to these questions; whether to participate or not in an economic union, or to answer if the existing currency areas bring their participants maximum benefits in terms of their economic welfare. However optimum currency region literature is able to define condition under which possibilities of enjoying from joining a common currency area. The development of the OCA theory vis-a-vis exchange rate theory leads to an interesting appraisal; an appraisal which will subsequently frame our research question or preoccupation. Examining how euro area has been fairing with the recent 2008/2009 crises, verifying optimality in OCA in the long run when the region functions under a solidified monetary union together with fiscal discipline implemented. In this thesis, the exchange rates variations as well as volatility of the euro area will be analyzed and that of U.S and its measured effects on imports and exports. This long-term relationship will be understood well using the autoregressive distributed lag model.

As seen above, Mundell, put the theory of optimum currency areas forth. He justified that certain benefits to a shared currency can outweigh the inevitable costs. On the other hand, he advises that the reverse is also possible; that the merits and demerits of sharing a currency between regions, countries, or continents can easily outweigh the benefits. According to Mundell, so many economists doubted the success of such an endeavor in the euro area and how possible the accrued advantages could surpass the costs and disadvantages.

The progress in the research has been seen as the success of some more criteria being added especially in the 1990s when prospective members for the euro area were



forming a single currency for their markets. The contributions especially those of the contemporary authors subsequently shaped research though the pioneers can't be neglected as well. Thanks to such thoughts that we have a euro zone, Central African Economic and Monetary Community (CEMAC) zone. In definitive, this research work found out that joining and adhering to a currency area, is not a linear route since the challenges and pressure emanating from political ideas and differences can't be underestimated.

## **2.6. Research Methodology**

This research is going to use ARDL or bound test approach to cointegration, which checks cointegration of variables, that is, investigating the relationship amongst variables in the long run based on standard F-test, (Pesaran et al, 2001). At first, two main approaches existed to check cointegration;

- The two-step residuals based procedures for testing the null of no-cointegration, (Engel & Granger, 1987)
- The system-based reduced rank regression approach, (Johansen, 1995)

The two old models of testing for cointegration amongst variables suggested that variables are integrated in the  $I(1)$ .

Pesaran et al, (2001), adopts a new approach to check relationship amongst variables-they suggest variables could be stationary  $I(0)$ , integrated of first order  $I(1)$  or mutually cointegrated. The advantage of an Autoregressive distributed lag model is that it does not require a pre-unit-root testing of variables. Secondly, it measures the long run and short run effects of exchange rate volatility on trade flows. In conformity to (Bahmani-Oskooee & Mitra, 2008), this methodology better explain this research as volatility could be stationary where as other variables are non-stationary. Again, the estimates from the long run model generally indicate unbiased results of the long run t-statistics.

The technical or the quantitative part of this work will seek to verify the euro area in the recent financial shock; the variations with respect to exchange between the euro area (E.A) and its partner, the USA as well as its volatility on imports and exports. The model applied here is an Auto-Regressive Distributed Lag (ARDL) that checks co-integration of variables and considers the stationarity or non-stationarity of variables. This model is also referred to as bounds test approach to co-integration, which explains the relationship between variables established on standard F-tests (Pesaran et al., 2001).

The advantage here is that there is no pre-unit-root testing which makes it very realistic for in its application since some variables could indicate a situation of stationarity while others are non-stationary (Bahmani-Oskooee & Mitra, 2008)

### **3. EUROPEAN ECONOMIC AND MONETARY UNION AND THE EURO**

In this sub-part, emphasis are going to; in the first level look at monetary unions on a general perspective along-side the theory of optimum currency region, after which, the research will relate the study to the euro-land, that is optimum currency within a monetary union. A careful look at the types of exchange rates together with international monetary regimes, which is from classical gold standard to the Bretton Woods Systems, will constitute the next level. Another level will be to appreciate the formation of the European Monetary Union starting from the Werner Report right up to the Maastricht Treaty and finally to the euro-area and to the launching of the euro in 1999. The last appraisal will be to review the present day challenge of this monetary union vis-à-vis the financial crisis of 2008. Attention will be paid as well to the management of the union as of date.

#### **3.1. Overview of the Euro Area and its Monetary Union**

This first level seeks to understand monetary unions within an optimum currency area and go ahead to review optimum currency area, and finally conclude in reconciling the two in the light of the euro-land.

##### **3.1.1. Monetary union**

A monetary Union is a league or association of states or countries that merge together under a single umbrella in order to better economic, political and social welfare of its citizens. This umbrella is regulated by a unified monetary policy that coordinates monetary transactions. Examples are; Economic Community of Central

African States, (ECCAS); Communauté Économique des États de l'Afrique Centrale, (CEMAC) which modulates economic activities. West African states also have a Monetary Union as well as Canada and the United States of America. In Europe, there is the European Monetary Union that regroups the 28<sup>6</sup> European Countries and 19<sup>7</sup> out of the 28 constitute the Euro area/euro zone/euro-land/euro-club/euro-group.

Adopting a unified monetary policy by member states and having different budgetary policies was a cause of the 2008-euro crisis (Alojzy & Yochanan, 2012). The European Union was created to promote economic, cultural, and regional prosperity. However, the global financial crisis demonstrates that its economic institutions are flawed and immature for any international financial globalization. While each sovereign state in the Eurozone forfeits the control of its money supply, the lack of a common fiscal institution allows individual countries to pursue their own political and financial agendas. The on-going economic hardship emphasizes the critical role of economic and political institutions. This was because European countries or the Euro Area or Euro zone countries had different budgetary policies, which transmitted asymmetric shocks that could not be absorbed spontaneously within the euro area (Alojzy & Yochanan, 2012).

### **3.1.2. Optimum currency areas or optimum currency regions**

This Theory was propounded by the Canadian Robert Mundell in 1961 in his seminal paper entitled ‘*A Theory of Optimum Currency Areas*’ Mundell (1961) defined optimum currency area as a geographical unit closely integrated through international trade and factor movements such as labor and capital. Since its inception, various authors have suggested different exchange rates systems to be

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<sup>6</sup> Constitute European countries; Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, The Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, united Kingdom.

<sup>7</sup> Constitute Euro Area; Austria, Belgium, Ireland, Germany, France, Italy, Luxembourg, Portugal, Finland, Spain, the Netherlands started the euro zone in 1999, Greece joined in 2001, Slovenia in 2007, Cyprus and Malta in 2009, Estonia in 2011, Latvia in 2014 and Lithuania in 2015.

used by members of such a currency area. Optimum Currency Area is a theory that lays down conditions of joining and adhering to a to a currency area. Mundell (1961) recognized the costs of adopting a single currency and made the case for the establishment of a common fiscal authority to facilitate the transfer of resources between members hit by asymmetric economic shocks when mechanisms such as the wage and price flexibility and labor mobility did not function. According to some, one of the main failures of the euro zone at this point is the inability to create an institution that will coordinate fiscal policies and will have the power to conduct such a coordinated fiscal policy.

Mundell tried to sustain responses regarding the conditions of joining and adhering to such a union or a common currency area. He however emphasized and revolved around factor mobility especially the labor mobility as a central and fundamental parameter in forming an optimal currency area. This theory has however attracted the interests of economists as discussed in chapter two especially with the formation of regional currency areas around the 1990s in Europe and Africa.

After Mundell (1961), researchers like Mckinnon (1963), Kenen (1969) advanced the theory but due to lack of a practical union, the theory ended only in books. In the 1990s, so many regions witnessed economic integration across the globe; the euro area was one of such, which in 1999 came to existence. This again sparked enormous research works in the field of optimum currency areas with Tavlas (1993), on the lead as traced by Tanja (2005).

The idea behind this is to attain macroeconomic objectives of low inflation, increased and stimulated investment levels, increased employment levels and an acceptable balance of payment position resulting from trade.

The figure below shows how inflation rates reduced in Euro area with the introduction of the euro as a single currency. The figure also shows that since the introduction in the early 2000s, the ECB was able to suppress the inflation below 3%. In 2008, the area witnessed a very high rate of about 4%. The figure also shows

that as from 2014, things have become normal. The figure also confirms that the crisis brought high inflation rates in the euro area.



**Figure 3.1:** Interest rate of EA, Jan 2000-March 2015

Source: ECB Statistical Data Warehouse. Viewed on 04 April 2015, <  
<http://sdw.ecb.europa.eu/home.d>>

### 3.1.3. The Economic and monetary union (EMU)

The Economic and Monetary Union (EMU) is an appellation of policies aimed at bringing and uniting the economies of all member states of the European Union at three stages. Both the 19-euro zone states and the 09 non-euro states are EMU members. According to the European Commission, Economic and Financial Affairs of the ECB (2015), a Member State however needs to comply and be a part of the "third EMU stage", before being able to adopt the euro currency; and as such the "third EMU stage"<sup>8</sup> has also become largely synonymous with the euro zone. European Union States, except Denmark and the United Kingdom, have committed themselves by treaty to join the "third EMU stage". The Copenhagen criteria<sup>9</sup> are the

<sup>8</sup> This was the final stage in joining the euro area, which meant fixing conversion rate to the euro.

<sup>9</sup> This was Membership Criteria to join the EU reached at by European council in Copenhagen, Denmark. This criteria recognized the right of central and eastern Europe to join the EU after satisfying 3-major condition which were; political stability to guarantee democracy, rule of law; functionality of economic markets; adherence to monetary, economic and political aims of the EU

current set of conditions of entry for new states wanting to join the EU. It contains the requirements that need to be fulfilled and the time framework within which this must be done, in order for a country to join the EMU.

An important element of this is participation for minimum two years in the European Exchange Rate Mechanism, in which candidate currencies demonstrate economic convergence as specified by the Maastricht Agreement via maintaining limited deviation from their target rate against the euro. This chapter will however begin with a brief review of monetary regimes beginning from Gold standards right up to the collapse of the Bretton woods Institutions. After which, a brief history of European monetary union will be considered. The chapter will be concluded with the causes of the crisis of 2008/2009 crises in the euro area.

### **3.2. International Monetary Systems and Exchange Rates Systems**

The unit of account in the 1850s was equated to a fixed weight of a precious metal (gold). Coins were produced and harmonized by laws stating the amount of metal in the coins and the price at which the mint would buy metal (Angela & Bordo, 2013). The international gold standard of the late 19th century has been described as a system of 'spontaneous order' (Gallarotti, 1995), while using this as basis, some writers in their literature describe the gold standard as an international monetary 'system' or 'regime', the designers at the time were fashioning national monetary systems, which translated a system of fixed exchange rates. On the other hand, in 1944 the designers of the Bretton Woods system were more sensitive and intentional – they were building an international monetary regime.

The gold standard had many levels; Angela and Bordo (2013), presents an analysis of two levels; at the first level – the clearest – each country or state equated its unit of account in terms of a weight of gold and the result was a set of fixed exchange rates across countries. This fixed rate system reflected national decisions, not international agreements, and has consequently been described as 'spontaneous order'. The

second level is to verify the existence of the gold standard as being spontaneous and translating government intentions.

### **3.2.1. The international monetary regimes**

#### **3.2.1.1. The classical gold standard**

This period dates as far back as the 1880s where each country equated its transaction (currency) to a fixed quantity of gold. Here the participating countries adhering to this regime fixed national money to a fixed quantity of gold. England adopted this regime officially in 1819 and the US in 1834. For the US, the price of gold was fixed at \$20.67 per ounce. There was economic growth and the regime succeeded in regulating the amount of domestic money in supply. It was until 1850 that the discovery of gold in Australia and California caused price levels to be very unstable in the short run. The decrease and drop in price of gold after the huge discoveries of gold in Australia and California in the late 1840s meant that the bimetallic equilibrium of 1850 would experience a drop as gold the cheaper metal, drove out silver, the growth of international capital markets used to finance wars and capital infrastructure expanded the importance of the international monetary regimes, and the growing role of central banks and substitution of paper money for metal altered the role of states in money provision. This period however succeeded until 1914 when the world war slowed transactions.

#### **3.2.1.2. The gold standard**

This period is often referred to as the inter-war period where Under Gold Standard, countries could not hold currency (be it USD, be it Pounds) with respect to gold as reserves except the US and UK. The regimes collapsed in 1931 following the UK's departure from gold in the face of massive gold and capital outflows. In 1933, the New Deal government under President F. D. Roosevelt nationalized gold owned by private citizens and cancelled contract or violated contracts which were specified in gold. The collapse of the gold standard gave the green light to the possibility of a floating exchange rates. The pound floated from October 1931 to about April 1932; the USD also floated from April 1933 to January 1934 to end of January



1934 the dollar floated from April 1933 to January 1934. The fall of the gold standard as the currency for co-coordinating exchange rates led to a rash of multi-lateral and bilateral negotiations

### **3.2.1.3. The Bretton Woods System**

The period of 1946 to 1971, International finance was placed under the Bretton Woods System. This is because the post-war order for the market economies of Europe, North America and Japan was founded on the Bretton Woods system, which provided the international framework for currency stability, with gold and the US dollar as the predominant monetary standards. With this regime, further adjustments of the gold standard, countries settled their international balances in U.S. dollars, but the U.S. government promised to redeem other central banks' holdings of dollars for gold at a fixed rate of thirty-five dollars per ounce. Huge U.S. balance-of-payments deficits gradually decreased U.S. gold reserves, however, reducing confidence in the ability of the United States to redeem and revitalize its currency in gold. Finally President Nixon indicated that the United States would no longer redeem currency for gold. This was the final step in abandoning the gold standard.

Bretton Woods systems and the struggle towards a managed international monetary regime The interwar period had shaken and disturbed economic order thereby necessitating Br and Us to re-organize/plan International monetary regime the key issues was to reconcile the plans of the British Keynes with that of the American Harry Dexter while Keynes Plans revolved around an international central bank to provide a new global currency known as *bancor* (a currency proposed after world war 2 to be used a unit of account in international transactions) that could provide global liquidity and help deficit countries like the UK after the world war. White's Plan revolved around a pegged exchange rate system on gold, an international credit union and protections for surplus countries like the US. The however became the Bretton Woods Articles of Agreement creating an adjustable peg system in which state's parities were calculated in terms of USD. This USD was defined in terms of gold at \$35 per ounce. The dollar was perceived as the key international currency (with sterling having a secondary role). According to (Angela & Bordo, 2013) by the

end of 1958, European countries (Japan in 1962) declared their current account convertibility to allow the Bretton Woods System (BWS) to fully function. The System was successful till the mid-1960s, translating an expansion of trade, rapid real growth and low inflation, problems started -the adjustment problems that is, UK bore the burden of adjusting deficits and most at time it was carried on in a nominal rigidity calculations meanwhile real income and rising unemployment was the order of the day hence currency crisis. Secondly, liquidity arising from shortage of gold shortage made up by the use of the dollars the principal source of global liquidity. The U.S. as the key international reserve provider would run persistent balance of payments deficits to provide the dollars to the more rapidly growing countries of continental Europe and Japan. Also, the loss in the role of sterling as an international reserve currency and the series of sterling crises from late 1950s to late 1960s, which only ended after the final devaluation in 1967

#### **3.2.1.4. Transition from managed floating exchange rate system to the euro**

The global economy experienced acute macroeconomic disequilibrium as they functioned under the floating rates. The petroleum shock of the 1970 indicated the importance and urgency in adhering to a stable and predictable monetary system. The 1970s was punctuated with volatile or fluctuating exchange rate movements. However, efforts to push back this disequilibrium were seen in the annual G7<sup>10</sup> meetings and the two significant conferences in the Plaza, 1986 and Louvre in 1988. The success was not total, that is, it was a smoked screen. Consequently, there was need to create an Institution such as the ECB that could manage financial systems.

The 1992 Maastricht Treaty was framed to wipe the currency problems by using fixed exchange rates in Monetary Unions. This again was a blunder because a successful monetary Union should be highly correlated with a fiscal Union and a political will as underlined by Bordo et al, (2011). The Maastricht Agreement

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<sup>10</sup> G7 represents a body of Ministers of Finance and Central Bank governors of great economies. They are; Canada, France, Germany, Italy, Japan, the United Kingdom and the United States.

anticipated that fellow members will institute fiscal discipline and consciousness and that the monetary union would endogenously lead to greater real integration and convergence in output differentials.

The idea seemed to have worked in the honeymoon stage of the euro; this was an environment of rapid growth in the early 2000. This did not last long and was attacked sharply by the financial crisis of 2008 where there was significant economic recession, output differentials and fiscal instability. This was accompanied by a banking crisis leading to sovereign debts. This attacked the economies of Greece, Spain, Italy, Ireland and Portugal. This however is a great indicator that no monetary Union will function without being associated to its fiscal union. This entails a great deal of an acceptable or considerable political sovereignty in order to survive as expected.

### **3.3. Stages in the Formation of European Monetary Union (EMU)**

After the Second World War, Europeans decided to rally together and form a one and indivisible Europe in order to fight the macroeconomic disequilibrium of price instability, rising inflations, acute unemployment, huge balance of payment deficit positions. Economic and monetary union was a desire of the E.U from the late 1960s onwards because its ideas revolved around price stability and an environment for higher economic progress, development and employment, which was a great relief to Europe. This was also a necessary step to enable Europeans to compete with the US, the largest leading economy in the globe after Second World War.

Nevertheless, a good number of political barriers and economic obstacles slowed this project. Weak political commitment, divisions over economic priorities and turbulence in international markets all played their role in frustrating progress towards EMU. In spite these challenges, the second half of the 20th century saw a constant search by the growing number of EU Member States for deeper economic integration as a means of strengthening the political bonds between them and

protecting the common market. The pathway towards an Economic and Monetary Union and the euro area can be summarized into four phases:

According to the European Commission (1990), one currency should represent one Europe; the road to euro saw the formation of the European monetary union evolved via stages and can be traced as seen below.

### **3.3.1. Phase 1: From the Treaty of Rome to the Werner Report, 1957 to 1970**

This period saw deliberations that were going to affect the entire euro area in some decades to come as. In March 1957, the European Economic Community (EEC) was signed and concluded. This treaty dwelled less on money because they were rather worried with the enlargement of Europe, hence there was a concentration tilted towards the British problems. Again, every determination was tilted in uniting the European peoples. After the two wars, leading economies such as North America, Japan and Europe was grounded on the Bretton Woods system, which directed stabilization of currencies in the context of international finance and with gold in the US dollar as the predominant monetary standards. The international currency stability that functioned in the post war era was short-lived. The report presented by the Pierre Werner Group was practically based on a one Europe that business and persons would be flexible. The variations and perturbations on international currency markets between 1968 and 1969 threatened the common and relatively stable price policy of the common agricultural policy, this was shocking because it were emphasis were laid upon the foundation of EEC. As a solution to this Pierre led a delegation to seek solution as soon as possible and to map out future strategies for the EMU in the next decade.

### **3.3.2. Phase 2: From the Werner Report to the European Monetary System, 1970 to 1979**

The so-called Werner group presented a report that had some controversies amongst members. As seen above, Pierre Werner, the Luxembourg Prime Minister at the time and a delegation set up the pace in forming the EMU in the 1980s. This was concluded in March 1971. The European Monetary System (EMS) that was formed in 1979 laid the practical steps in achieving the EMU under a decade and the possibilities of a single currency was envisaged as well. The feasibility was also questionable. Nevertheless by 1971 the members came to a compromise and started the preliminaries of the first stage. According to the Journal of European commission, the first stage was aimed at reducing the gaps or variations in currencies. Unfortunately it did not work, in attempting to narrow these gaps, and get currencies closer, currency instability prompt up coupled with the oil crisis of the 1970s hit directly the currencies. Thus all attempts proved futile.

### **3.3.3. Phase 3: From the start of EMS to Maastricht, 1979 to 1991**

After the petroleum shock or oil crisis of the 1970s, the economic atmosphere in Europe was questionable as it was marred by gross instability in currencies, low investment rates and economic hardship. Attempts of a greater economic integration in Europe was put to test and the just launched EMS was given the tasks of resolving the price instability, fostering economic growth via increasing investment levels and reducing inflation. In achieving this, the EMS was established on an exchange regime while considering the just created European currency unit (ECU) –which controlled all the currencies of the EMS. To succeed in this, an Exchange Rate Mechanism (ERM) was introduced to manage the deviations within currencies in a narrow band.

This however produced positive and resounding success just in a decade, the EMS successfully coordinated the monetary policies and investments levels were highly boasted and the control of money was successful. On these grounds, members saw the need and urgency of a one market, one Europe and single currency. These

resounding successes gave the go-ahead to the member states to the then President of the European commission, Jacques Delors to gather the Central Bank's governors in the member states to sit and discuss on how they could together achieve the long term and macro-economic objectives via EMU. Thus, the 'Delors Report' came up and became instrumental as will be seen in the subsequent paragraph.

#### **3.3.4. Phase 4: From Maastricht to the euro and the euro area, 1992 to 2002**

To realize the above objectives, there was urgency in converging the economies of Europe in order to achieve the desired goals and succeed. Note should be taken that this was already steps towards the euro zone, as an optimum currency area as propounded by Mundell (1961). As explained above, the president of the European Commission and EU Central Bank governors came up with some practical steps for a common currency area under the 'Delors Report' in which there were three practical steps for the EMU to achieve its dream of a one-currency zone under a decade.

##### **3.3.4.1. Stage 1: Adjusting the internal market mechanisms (1990-1994)**

The first stage was namely through the introduction of free movement of capital in order to spark economic development and growth and also encourage internationalizing of trade and commerce.

##### **3.3.4.2. Stage 2: Setting up Monetary regulatory authorities**

The second stage was out to set up the monetary regulatory authorities like the Central Bank and see how various economies could adjust to a one currency. The European central bank (ECB) and the Euro System of Central Banks (ESCB) were to act in these regards. ECB was the central bank controlling the ESCB and the ESCB was the Central Bank of member states who had to implement the decisions of the ECB.

### **3.3.4.3. Stage 3: fixing exchange rates and launching the euro (1999 onwards).**

The guidelines found in the “Delors Report” were acceptable for forming EMU. Every framework was laid down in Holland, Maastricht in 1991. Every road map for the EMU was detailed in this treaty’s provisions. It gave the framework in defining actions of the EMU and also the legal framework too was settled. By February 1992, in Holland, the Treaty was signed and become functional by late 1993. Worthy of note was also the so-called Maastricht convergence criteria for the members of the euro zone. After laying the foundations, by January 1999, the euro was launched and came into circulation in 2002 with ECB and ESCB playing the decisive monetary policy roles.

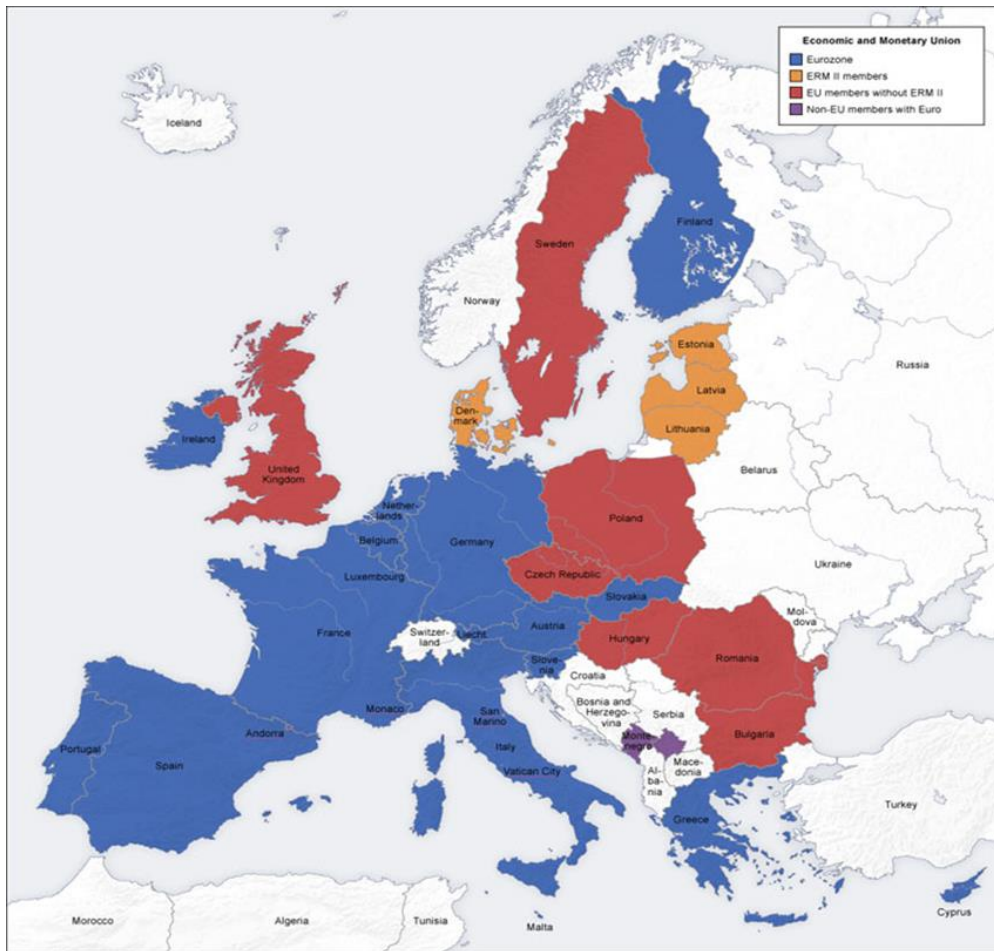
### **3.4. The Euro is launched on the 01/01/1999**

By December 31 1998, every arrangement regarding conversion rates of the national currencies was finalized, tied to the euro and equally fixed in an irrevocably manner. The 1<sup>st</sup> of January 1999 was the day the euro was introduced. This European Monetary system meant that, there would be a European Central Bank-ECB and the National banks of the EU member states. A period of 3 years was set aside as the transition period of the euro, which is, a period of withdrawing national currencies and introducing the bank notes and coins. At its early stages, the euro was scriptural or book money since daily operations were still effectuated in the national currencies while accounting or financial operations were carried on in the euro. By the end of 2001, significant sensitization had been carried on and the euro was already well known as each shop and petrol stations had approximated amounts in all labels of goods.

On the 1st of Jan. 2002, cash completely changed, the banking sector, uncompleted transactions in national currencies that are cash in transit. According to the Journal of European Commission on Economic and Financial Affairs-One Currency for One Europe, around 144 billion euro was pumped into the euro area via national banks to make provisions. By 3 January 96% of Automated Teller Machines (ATMs) in the

euro area could cough out euro banknotes. After a week a great deal of transactions were being effectuated in the euro.

Also, the below is a well-designed map of Europe, indicating the Eurozone territory and its members as of present.



**Figure 3.2:** Map of Europe Indicating the Economic and Monetary Union

Source: EU viewed on 5 June 2015 <https://www.ecb.europa.eu/euro/intro/html/map.en.html>



### 3.5. What is the Euro-Zone?

Around the 1950, Europe was still suffering from the interwar periods that plunged the continent into hardship and misery. France's foreign minister at the time, Robert Schuman suggested a formation of a trade block. In 1951, Western Europe signed and created a European Coal and Steel Community (ECSC) in Paris. This stopped the possibilities of weapon productions because the countries linked their coal and steel industries together. The coal and steel community expanded remarkably and transformed into a large and single market that was very formidable. The European Union that was formed in 1957 also concentrated on establishing a single market. This single market promoted economic, political and socio-cultural well-being of Europeans in a remarkable way. The single market prospered but was still hampered by the multiplicity of national currencies. In 1992, the Maastricht Treaty was signed, thus, setting the pace for the introduction of the euro in January 1999 and greater economic cooperation and integration. The Maastricht Treaty elaborated the convergence criteria for the European union members.

The Eurozone is '*those members of the European Union that have adopted the euro as their currency...*' on the eve of Jan 1999, the euro area was made up of 11 members of the 15 members of the European Union, Others joined like Greece (2001), Slovenia (2007), Cyprus (2008), Malta (2008), Slovakia (2009), Estonia (2011), Latvia (2014) and Lithuania (2015). As of date, there are 19 members of the euro zone. European member states are part of the Economic and Monetary Union and thus seek a common growth in their general being as a collective interest.

Nevertheless, some members have taken another initiative to join the euro area and replace national currencies to the euro. These countries form the euro area. The microstates of Andorra, Monaco, San Marino and Vatican City also use euro for transactions and operations, on the basis of a formal arrangement with the European Community. Montenegro and Kosovo likewise use the euro, but without a formal

arrangements. Today the Eurozone stand to be one of the strongest economic blocks and a major player in the global economy.

**Table 3.1:** Evolution of the euro zone members from 1999 to 2015.

1999	Belgium, Germany, Ireland, Spain, France, Italy, Luxembourg, the Netherlands, Austria, Portugal and Finland
2001	Greece
2007	Slovenia
2008	Cyprus , Malta
2009	Slovakia
2011	Estonia
2014	Latvia
2015	Lithuania

Source: ECB, (2015)

The idea of common markets in Euro zone functioned in a satisfactory way and output increased considerably, employment levels stepped up, inflation rates were suppressed below 2%, standard of living stepped up, external trade resulted into a favorable balance of payment positions between member states. Around the 2008, subprime crisis spread to Europe and plunged especially emerging countries like Portugal, Italy, Spain, Ireland and Greece into crisis. This crisis and its impacts will be discussed in the sections ahead.

### **3.6. What is an Optimum Currency Area?**

As earlier discussed in our exhaustive literature review, Mundell defined optimum currency area as a geographical region closely integrated through international trade and factor movements such as labor and capital. The theory states that fixed exchange rate systems are most appropriate for these areas.

Mundell recognized the costs of adopting a single currency in an area and made the case for the establishment of a common and harmonized fiscal authority to facilitate the transfer of resources between members hit by asymmetric economic shocks when mechanisms such as the wage and price flexibility and labor mobility could not function. One of the main failures of the euro zone and that has plunged the area to

macroeconomic instability at this point is the inability to create an institution that will coordinate fiscal policies and will have the power to conduct such a coordinated fiscal policy. As earlier seen in the Chapter two, the USA and Canada also belong to such blocks that are referred to as Optimum currency Area. In Center Africa, there is also a block called CEMAC zone.

To become an optimum currency region and surrender national currencies to a single currency depends on the willingness of the future members. Mundell together with the classical authors like (McKinon, 1963) and (Kenen, 1969) played a central role and identified conditions to be satisfied before adhering to a single currency area. Contemporary together with the Maastricht criteria authors have also complimented and reshaped the theory especially as its practicability in Europe came about around late 1990s.

### **3.7. The Maastricht Convergence Criteria**

The ultimate criteria in joining the euro area has largely been based on the Maastricht Treaty of 7 Feb 1992 which laid the prerequisites of prospective members in joining and adhering to the euro common currency area. This are the criteria all EU members are expected to meet in order to enter the third stage of the Economic Monetary Union and adopt the euro as their currency. According to the European Commission (2015), all members of the European Union are expected to adopt the euro and be in the euro area, the United Kingdom and Denmark are the only exceptions because they have ‘opt-outs’. All EU countries belong to the EMU; consequently the EMU manage the general economic activities. The EU does not define a time frame in meeting this criteria it however allows the various states to develop strategies in meeting the criteria. For example Sweden is supposed to belong to the euro area, but since she is still making the necessary adjustments in its central bank. The prospective members make changes in their sovereign national banks in such a way that ensures the independence of monetary policies when they join the ECB and ECBS. The convergence criteria represent key macroeconomic indicators, which are discussed below.

### **3.7.1. Price Stability**

Price stability via reduced rates of inflation was a precondition to belong to the euro area as stated by the Maastricht convergence criteria. This degree of price stability is observed using inflation rates over a period of one year. Here, rates must not exceed 1.5 per cent points of, at most of three best performing E.U member states with respect to price. These figures are calculated using Harmonized Index of Consumer Prices (HICP).

### **3.7.2. Government budget deficit sustainability**

Prospective members at the time of entry into euro area, should not have huge government deficits with respect to the Gross Domestic Product, (GDP), at market prices. The standard rate here is 3 % and the calculation is done using the last fiscal year. Rates slightly above 3%, like 0.5% more, is also accepted as a standard rule unless in the event where the ratio has been on steady and successive decline before approaching the threshold of around 3 %. Or in the case when after studies, it's justified that exceptional and questionable forces pushed the small deficit ratio, for example, spending provoked by economic pressure (depression). In such situations, the European Union Council opens is consulted to help the prospective state in complying with the deficit criteria.

### **3.7.3. Government debts with respect to GDP ratio sustainability**

In this criterion, the treaty specified that, government debts with respect to GDP (at market prices) ratio should not surpass 60% at the end of just ended fiscal year. If a prospective country's debts to GDP ratio exceed the stated 60%, the ratio must be studied in order to see if the ratio is moving towards 60% at a satisfactory pace. If there are such traces, the European Union Council opens is consulted to help the prospective state in complying with the debt criteria of fiscal discipline.

### **3.7.4. Exchange rate stability**

This criterion happens to be very central in determining if a prospective candidate is ready and ripe for the euro area. This is the stage that ensures the convertibility finally to the euro currency. Exchange rate stability is ascertained via the participation in the Exchange Rate Mechanism (ERM II). Prospective members currency should not have been devalued the central rate of their euro-pegged currency in the last two years. The Exchange Rate Mechanism or ERM II considers at the least two past years without major gaps (without major tensions) from the central rates of ERM II.

### **3.7.5. Long-term interest rates**

As specified by the Maastricht convergence criteria, it was a mechanism to assess the strength of convergence achieved by fulfilling the above criteria that is fiscal discipline and exchange rate stability. Here, it stipulated that an average 10-year-government bond for the in the past period (year), should not be more than a 2.0% greater than the weighted arithmetic of the same 10 year bond yields in the last 3 European Union members with respect to their HICP (inflation).

The table below summarizes the five convergence criteria for potential entrants to the Euro area.

**Table 3.2:** Summary of the Maastricht Convergence Criteria

<b>What is measured:</b>	Price stability	Sound public finances	Sustainable public finances	Durability of convergence	Exchange rate stability
<b>How it is measured:</b>	Consumer price inflation rate	Government deficit as % of GDP	Government debt as % of GDP	Long-term interest rate	Deviation from a central rate
<b>Convergence criteria:</b>	Not more than 1.5 percentage points above the rate of the three best performing Member States	Reference value: not more than 3%	Reference value: not more than 60%	Not more than 2 percentage points above the rate of the three best performing Member States in terms of price stability	Participation in ERM II for at least 2 years without severe tensions

Source: The European Commission 2015, viewed on 01 June 2015, <

[http://ec.europa.eu/economy\\_finance/euro/adoption/who\\_can\\_join/index\\_en.htm](http://ec.europa.eu/economy_finance/euro/adoption/who_can_join/index_en.htm)>

### 3.8. Criteria or Conditions for an Optimum Currency Area

The analysis on Optimum Currency Area suggests six criteria for developing a currency union. To better understand and make sound judgments on OCA, it will be better to examine the criteria of joining and adhering to a single currency region.

The decision to join and adopt a single currency or to adhere to an optimum currency area rests on the shoulders of the states and government. Before joining and adhering, there are some economic and political criteria to be closely analyzed. The criteria below will be discussed, and after which we will verify if truly Europe is an optimum currency region and also test the optimality.

### **3.8.1. Criterion 1: Mobility of Labour**

The Classical author in his paper *The Theory of Optimum Currency* advanced this criterion in 1961. According to Mundell (1961), any region wanting to adopt a single currency for its transactions should consider mobility of labor amongst members. In our study, we have Europe as case study, this means that in the euro zone, there should be mobility of labor in that if there is an asymmetric shock, citizens of one part say Greece should move to the Netherlands freely and pick up jobs there, thus, making labor mobile.

However, this criterion was attacked as labor mobility is easy within national borders and not with international borders because of the difference in culture, language, welfare and government policy, if we examine the case of Eurozone we see that the existence of so many languages and cultures can not permit the free displacements at every level. Again, capital mobility is quite different especially when it comes to financial and physical capital. Another handicap of this criterion is at the level of specialization. In cases where specialization is present, mobility is not possible.

### **3.8.2. Criterion 2: Diversification of products**

The second precondition for an OCA is the diversification of products and production. This was put forth by Kenen (1963) where according to him, he complimented the first criterion by saying that when a country produces a variety of good or products, its exports are diversified and in case of asymmetric shocks on the product, each of the products will face light perturbations or crisis. In the case where a country is not diversified in its production in the international market, any crisis on its export attacks and transmits negative consequences to its economy and this deteriorates the balance of payment position adversely. Thus, the euro area uses this as a precondition for future members.

### **3.8.3. Criterion 3: Openness**

The third criterion was analyzed and put forth by McKinnon (1969) where he suggested that countries open to the external world or to the rest of the world should trade extensively with each other if they must succeed in an optimum currency area. He differentiated marketable from non-marketable product in saying that marketable goods should have a unique price that goes global. According to him, a small economy's exchange rate does not affect competitiveness significantly because a small economy is barely a price-taker. If the Eurozone members function this way, then domestic or national prices of goods become relatively cheaper when compared to imports because of the flexible rates of exchange.

### **3.8.4. Criterion 4. Fiscal Transfers**

This criterion suggests that countries agree to compensate each other's in periods of shocks that are asymmetric. Transfer in this sense acts like an insurance that solves and reduce the costs of an asymmetric macro-economic shock. In aspects of transfers, we notice it within national borders, which passes via welfare systems or federal states. The last major component of the optimum currency area criteria concerns automatic transfers to other areas suffering from asymmetric shocks. The ineffectiveness of monetary policy at the regional level, transfers from expanding regions to depressed regions represents another important method to mitigate the effects of asymmetric shocks. Such transfers would provide funds for expanded fiscal policies to lift a region out of recession.

### **3.8.5. Criterion 5: Homogeneous preference**

This condition states that, countries or members come together in a consensus to seek ultimate solutions in dealing with the asymmetric shocks emanating from the OCA and thus allow for optimality. When the criterion of Kenen's diversification of products is satisfied, there exist rather symmetry of shocks in the products. In such a consensual atmosphere of understanding each other, members will better tackle the traces of asymmetric shocks.



### **3.8.6. Criterion 6: Commonality of destiny.**

If we recall the definition of OCA as the adoption of a single currency in order to subdue the costs and obtain benefits, then we will reconcile it with this criterion easily. This criterion, states that for countries or regions that come together to attain objectives should also bare the costs arising from the OCA. This, therefore, means that an OCA is not without challenges, and thus when such asymmetric shocks hit the region, no complicit of interest should prevail. Instead, a mutual understanding should reign so that together they can quell the asymmetric shocks.

## **3.9. The Costs and Advantages of adopting the euro as a single currency**

The adoption of the euro by European countries in 1999 marked the creation of the largest common currency area in recent history. This was accompanied by the creation of the European Central Bank (ECB), which manipulated inflation targeting policies to ensure low and stable increases in the price level across all member countries. European countries decided to move from individual currencies to the euro how ready they were for a single currency raised interesting questions for the future political and economic directions of the euro area. Will the economic integration of the euro-zone countries lead to a political union? Or can the countries effectively share a common currency while still functioning as distinct states? Conversely, could economic pressures arising from regional differences between European countries lead to the disintegration of the euro monetary union, and what would this mean for Europe?

### **3.9.1. Benefits of adopting the euro as a single currency**

Below are some advantages of using the euro as a single currency by the members of the euro club.

### **3.9.1.1. Elimination of transaction costs arising from exchange rate conversions**

According to De Grauwe (2005), there is huge elimination of transaction costs. This means that foreign exchange and hedging transaction costs are completely removed as all members are trading in just one currency, which is applicable in the entire zone. The conversion rates for foreign currencies are avoided, and time too is saved. The elimination of uncertainty with respect to exchange rate will lead to an appreciation in the global welfare especially in a society of doubtful and questionable individuals. There are at times an investment proposal looks very risky just because of the uncertainties surrounding exchange rate, thus in a one currency environment, that is the Eurozone, revenue will increase thus boasting the welfare of the EMU.

### **3.9.1.2. Eases Price comparison, and increases competition across regional borders**

A one-currency system easily eases the comparison of prices across the Eurozone, for example we quickly compare the prices of products when they have a unique price labels. This however fires the zeal of competitors as they can easily measure the threats of their potential competitors. Transparent prices decrease arbitrage opportunities, improving efficiency significantly amongst members of a shared currency like the Eurozone. Price comparisons between two regions with different currencies are also an inconvenience to business, so a common currency would improve efficiency and decrease arbitrage opportunities by allowing for instant comparisons. Thus, from a purely trade-oriented perspective, the desire for single money is clear- countries trading extensively with each other would stand to benefit immediately from sharing a single currency due to increased efficiency from elimination of foreign exchange transaction costs.

### **3.9.1.3. Attainment of macroeconomic objectives**

The macroeconomic situation on a region of one currency will be further strengthened and stabilized when it comes to managing inflation rates. This directly leads to a drop in the cost of capital and according to the Keynesian and the multiplier effect concept, more people will come and borrow and thus stimulate

economic activities and hence step-up the level of employment and hence increased output too. Analysis based on simulation, reveals that the more integrated a union such as the Eurozone, the more benefits from stability with regards to the macroeconomic situation. According to the report of the European commission (2005) there was a significant drop in inflation rates, there was a reduced balance of payment deficits and a historical low interest rates.

### **3.9.2. Costs of adopting the euro as a single currency**

Here, we review the costs of adopting the euro as a single currency, that is the disadvantages arising from using a common currency by the members of the euro area. Amongst the disadvantages we will examine in this section, monetary independence appears to be the paramount loss as will be seen below.

#### **3.9.2.1. Loss of Monetary Independence**

The loss of Independence over national monetary policy, which must be surrendered to the central monetary authority. This is a huge cost or disadvantage to the members, because national currency was like a representation of national cultures and belonging, but surrendering money to adopt the euro was socially or culturally painful. Furthermore, this loss of sovereignty over monetary policy did not only signal a situation of cultural identity, it therefore meant that monetary policy would be designed and governed by the European Central Bank, and all the total control of money supply will be in the hands of this central bank. In this light, the members pilot only fiscal or budgetary policies while monetary policy is handled by the ECB. This according to some economists and analysts was the reason for the 2008 financial crisis.

#### **3.9.2.2. Costs on economic agents**

According to De Grauwe (2005), the disadvantages on the part of the individual economic agents should not be undermined as a one-currency will mean no exchange offices, no middle men and conversion commission. Therefore, in identifying this aspect as benefits for others, it's equally a cost for some.

### **3.10. Discussion and Analysis on the costs and benefits of adopting the euro as a single currency**

Economists have reviewed the advantages and disadvantages of joining and adhering to a currency club and found out that it's hard to quantify some of the mechanisms assumed in the causes and effect; such as the relationship between production (output) and trade. The extent to which this output will grow in function to trade is uncertain and this could pose a problem as seen in the economies of the PIIGS- Portugal, Italy, Ireland, Greece and Spain.

Again, the responsiveness to shocks is weak. A member will not be able to use monetary policy in a discretionary way during periods of crisis – like devaluing to sustain internal stability. This has sterilized the possibility to forecast and plan in the very long run. The loss of these two policy instruments poses significant problems when a country is faced with economic conditions that do not match those of its currency partners, as only fiscal policy remains available. This dilemma has led economists to develop a body of theory, which outlines criteria for an “optimum currency area.”

How well a given region, such as the euro-zone, satisfies the criterion provide some guidance as to the long-term sustainability and viability of any given currency union. To better pass on acceptable judgment if Europe and its euro are an optimal area as well as optimal currency area, it will be important to examine closely the parameters of optimum currency area and see if all is in accordance.

The analysis of Bayoumi et al, (1997), also found out that labor mobility as an instrument to stabilize is less effective in the euro area than in the US, that is, it was less suitable for an OCA variable. The study was typically at the regional level and would again be less suitable when nations tend to migrate. They also studied the applicability of fiscal policies that is excluding transfers but debt issuance and concluded that it will be relatively easy for sub-central governments in federations than sub-central governments in a unitary state to issue a debt in spite the pressure

and prefer the contrary as sub-central governments in federations have larger budgetary power than those of unitary states (Bayoumi et al, 1997).

Again, in an analytical study, De Grauwe and Ji (2004), the advantages and disadvantage of the euro area by comparing Central and Eastern European states-CEEC. Their study suggested that trade is positive when exchange rate fluctuations are eliminated. This elimination will likely trigger a decrease in the risk premium and interest thereby causing a drop in the region's economy. They suspect a positive correlation coefficient between trade and production

### **3.11. Challenges of the European Monetary Union and European Monetary System**

#### **3.11.1 The 2008/2009 financial crisis in the euro area**

Uniting Europe was one of the principal factors of the creation of the euro currency. Countries at war tend to do less business with each other. Europe had lots of political boundaries that made business difficult coupled with the different currencies that existed in Europe. So the philosophy of uniting Europe had to do away with these boundaries and so many currencies. After the World War 2, the fastest way to rebuild Europe was to remove all these and institute a unified Europe. The last of such barriers to be broken was the Berlin wall uniting Germany, consequently, Europe was ready for a union and the European Union countries signed the Maastricht Agreement laying every guidelines of the union. With this Union of European country, business became animated, movement of goods and persons was accelerated, and various economies were revived. The financial crisis in the euro land has challenged the ECB and the objectives for which they stood for. This has further gotten bad with the crisis in Greece and the suggestions that might leave the club.

### **3.11.2 Managing The Economic and Monetary Union**

The EMU or its EMS is not an ultimate solution to Europe's financial difficulties, it is just a body that is out to facilitate and further the objectives of total economic integration of the European Union in an equilibrated manner that absorbs the unemployment and inflation while ensuring a steady growth, an acceptable balance of payment position. The operations and transactions of EMU were framed while considering the monetary and economic aspects of the euro area. The bad experience of the 2008 financial crisis became a major drawback of this union. This has left the EMU with no option than to further implement stricter rules and guidelines and also additional monitoring mechanisms to check macroeconomic imbalances and also to assess the draft budget of the euro area countries.

The European Central Bank (ECB) manages the monetary policies and all the banks of EU countries form the European System of Central Banks (ESCB). Monetary decision is piloted by the Governors of ECB, which also include Governors of the national central banks of the EU countries that have adopted the euro. The sole objective of the ECB is to maintain price harmonization and stability within the euro zone because it's from this that there is growth and economic development. ESCB also maintains price stability by controlling its interest rates and intervening in markets too.

The aim of this organ is to correct gaps in the euro area like deteriorating export market share, huge levels of private sector indebtedness, risky assets made of uncertainties in the financial markets. If not well checked could lead to speedy multiplier or spilled over effects. That is why the Commission benchmarks EU countries based on scoreboard of Macroeconomic indicators. With such a diagnosis, the Council can be able to make significant recommendations to the concerned EU country and curb the gaps at early stage. In serious cases, corrective or austerity measures are recommended and are backed up by strict rules as detailed in the new Excessive Macroeconomic Imbalance Procedure (MIP). This enforcement is done via financial sanctions for euro-area countries that disrespect these guidelines or framework of recommendations.

## **4. IS THE EUROZONE AN OPTIMUM CURRENCY AREA?**

### **4.1. Evaluating the Eurozone as a Single Currency Club**

In line with European project of greater economic integration, a monetary union (EMU) was put in place, which came to the lime light officially in 1999. In line with the membership of EMU, was the Maastricht convergence criteria, which is a set of economic variables linked to macroeconomic stability that were supposed to act as fulfillment criteria for joining and adhering to the EMU. These convergence criteria slightly weaken the simple criteria laid down by the classical authors of Optimum Currency Area (OCA) theory. The classical framework laid the criteria to which a member (or region) has the right economic situations for joining a currency area with less emphasis on stability per se and with more focus on flexibility and real economic convergence.

Most of the empirical studies investigating Eurozone reach a conclusion that they find a core of some member countries like Germany and its neighbors, that seem to be in an advanced or developed section of the EMU, and two periphery groups, that is, the Southern and Northern Europe respectively whose conditions for being in the EMU are less optimistic. The architects of the Maastricht Treaty, as a great step towards fuller economic integration and the single market recognized using a single currency. With the euro passing from 1999 and coming fully into transactions in 2002, the Eurozone moved ahead in economic integration.

The simple sharing of the euro amongst its members did not translate an automatic economic performance (economic symmetry) and integration (political unity). Its vital in the analysis of euro area to refer back to the work of Mundell in 1961 in his

maiden paper, ‘‘the theory of optimum currency’’ where he put forth the requirements for a members aiming to join a currency union or region. We are going to verify if the Eurozone is optimal by reviewing the various criteria advanced by both classical and contemporary economists.

- Members of the currency area trade extensively with each other,
- The economic cycles in the different regions are in phases (i.e., the regions face symmetric shocks)
- Labor markets are integrated and there is high mobility of labour.
- There are automatic mechanisms (fiscal Equalization) to transfer funds to regions suffering from asymmetric shocks.

#### **4.2. Discussion on Eurozone as an Optimum Currency Area**

Since the launch of the European Economic and Monetary Union (EMU) much time has elapsed for critical analysis to be carried on to investigate the arguments raised by both the pessimists as well as the optimists. For the pessimists, EMU and OCA were too sudden to point the dangers in aggravated economic difficulties and divergence amongst members. The optimists strongly believed that EMU would stimulate the desired mechanisms or forces required towards economic prosperity thereby satisfying the very reasons for an optimum currency area.

According to Jurgen (2009), the criticisms advanced that it was too early for the Eurozone to adopt a single currency and function, as an optimal region was questionable. In conforming to the principles laid down for the formation of an optimum currency, the theory postulated that prospective members should be sufficiently similar in structural economic aspects. The theory stressed that prospective members should be abundantly flexible and opened to trading to each other’s; the theory also suggested that there should be interconnection in international finance, if not the disadvantages (costs) will be more than the advantages or reasons for joining.



Again, if not similar in structure, the costs will arise in the form of economic difficulties, unemployment and divergence in economies thereby leading to asymmetric economic shocks, be it positive or negative shocks. In simple terms, a country in the Eurozone that was touched by a positive demand shock will realize a high wage rates and accompanied by inflation, in this light the country will lose competitiveness when compared to other members of the currency union. In responding to this, Jurgen (2009) demonstrated that in the absence of a monetary and fiscal policy, and where devaluation has a place, and assuming the weaknesses of other adaptation channels like labor mobility, national wage rates will drop sharply. In an attempt of restoring such an economy in the scene of international competition, a delayed recession would be important to induce the necessary adjustments in wages and growth rates.

In translating the traditional theories of Mundell (1961), Mckinnon (1963) and Kenen (1969) to the Eurozone, we notice that these classical authors focused on the costs /dangers of a currency union. Over time, the equilibrium or balance was pushed to more optimistic views as seen below.

The classical theory revolved around Keynesian macroeconomic theory, which was further explained by Philips curve, where by, an unexpected increase in inflation as a result of devaluation or in monetary policy could translate a sharp drop in unemployment and lead to adjustments by reducing real wages due to high prices. These devaluation and monetary policy adjustments became ineffective in a currency union. The monetarist pointed out that the long run Philips curve could shift from downward sloping and be vertical because the Eurozone workers will turn to focus on real and not nominal wage thereby contradicting the past experiences. In this regard, we deduce that the principle of OCA as put forth by the classical, which was a paramount criterion in forming the Eurozone, was weakened.

Again, the traditional or classical theory was practically difficult to function in the Eurozone because different OCA criteria sustained different conflicting responses in applicability in the euro area. In trying to find out whether a country would be suited to join and adhere to the currency union resulted to ambiguity in responses because

the southern economies in Europe were so weak and could not meet-up. Due to this weakness/failure traditional OCA indicators in the recent years have been developed and tested with econometric models.

Furthermore, OCA criteria such as openness, fiscal equalization, labor mobility, market flexibility and the symmetry of economic policies are not fixed in time and may be further integrated within the EMU. This is strongly supported by João et al (2007), in what became known as “endogeneity hypothesis of OCA” this endogeneity hypothesis explains in simple terms the OCA properties will be satisfied and well animated within or inside. In this case, rather than looking at the fulfillment before entry of prospective members, the analysis has to evaluate the potentiality and focus on the potential endogeneity of trade openness and financial integration.

Therefore, to better understand if the Eurozone is an optimal currency area, we are going to consider the endogeneity hypothesis and proceed with empirical analysis.

The question posed by authors like Joao et al, (2007), and which is clearly analyzed by Jurgen (2009), are to find out if a currency union such as that of euro area can be expected to stimulate trade and financial integration cooperation just from a decrease in mere transaction costs and elimination of exchange rate costs as well as exchange rate risk; hence the worry here is to understand if an increase in trade and financial cooperation or integration can lead to a greater synchronization of business cycles to the benefit of members in the euro area?

The above authors put significant literature forth and it was realized that the impact of trade integration on business cycles synchronicity was without ultimate answers. In the first instance, high and stimulated trade links between countries definitely leads to spillovers like in the case of positive demand shock, in the flourishing economies like Germany, Holland and Austria. Will this trade provoke an increase imports from the other members? In this case, it's certain that intra-industry trade intensifies because of high incomes and hence provokes a demand for income-elastic goods as well leading to relevance in economics of scale.

According to the international economics theories of Grubel and Lloyd (1975), these goods are often traded between the same industry in the form of intra-industry trade, which leads to economic spillovers and makes countries to trade with economies of similar sectorial structures. In this light, the impact of similar shocks in the Eurozone was no longer too different (asymmetry of shocks) on the other hand, the classical and contemporary theories of OCA basing on economies of scale, there is more economic integration which leads to specialization amongst members of the euro area. The reality here is that economic divergence will increase between members of same sectorial shock.

Empirical analysis makes it clearer; Jurgen (2009) in his analytical paper makes it clearer that trade integration between euro zones countries are linked with highly correlated business cycles coefficients. As confirmed by international trade literature on intra-trade and intra-industry, these high links are pivotal in these results in the euro zone. The negative and indirect effect of specialization resulting from trade integration between euro zone countries has less effect on the business cycle synchronization.

As concerns endogeneity of financial integration in the euro zone, there are no clear-cut solutions just like above. Reasons for increases in business cycle synchronicity are seen in financial linkages, which lead to spillovers. If we consider when business men in places like Hungary have a high return on investment (ROI) in places like Germany, France and come back to spend the profits in Hungary, or when consumers in less vibrant regions like Poland earn less incomes and turn to come and smoothen their consumption pattern by borrowing from regions like Finland. This could be risky and lead to weak functioning and less synchronization of the business cycles. This might induce more or greater specialization and could cause problems in periods of shocks. Again, it could further lead to more divergence. Empirical studies here suggest that financial integration empowers business cycles synchronization, but the effects of negative specialization could be the resultant in the euro area. While indirect effects of specialization are found to be real and thus reduce the effects of direct effects.

Also, we trace empirical evidence regarding other potential endogeneity factors. The European Monetary Union in its OCA could be influenced by reforms that are structural, which would enhance flexibility in markets and labor. The reforms could indicate urgency within the currency area but might have little or no corrective mechanisms or instruments for adjusting coupled with the fact they could face stiff resistance due to political reasons. The Eurozone is a region with multiplicity of culture and governments that could have varying modes of resolving structural reforms. So decision-making could practically be difficult due to these multiplicities and coupled with the political interests.

The 2008/2009 financial crises have further demonstrated that Eurozone is plagued with inconsistencies. Fiscal policies were the source of asymmetric shocks due to weak disciplinary measures from co-members in the EMU. European countries that were having less absorbing shock-mechanisms like Portugal, Ireland, Italy, Greece and Spain experienced huge divergence because they failed to cut their deficits in the periods of high economic growth and had long and lasting macroeconomic disequilibrium in consolidating these gaps. The present or on-going crisis in euro area has put to question if truly the euro area is truly an optimum currency area which is in line with the pessimist ideology as identified by Jurgen (2009) in his detailed analysis where there were reasons showing that EMU was too young for a single currency.

### **4.3. Analyzing the divergence in economies in the euro zone**

Despite the high rate in economic integration, there are still economic and political risks both in southern and euro countries. The southern European countries are attacked by multiple recessions, their economic decrease are deeper and longer than in the rest of regions in the EMU. These uncertainty or risks are from the recent recessions, which are translated and explained by so many factors like;

- Weaknesses in competition between members, for example, Greece imports a good quantity of manufactured goods and other finished goods. This consequently explains the reasons for her slow and weak economic recovery.

- The 2008 debts/financial/sovereign crisis; the crisis has further complicated the smooth functioning of economies and left huge macroeconomic deviations amongst members.
- The sharp fall in real estate especially in Greece and Spain

The Eurozone satisfy some of these criteria as seen above, likewise, some are fulfilled as the union progresses as seen by the endogeneity evidence put forth the economic trend by Jurgen (2009). Furthermore, the presence of the 2009 financial crisis in the euro zone is also a soft warning for the criteria of OCA to be re-examined.

#### 4.4. Considering Maastricht convergence criteria to check deviations in the euro zone key macroeconomic indicators

The table below shows selected indicators for the Eurozone, and its annual percentages changes together with their reference period.

**Table 4.1:** Key Macro-economic indicators in the Euro Area

<b>Selected Indicators for the euro zone</b>	<b>Euro zone annual % changes</b>	<b>Reference P</b>
<u>Inflation rate (HICP)</u>	<u>-0.1</u>	2015Mar
<u>Monetary aggregate M3</u>	<u>4</u>	2015Feb
<u>GDP in prices of the previous year (economic growth)</u>	<u>0.9</u>	2014Q4
<u>Unit labour costs</u>	<u>1.3</u>	2014Q4
<u>Population (in millions)</u>	<u>335</u>	2013
<u>Unemployment rate (as a % of labour force)</u>	<u>11.3</u>	2015Feb
<u>Labour productivity</u>	<u>0</u>	2014Q4
<u>Current account balance (as a % of GDP)</u>	<u>3.52</u>	2014Q4
<u>US dollar / Euro exchange rate</u>	<u>1.0743</u>	22-Apr-15
<u>Government deficit (-) / surplus (+) (as a % of GDP)</u>	<u>-2.5</u>	2014Q3
<u>Government debt (as a % of GDP)</u>	<u>92.1</u>	2014Q3

Source: ECB Statistical Data warehouse (2015). Viewed on 30 May 2015, via

<http://sdw.ecb.europa.eu>

The above table is to demonstrate how the euro zone has been fairing since its existence in 1999. From the Maastricht convergence criteria, we see that there is a weak level of sustainable public finance or government debts with respect to GDP

ration sustainability (92.1 %) from the original 60% as specified by the Maastricht convergence criteria. Deviation of more than 30 % is not acceptable and put to question the euro zone currency area. The huge unemployment rates of more than 10 % is alarming, this means that the euro zone can't reconcile the twin problems unemployment and inflation, because inflation is too low showing price stability. This critical analysis shows euro area is an OCA but not a perfect example of an OCA. According to Business Insider of 29 June 2015, the 2004 financial audit report shows that Greece did not qualify to belong to the euro-club because her government budget deficit was above the 3% limit for admittance. This accounts for the non-fulfillment of the Maastricht convergence conditions

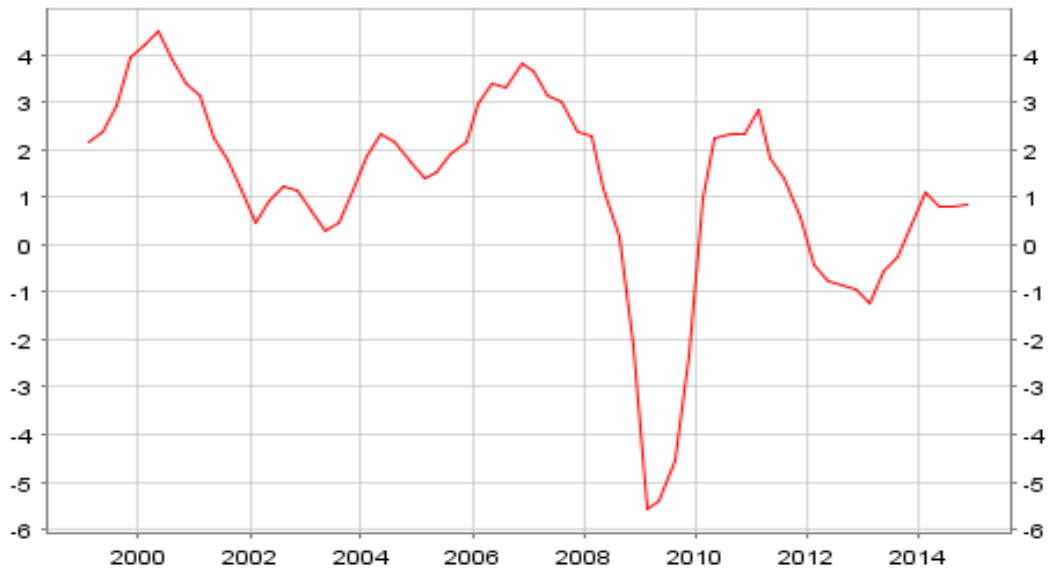


**Figure 4.1:** US dollar / Euro exchange rate as of April 2015

Source: ECB Statistical Data warehouse, viewed on 21 May 2015 <http://sdw.ecb.europa.eu>

The graph above shows exchange rate parity between the euro and the dollar. It shows that exchange rate was quite low when the euro was introduced and became increasingly volatile as from 2002. As from 2002 onwards, till the 2008 financial crisis, exchange rate has been quite volatile but the last quarter of 2014 witnessed a significant drop in exchange rate between the euro and the dollar.

The Figure below shows the GDP in prices of the year just ended, that is economic growth.



**Figure 4.2:** GDP in prices of the previous year (Economic Growth)

Source: ECB Statistical Data warehouse, viewed on 21 May 2015 <http://sdw.ecb.europa.eu>

Gross domestic product in prices of the past year indicates the path of economic growth. The GDP being a powerful indicator in the euro zone, it was relatively stable from 2000 to about 2007 as seen in the graph above, there was a very sharp fall from 2008 to 2010 indicating the presence of crisis and drop in economic growth. As from 2011, there was improvement but relatively weak as fell back again but not as in the 2008.

The Fig below shows unemployment rate as a % of the labor force



**Figure 1.3:** Unemployment rate as a percentage of the labor force

Source: ECB Statistical Data warehouse, viewed on 21 May 2015

<http://sdw.ecb.europa.eu>

The figure shows that since 2007, unemployment rate in the Eurozone fell but increased steadily since the financial crisis.

The Figure below shows government deficits (-) / surplus (+) (as a % of GDP)



**Figure 4.4:** Shows government deficits or surplus a percentage of GDP

Source: ECB Statistical Data warehouse, viewed on 21 May 2015

<http://sdw.ecb.europa.eu>



As noticed in the figure above, the Eurozone is not converging the economies as specified by the Maastricht criteria. According to the said criteria, government deficits or surplus as a percentage of GDP or sound public deficits should be -2.5%. The graph above demonstrates that since the financial crisis, it's only in 2014 that the criterion was being respected.

#### **4.5. Analyzing Arguments for and Against the Eurozone**

Since the conception of the Euro zone, it has been highly debated if truly the euro area will succeed in its efforts of total economic integration or a brake-up and return to national currencies. The recent crisis has further worsened the situation and with some countries like Greece yet to recover. The question posed here is to investigate if countries like Greece would be better off if they leave the euro area. Also, it's interesting to find out why despite the crisis in the euro area, there is rather an enlargement of the region instead of a brake-up. The baseline of this argument however revolves around the advantages and disadvantages of leaving the euro area with respect to the current economic crisis.

The financial crisis of 2008 coupled with large public debts especially amongst the PIIGS, slow pace of economic recovery, indiscipline in fiscal policies, controversy over the austerity measures with painful labor costs, increased divergence in the E.A economies have challenged the dreams of EMU and ECB of total integration. The crisis came from the US and has affected the E.A deeply, but why not Germany? Why not Holland? Germany's competitiveness for example has not been offset by the rise in currency; this is because Germany's real exchange rate under the euro is around 40% below where the deutschemark used to trade against the US dollar. The German economy is one of the highest beneficiary of the common currency, any systematic default, would cripple the banking and exports sectors, this further explains why Germany is bent on not leaving the Euro zone and imposing austerity measures.

Draghi (2015) in a speech delivered at the IMF, announced that the ECB has adopted new monetary instruments (quantitative easing) that are different from the conventional tools but are out to achieve the same results. Again, he had earlier in 2014, stressed that ECB will do what ever it takes to save and preserve the euro. The consequence of these actions of Draghi has seen the decrease in dangerous yields of peripheral European Sovereign bonds that made borrowing very dangerous in the past.

Despite the difficulties of the euro zone, no member is leaving the currency area, instead, there is an enlargement of the E.A even in the mist of crisis; Slovakia joined the zone, Estonia in 2011, Latvia in 2014 and Lithuania in 2015. This shows that the E.U members are determined to combat the crisis at all cost and the question of brake-up to national currencies is far fetched. Why then is the pain felt deeply in the Greek economy? Or why then has the systematic crisis been shifted to Greece? The reason behind the formation of EA was for a greater economic performance, but other EA members have refused to redress the situation accordingly. In the full sense of the euro club, the debts of Greece have to be the internal debts of the entire euro area (Ertem, 2015). According to the Greek government, the EU is not ready to reconcile with them, which makes Greece to suspect the EU has different plans. This could be right because the EU can absorb the debts and quell the crisis. But what are the motives behind this? The objective is to make Greece people force their government to practice neo-liberal policies and probably turn the Greek experience into an example worth emulating for the entire euro club (Ertem, 2015).

The banking industry within the euro area has been largely criticized for fueling the crisis via asset-backed securities and this was at the forefront of the global crisis that was later extended to the euro area (Philip, 2012). It's argued today that the euro area needs a banking unification that is closely monitored by a fiscal union in order to step out of the crisis and be able to stimulate its growth (Honkapohja, 2013).

Greece is expected to make 1.6 billion euro re-payment to the International Monetary Fund the end of June 2015. If this is not done, the country will encounter banking defaults and probably spark capital controls. If this happens, Greece might be pushed

out of the currency club. Greece is currently negotiating with her international creditors (European Commission, ECB & IMF) as deadline looms to unfreeze 7.2 billion euro in bailout money. The recent finance ministers' summit in Brussels, June 2015 is largely preoccupied with the Greek crisis. Nevertheless, the Greece finance minister and the prime minister who were both in Brussels insisted that Greece is determined to stay in the euro currency club.

When the euro was introduced in 1999, there were arguments that it was too weak for reviving economies, now the arguments raised is that the euro is too strong for countries like Italy. The current problem is external, that is, it came from the dollar. The decision to join the Eurozone is effectively irreversible and exit is effectively impossible (Eichengreen, 2010). This is very relevant in that;

A first reason why members will hardly exit, the economic costs are enormous. A country that leaves the euro because of problems of competitiveness would be expected to devalue its newly reintroduced national currency. But workers would know this, and the resulting wage inflation would neutralize any benefits in terms of external competitiveness. Moreover, the country would be forced to pay higher interest rates on its public debt.

Again, why countries are very reluctant to abandon the euro is because to re-write all accounting and business contracts back to local currency will be painful to realize. The citizens will face difficulties getting used to the national currency coupled with the fact that such a decision will have to be approved through discussions and may be national parliament. In fact it is going to be highly procedural to achieve such a lofty endeavor.

Another reason why leaving the euro area despite the difficulties at hand, is fear of discrimination. If a member leaves the euro area, the member will continuously face opposition from the other E.U members and consequently, this will act against the country's own progress. Besides this, Wyplosz (2015), goes further to state that, Europeans authorities are bound to face obstacles in giving the mutual support to each other because they both face conflict of interest. Close to 80% of the Greek debt

is now owed to officials of the European Union and the IMF. Yet the official slogan or rhetoric is that “we have done enough for Greece” (Wyplosz, 2015).

Yellen (2014) argues that macro-prudential approach can promote financial stability and full employment of a central bank in a currency area that is hit by systematic crisis. This will empower the role of monetary policy within the area. Therefore, a better implementation of monetary policy and a balance of macro-prudential approaches will ensure the financial stability of the central bank. Draghi (2015), the current ECB president has recently announced new tools (quantitative easing) aimed at achieving same targets.

According to Philip (2012), international financial system has demonstrated a severe test of financial globalization. The growth in cross-border trade ten years before the crisis saw a rapid increase in credit markets that fired the crisis. This has further amplified the costs of policy and regulatory failures in terms of preventing and managing the crisis. To Philip (2012), if the euro area most succeed in the phase of financial globalization, then more needs to be done as regards the designing of global, regional and national policies in a manner that can absorb asymmetric shocks at the level of international financial integration. There must be a balance between the international and the EA institutions to meet the present day challenges arising from globalization.

However, the reactions of authors concerned about the euro area leads this study to establish a conclusion that, if the euro area must survive the present shock under fixed exchange rate, then there is urgent need for a fiscal union to discipline the actions of member’s states because Greece’s experience shows clearly that fiscal indiscipline from politicians plunged the country to crisis.

Again, the debates clearly indicate the euro area is an optimum currency area and not a perfect example of a currency club.

## **5. AN EMPIRICAL ANALYSIS ON THE EFFECTIVENESS OF THE EURO ZONE AS AN OPTIMUM CURRENCY AREA**

The goal of this last part is to test and bring out empirical evidence on the effectiveness of Optimum currency areas theories in the euro zone. In doing so, international trade flows are independently tested to see if exchange rate is the major drivers of imports and exports. The chapter proceeds to use a time series econometric methodology as will be seen in the subsequent paragraphs.

### **5.1. Trade flows in the Eurozone and the 2008 financial crisis**

At this level, an analysis of the euro zone in the recent crisis vis-à-vis exchange rate risk or volatility will be examined in the light of trade flows with partner, the USA.

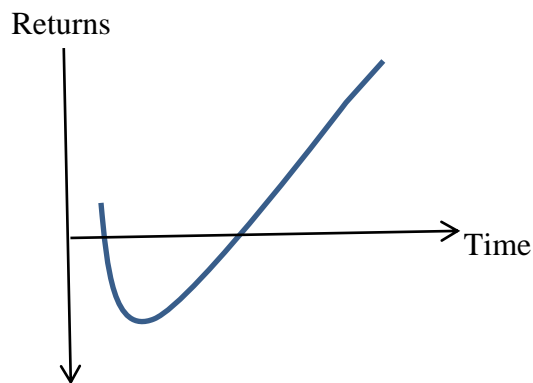
#### **5.1.1. Impacts of Exchange Rate Volatility on Trade Flows between the Eurozone and the United States**

Since the conception of the Eurozone as an OCA, the crisis has left consequences in the economy of the euro area as seen in the economies of Greece, Portugal, Ireland, Italy and Spain. In this part, an econometric analysis is applied to measure the effects of this risk (exchange rate volatility) on trade flows. In this manner, we will proceed by having a brief review of what studies on exchange rate and trade theory explain. The aim of this analysis is to indicate the vitality of exchange rate between the E.A and U.S as key global economic players. Also, this study is out to find out if exchange rate or exchange rate volatility is important factors in explaining the international trade flows especially in the 2008 financial crisis.

### 5.1.2. The J-Curve and the Marshall Lerner Conditions

The analysis of currency volatility theory is inspired by the J-curve consequences and the Marshall-Lerner condition. The Marshall Lerner conditions explains how a country's currency depreciation can be corrected using a current account deficit. Price elasticity of demand (PED) for exports plus the price elasticity of demand for import should be greater than one, that is  $(PED_x + PED_m > 1)$ . In other words, if the home currency devalues, that is the prices of international goods increases in relation to the prices of local goods, the balance of trade will be affected positively because home consumers will buy less imports and foreign consumers will purchase more of exports (Welfens, 2009).

The J-curve shows a deterioration in a country's BOP position when there is a devaluation / depreciation. The J-shape indicates the time series trend. The effect is a phenomenon in which a period of weak or negative output or returns is followed by a slow or weak recovery that stabilizes at a higher level than before the decline. The situation appears as a 'J' shape on a time series.



The trade balance of a country faces the J-curve effect if devaluation of its currency occurs. At first, the total value of imports exceeds its total value of exports resulting in a trade deficit. But eventually, the currency devaluation reduces the price of its exports. Consequently, the country's level of exports gradually recovers, and the country moves back to a trade surplus (Bremmer, 2007).

## 5.2. Econometric Model Specification and Data Definition

This technical part of the thesis tests the impact of exchange rates and the and their volatility on trade flows in the Euro Area and the USA. The same test has been studied by Bourdan and Korinek for the trade between China, Euro and the United States .An autoregressive-distributed lag (ARDL) is used to measure and model the effects of exchange rate and exchange rate fluctuations on trade flows in the Euro zone and the United States (U.S). The ARDL model is also known as the bound test and was introduced by Pesaran et al, (2001). The estimations of imports and exports are done in two separate equations; exchange rate and exchange rate volatility, and also, determinants proxy for income (GDP) is also included in these equations. The method was chosen for various reasons; it takes into account the mathematical properties of the time series by verifying stationary<sup>11</sup> or non-stationary of our variables. Cointegration<sup>12</sup> is applied to check the long run as well as short run effects with the associated risk. The reason again for using this method is because it enables the determination of the short and long run effects together; also, ARDL is advisable and beneficial because there is no pre-unit-root-testing<sup>13</sup> of the variables in the

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<sup>11</sup> Stationarity of a time series suggests that the variables fluctuate around a mean in a manner that there is always short return to the equilibrium. A stationary series is one whose mean, variance, autocorrelation are stable over time. If a series is not stationary, it can be differenced in order to make it suitable for forecasting. This is because prediction is insignificant and very difficult without a correction of these statistical or mathematical properties.

<sup>12</sup> Cointegration signifies a situation of relatively stable long run relationship. Variables are cointegrated when the gaps and deviations are less, that is, if there is a linear relationship amongst the variables, which renders it stationary.

<sup>13</sup> Unit test is also an important step in time series as economic and financial time series demonstrate situations of stationarity or non-stationarity in the mean. Asset prices, exchange rates, GDP are examples. The goal of econometric analysis is to determine the most appropriate form of the trend in the data. For example, in ARMA modeling the data must be transformed to stationary form prior to analysis. If the data are trending, then some form of trend removal is required.

model. This makes it more suitable than the other techniques of cointegration test like that of Johansen, Augmented Dickey-fuller, (ADF), and Watson.

$$M_{,t} = b_1 + b_2 Y_{E.A,t} + b_3 ER_t + b_4 Vol_t + \mu_t \quad (1)$$

$$X_{,t} = b_5 + b_6 Y_{U.S,t} + b_7 ER_t + b_8 Vol_t + \varepsilon_t \quad (2)$$

Equation (1) is a reduced form of the equation, derived from demand and supply model in which  $M$  is the measure of trade in time period  $t$  defined as a ratio of imports of the E.A from the U.S.  $Y_{E.A}$  is the measure of production (proxy for income here is GDP),  $ER$  is the exchange rate parity of the euro and the dollar (nominal),  $Vol$  is the represents exchange rate volatility (risk). The second equation (2) is also a reduced form equation, derived from demand and supply model where  $X$  measures the value of exports from E.A to the U.S,  $Y_{U.S}$  represents income and  $ER$  is the nominal exchange rate.

### 5.2.1. Data Definitions and Sources

The research considers two main regions; the E.A and the U.S, where the impact of trade risk or volatility is measured to see its effects on imports and exports especially in the recent financial crisis of the EA.

Information on this study is a time series data that ranges from 1999 to 2014. The data for exchange rates is retrieved from ECB statistical warehouse that of GDP is retrieved from Organization for Economic Cooperation and Development (OECD) and that of import and export from United States Census Bureau. The time series in this study is presented in quarterly form. From 1999 to 2014, our series thus have 64 observations. Exchange rate volatility is the standard deviation of the nominal exchange rate data collected from the ECB statistical warehouse. To better measure the risk, the data was collected based on daily rates and later on converted to a quarterly format.



## **Time Series**

Time series are statistical data over a long time interval. They are commonly represented on charts, and the importance of time series analysis is seen in mathematical finance, econometric analysis, weather forecasting, just to name a few. Time series forecasting is used to predict the future values based on previous observations and regression analysis is used to test theories. In describing time series, we decompose the series into four elements; Trend ( $T_t$ ) long term movements in the mean; Seasonal impacts ( $I_t$ ) cyclical variations with respect to calendar; Cycles ( $C_t$ ) cyclical fluctuations like trade cycles; Residuals ( $E_t$ ) systematic fluctuations. They can either be additive or multiplicative structures when merged. Time series can be univariate analysis where it uses one variable in terms of application and multivariate analysis where it involves multiple variables simultaneously.

The time series could be represented in structures such as Vector autoregression (VAR), Autoregressive conditional heteroskedasticity (ARCH), Autoregressive moving average (ARMA) and Autoregressive Integrated Moving Averages (ARIMA), are both models to understand time series data and make previsions, Autocorrelation (Serial correlation) is a tool to sought patterns that are repeating such as periodic signals blocked by noise as well indicating missing basic frequency signals frequency in a signal implied by its harmonic frequencies. Autocorrelation could be seen as correlation amongst variables of some observations at different points of time if it is about a “time series data”, or it will be correlation between the variables of some observations at different space if it is about “cross sectional data”.

The above-mentioned models are carried on time series and further tested using specific test to see the level of significance. The tests consist of Dickey-Fuller, Johansen, Ljung-Box, Durbin-Watson, Breusch-Godfrey tests.

### 5.2.2. Econometric Methodology

The econometric model is formulated in two separate equations of exports and imports with respect to the euro area vis-à-vis her partner. The trade flows equations are modeled as a conditional ARDL-correction model for the E.A and the U.S. The equations incorporate a linear combination of the lagged level of all variables, which represent the error correction term (ECT, second line of each equation). With these specifications, we detect the effects in the short run and long run.

$$\Delta M_t = c_0 + \sum_{k=1}^{n1} c_{1k} \Delta M_{t-k} + \sum_{k=0}^{n2} c_{2k} \Delta Y_{EA,t-k} + \sum_{k=0}^{n3} c_{3k} \Delta ER_{t-k} + \sum_{k=0}^{n4} c_{4k} \Delta Vol_{t-k} + \delta_0 M_{t-1} + \delta_1 Y_{EA,t-1} + \delta_2 ER_{t-1} + \delta_3 Vol_{t-1} + \mu_1$$

$$\Delta X_t = d_0 + \sum_{k=1}^{n1} d_{1k} \Delta X_{t-k} + \sum_{k=0}^{n2} d_{2k} \Delta Y_{US,t-k} + \sum_{k=0}^{n3} d_{3k} \Delta ER_{t-k} + \sum_{k=0}^{n4} d_{4k} \Delta Vol_{t-k} + \lambda_0 X_{i,t-1} + \lambda_1 Y_{US,t-1} + \lambda_2 ER_{t-1} + \lambda_3 Vol_{t-1} + \xi t$$

The following steps will guide the analysis

#### 5.2.2.1. The Process of Cointegrations

To check for cointegration or significance of the lagged variables, we will refer our results to F-test, which is the first step in estimating the error correction. In this stage, Pesaran et al, (2001) propose a fixed number of lags to be added to the differenced variable. The estimations are by Ordinary Least Square and the different models of ARDL for all lags with a maximum of 12 lags. To select the best model of the lags for this analysis, the Akaike's information criterion (AIC) and Schwartz Bayesian Criterion (SBC) also known as Schwartz information criteria (SIC) indicate which model and number of lags to be selected. The model with which has the smallest value is selected.

Cointegration is then tested using OLS estimations by restricting all estimated coefficients of lagged level variables equal to zero ( $\lambda_0 = \lambda_1 = \lambda_2 = \lambda_3 = 0$ ) the null

hypothesis is then tested against alternative for cointegration using the F-test with an asymptotic non-standard distribution. When the F-statistics is above the upper band, the null is rejected, hence justifying the presence of cointegration. If this value thus fall below the band, the null can't be rejected, thus a situation of no cointegration indicative of such a result. When the F-statistics fall within the band, the results are difficult to be concluded. That is why it is referred to as a bound test, because it falls between the bounds because the two sets of critical values indicate possibilities of the regressors into purely I(0), I(1) or mutually integrated

After the confirmation of the existence of long-term relationship between the variables, the long run and short run model is thus derived. The error correction term is then formed from these estimates  $\lambda_0-\lambda_3$  as  $ECT_{t-1}$ .

The  $ECT_{t-1}$  is then introduced and it replaces the linear combination of the lagged variables and re-estimated by using the same lag as before. The velocity of recovery back to the long run equilibrium is then measured by the coefficient obtained from this  $ECT_{t-1}$ . A negative coefficient that is also significant indicates the speed of adjustment back to the equilibrium and also justifies the presence of cointegration amongst the variables (Bahmani & Ardalani, 2006). The greater the coefficient, the more rapid the economy is to return back to equilibrium.

In the concluding part, a cumulative sum (CUSUM) and cumulative sum of square test (CUSUMQ) test for stability are tested for long run and short run stability test of Brown et al, (1975). A serial correlation (autocorrelation) is checked using the specifications of LM-test of non-autocorrelation of residuals and Ramsey Reset specification test.

$$W_r = \frac{1}{\hat{\sigma}_{ols}} \sum_{j=k+1}^r v_j, r = k + 1, k + 2, \dots, n$$

The tests (CUSUM and CUSUMQ) are based on a recursive residual that rely on the first j observations. Also the tests are demonstrated on a graph with assumption of a

5 % significance level where W and a pair of straight lines for values of  $r = k+1, k+2, n$ .

### **5.3. Checking for Cointegration or Long-term relationship between Export variables to be estimated**

#### **5.3.1. Developing the Auto-Regressive Distributed Lag Model**

The ARDL model in this work is constructed using Imports and Exports as dependent variables while exchange rate; gross domestic product and exchange rate volatility are independent variables. In the ARDL model, some of the variables are cointegrated of first order and said to be stationary of first order  $I(1)$ , while some are not  $I(0)$

Since there is no pre-unit-testing test here, we proceed by differencing the variables and after which we select suitable lags in the guidelines of AIC and SIC. The optimum number of lags for the ARDL model did not have a limit, but Pesaran et al., (2001) proposed a maximum of 12 lags. In this research, testing and selection started with 12 lags to see the model that aptly satisfies the SIC and AIC criteria. According to these criteria, the model that has been introduced a particular number of lags should have the least values. In this case, the Export equation was introduced 3-lags which had the lowest values of SIC and AIC criteria. Thus, the formulation of the distributed 12-lag model was as follows,

The Normal Model:

$$M = b_1 + b_2 * GDP_{E.A} + b_3 * ER + b_4 * Vol$$

$$X = b_5 + b_6 * GDP_{U.S} + b_7 * ER + b_8 * Vol$$

M=imports, X=Exports, GDP= Gross domestic product, ER=Exchange rates,

Vol=ER Volatility

The model used 3-lags; The software used for the analysis is Eviews (IHS Global Inc.) version 8.

### 5.3.2. Procedures to Test Long-Term Relationship (Cointegration)

After selecting the perfect model, the model was then tested for;

1. Stability Diagnostics via recursive estimate (Ordinary Least Square), that is, CASUM and CASUMQ plotting  $W$  and a pair of straight lines for values of  $r=k+1$ ,  $k+2$ ,  $n$ . assuming a 5% significance level  
CASUM and CASUMQ
2. Serial correlation; LM test verifying the  $R^2$  & P values. If  $>5\%$  we Accept the Null Hypothesis and attesting no serial correlation
3. Bound testing; Bound testing via coefficient diagnostic using WALD test compared with the Pesaran Critical values at 5% significance. The F-statistics is then compared within the bounds. If  $F\text{-stat} > \text{upper limit}$ , we confirm cointegration(reject the null) if below, no cointegration, within, inconclusive.
4. The next is to develop the SR & LR model by establishing the error correction term  $d(m)$   $c$   $d(m(-1))$   $d(m(-2))$   $d(m(-3))$   $d(gu(-1))$   $d(gu(-2))$   $d(gu(-3))$   $d(e(-1))$   $d(e(-2))$   $d(e(-3))$   $d(v(-1))$   $d(v(-2))$   $d(v(-3))$  ECT(-1)
5. After correcting the model, the ECT coefficient is obtained. A negative and significant coefficient is desirable because it indicates the speed of recovery back to the equilibrium.
6. The model is then tested for -Serial correlation and stability diagnostic as specified above.
7. The last step is to restrict the independent variables and check the short run causality amongst the lagged variables to see the short run impacts
8. Where null hypothesis is rejected in case the probability is not equal to zero

**Table 5.1: Serial correlation, LM test**

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.672103	Prob. F(3,40)	0.1883
Obs*R-squared	6.685988	Prob. Chi-Square(3)	0.0826

Test Equation:

Dependent Variable: RESID

Method: Least Squares

Date: 05/31/15 Time: 15:48

Sample: 2003 2062

Included observations: 60

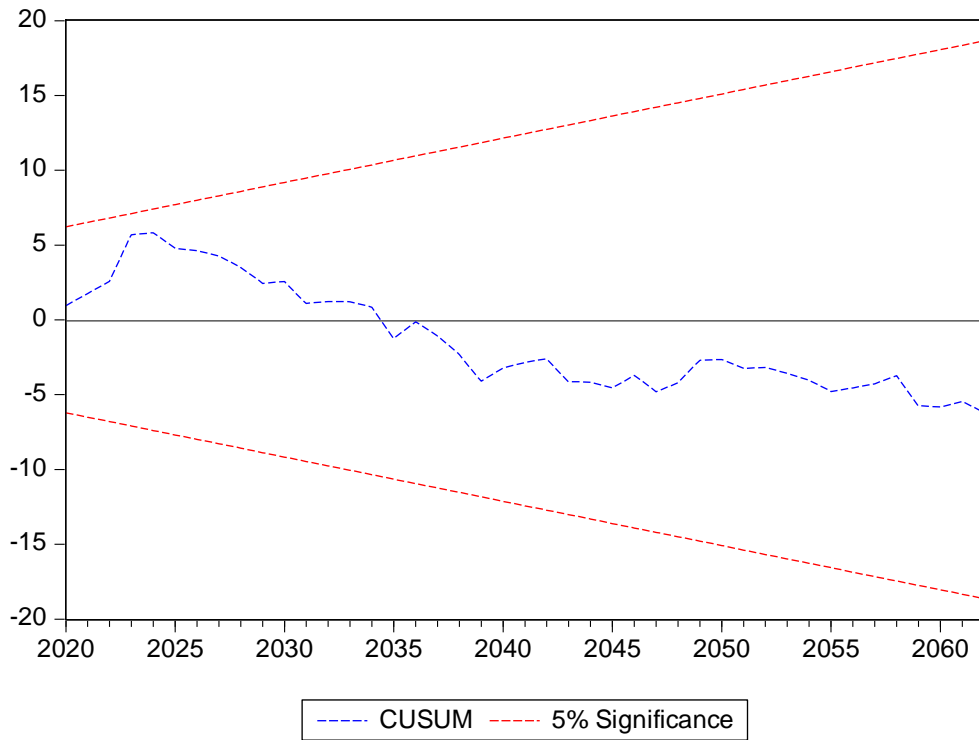
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.034938	0.158144	0.220925	0.8263
D(X(-1))	0.057655	0.339966	0.169591	0.8662
D(X(-2))	0.027092	0.195802	0.138363	0.8906
D(X(-3))	0.042260	0.072434	0.583423	0.5629
D(GE(-1))	-0.004054	0.025843	-0.156881	0.8761
D(GE(-2))	0.008637	0.025862	0.333969	0.7401
D(GE(-3))	0.001050	0.023813	0.044081	0.9651
D(E(-1))	0.107395	0.206913	0.519034	0.6066
D(E(-2))	0.023884	0.219604	0.108761	0.9139
D(E(-3))	-0.010691	0.210622	-0.050759	0.9598
D(V(-1))	1.308973	2.693987	0.485887	0.6297
D(V(-2))	0.826968	2.270223	0.364267	0.7176
D(V(-3))	1.138533	1.700538	0.669513	0.5070
X(-1)	-0.434835	0.454015	-0.957755	0.3439
GE(-1)	-0.005546	0.025156	-0.220450	0.8266
E(-1)	-0.021223	0.092996	-0.228208	0.8206
V(-1)	-0.609954	2.844200	-0.214455	0.8313
RESID(-1)	0.606150	0.299005	2.027223	0.0493
RESID(-2)	-0.185485	0.283460	-0.654361	0.5166
RESID(-3)	0.030154	0.298079	0.101161	0.9199
R-squared	0.111433	Mean dependent var		1.91E-17
Adjusted R-squared	-0.310636	S.D. dependent var		0.068405
S.E. of regression	0.078313	Akaike info criterion		-1.995014
Sum squared resid	0.245315	Schwarz criterion		-1.296899
Log likelihood	79.85041	Hannan-Quinn criter.		-1.721943
F-statistic	0.264016	Durbin-Watson stat		1.958048
Prob(F-statistic)	0.998577			

Serial correlation is checked by verifying  $R^2$  and Probability, and the Probability value is  $>5\%$ , that is,  $8.26\%$  and the observed  $R^2$  is  $6.69\%$

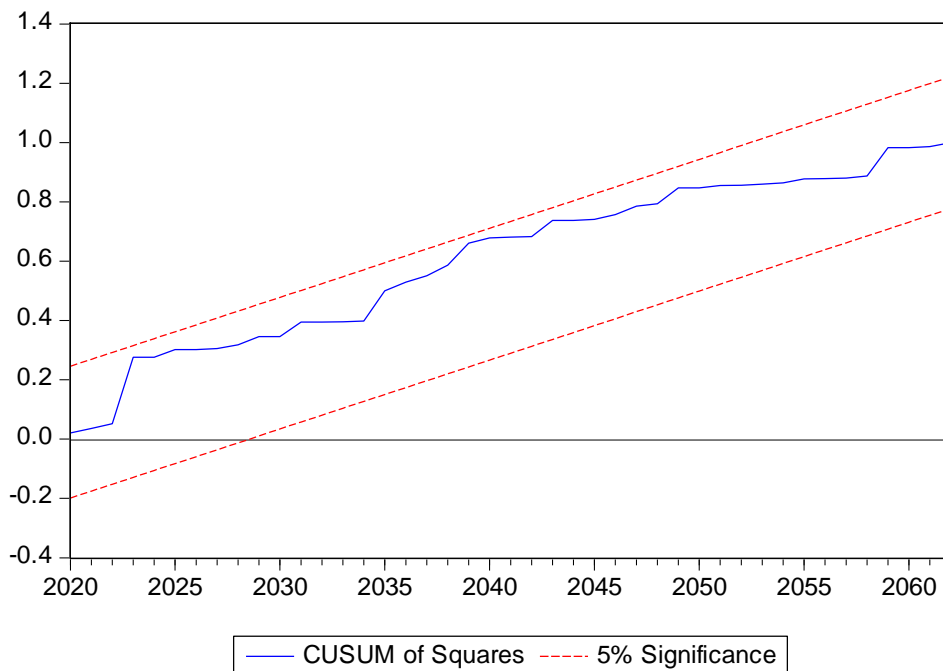
Here we Accept Null Hypothesis indicating that the model has no serial correlation.

Check for Stability Diagnostics using recursive estimate (OLS), that is, CASUM and CASUMQ stability via CUSUM and CUSUMQ test at 5% significance



**Figure 5.1:** CUSUM test at 5% significance

Also, the CUSUMQ test is carried on to see the level of stability, that is, if it falls between the boundaries



**Figure 5.2:** CUSUMQ test at 5% significance

The two graphs above, demonstrate stability of the model at 5% significance

### **Test of coefficients Diagnostics using Wald test (Bound Testing)**

The next step is to check for long run relationship using the Pesaran et al, (2001) cointegration procedures. First we check our F-Statistics using the WALD statistics, this is known as a coefficient diagnostic. In this stage, we check for long run relationship between Exports, GDP, Exchange rate and exchange rate volatility.

The Null Hypothesis here is:

$$c(14)=c(15)=c(16)=c(17)=0$$

The results, that is, the F=statistics is used as reference and with the critical values of the Pesaran table. In our model, there is an unrestricted intercept and no trend as seen by the previous graphs, the value here is compared with the Pesaran critical value at 5 % level of significance.



**Table 5.2:** Coefficients Diagnostics using Wald test

Wald Test:  
Equation: Untitled

Test Statistic	Value	Df	Probability
F-statistic	15.92398	(4, 43)	0.0000
Chi-square	63.69591	4	0.0000

Null Hypothesis:  $C(14)=C(15)=C(16)=C(17)=0$   
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(14)	-2.259490	0.287077
C(15)	0.004262	0.025350
C(16)	-0.052029	0.091766
C(17)	-2.937931	2.686206

Restrictions are linear in coefficients.

From the Pesaran table

**Table 5.3:** Bounds Test for Co-integration Results using F-Stat (Export Equation)

Critical value at	Lower Bound Value	Upper Bound Value
1%	2.72	3.77
5%	3.23	4.35
10%	4.29	5.61

**Note:** Computed F-statistic: **15.92398** (Significant at 0.05 marginal values). Critical Values are cited from Pesaran et al,(2001), Table CI (iii), Case 111: Unrestricted intercept and no trend.

F-Statistics  $>4.35$  (upper limit), we thus reject the null in preference for the alternative and recall that

$$\text{Null stated } c(14)=c(15)=c(16)=c(17)=0$$

The bound tests above demonstrate that the variables both have a long run relationship as seen.

Developing the long run and short run model.

Estimates are then used to form the error correction term, after that, the error correction model is re-estimated by using the same lag structure. As the variables are adjusting towards equilibrium, the coefficients are used to determine the velocity or speed of adjustment back to the equilibrium. When the coefficients are negative and also significant in magnitude, it attest strongly the presence of co-integration among the variables ( Bahamani & Ardalani, 2006).

**Table 5.4:** Development of long and short runs model

Dependent Variable: X  
Method: Least Squares  
Date: 05/31/15 Time: 17:02  
Sample: 1999 2062  
Included observations: 64

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.125950	0.203332	-0.619428	0.5380
GE	0.038369	0.034954	1.097717	0.2767
E	0.045138	0.138282	0.326419	0.7452
V	4.266810	2.981271	1.431205	0.1576

R-squared	0.051080	Mean dependent var	0.012691
Adjusted R-squared	0.003634	S.D. dependent var	0.172505
S.E. of regression	0.172191	Akaike info criterion	-0.619961
Sum squared resid	1.778988	Schwarz criterion	-0.485031
Log likelihood	23.83876	Hannan-Quinn criter.	-0.566805
F-statistic	1.076594	Durbin-Watson stat	1.364225
Prob(F-statistic)	0.365892		

From this long-run and short-run estimation, its easy to determine the residual of the error correction model and then re-estimate using the 3-lags

$$d(x) c d(x(-1)) d(x(-2)) d(x(-3)) d(ge(-1)) d(ge(-2)) d(ge(-3)) d(e(-1)) d(e(-2)) d(e(-3)) d(v(-1)) d(v(-2)) d(v(-3)) ECT(-1)$$

d=difference; x=exports; ge=gdp of E.A; e=exchange rate; v=volatility of exchange rate; ECT=error correction term. The below are the results obtained.

**Table 5.5:** Long run interpretation of ECT

Dependent Variable: D(X)  
 Method: Least Squares  
 Date: 05/31/15 Time: 21:14  
 Sample (adjusted): 2003 2062  
 Included observations: 60 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.033864	0.014269	-2.373348	0.0219
D(X(-1))	0.369829	0.242312	1.526255	0.1338
D(X(-2))	0.364385	0.159709	2.281557	0.0272
D(X(-3))	-0.071242	0.082503	-0.863515	0.3923
D(GE(-1))	-0.042517	0.026960	-1.577069	0.1216
D(GE(-2))	-0.033405	0.027446	-1.217127	0.2298
D(GE(-3))	-0.044382	0.027182	-1.632763	0.1093
D(E(-1))	-0.059818	0.224578	-0.266357	0.7912
D(E(-2))	0.047995	0.228730	0.209832	0.8347
D(E(-3))	0.140496	0.224846	0.624855	0.5352
D(V(-1))	-5.546279	2.061400	-2.690540	0.0099
D(V(-2))	-3.185776	2.192529	-1.453014	0.1530
D(V(-3))	-2.239965	1.822127	-1.229313	0.2252
ECT(-1)	-1.486030	0.302751	-4.908415	0.0000
R-squared	0.719086	Mean dependent var		0.001106
Adjusted R-squared	0.639697	S.D. dependent var		0.164697
S.E. of regression	0.098860	Akaike info criterion		-1.589261
Sum squared resid	0.449572	Schwarz criterion		-1.100580
Log likelihood	61.67782	Hannan-Quinn criter.		-1.398111
F-statistic	9.057764	Durbin-Watson stat		1.692777
Prob(F-statistic)	0.000000			

The results above demonstrate that the speed of adjustment towards long run equilibrium is **14.86%**. This means, the larger the error correction coefficient, the greater the speed of adjustment back to the equilibrium. Hence our model is adjusting rapidly towards the equilibrium

Again, serial correlation is verified in the corrected model

**Table 5.6:** Test for serial correlation, LM Test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.440509	Prob. F(3,43)	0.2442
Obs*R-squared	5.479359	Prob. Chi-Square(3)	0.1399

Test Equation:

Dependent Variable: RESID

Method: Least Squares

Date: 05/31/15 Time: 21:17

Sample: 2003 2062

Included observations: 60

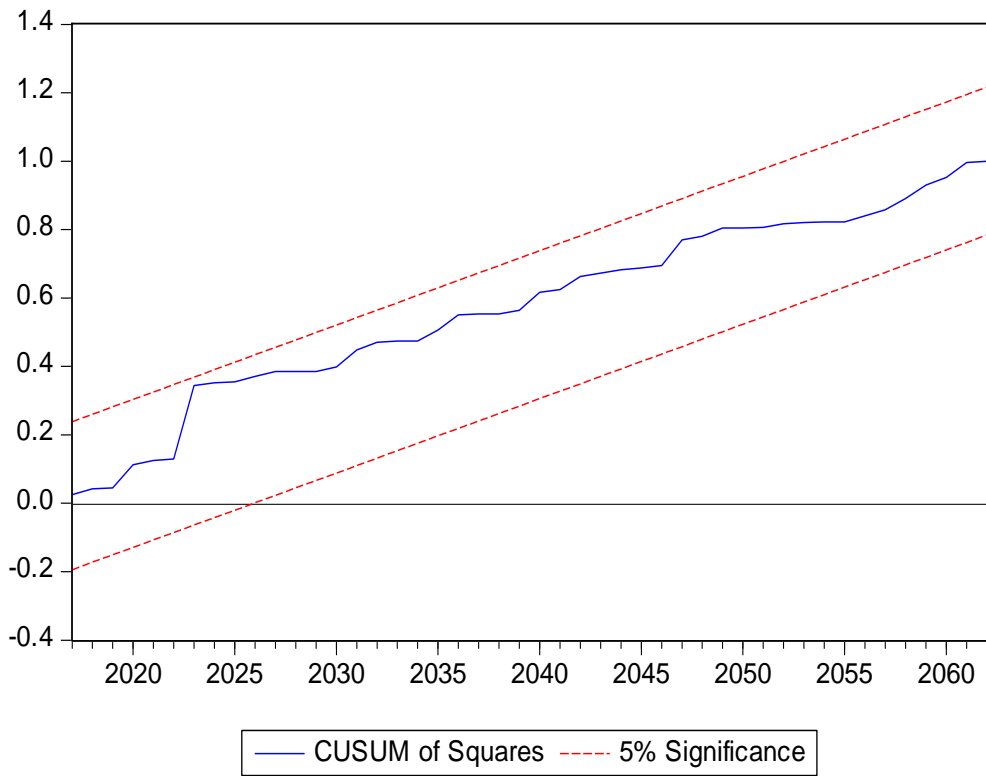
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.001496	0.017363	-0.086148	0.9317
D(X(-1))	-0.277573	0.457786	-0.606338	0.5475
D(X(-2))	-0.081552	0.286706	-0.284444	0.7774
D(X(-3))	0.061389	0.090611	0.677505	0.5017
D(GE(-1))	-0.011080	0.035894	-0.308679	0.7591
D(GE(-2))	0.013917	0.034026	0.408997	0.6846
D(GE(-3))	0.000351	0.031057	0.011308	0.9910
D(E(-1))	0.021503	0.234545	0.091679	0.9274
D(E(-2))	-0.007229	0.231759	-0.031194	0.9753
D(E(-3))	-0.017851	0.223480	-0.079877	0.9367
D(V(-1))	0.273429	2.883050	0.094840	0.9249
D(V(-2))	0.336664	2.706216	0.124404	0.9016
D(V(-3))	1.037417	2.017795	0.514134	0.6098
ECT(-1)	-0.135068	0.573699	-0.235434	0.8150
RESID(-1)	0.549840	0.383755	1.432790	0.1591
RESID(-2)	-0.368250	0.321559	-1.145203	0.2585
RESID(-3)	-0.026700	0.334910	-0.079722	0.9368
R-squared	0.091323	Mean dependent var	-1.85E-17	
Adjusted R-squared	-0.246790	S.D. dependent var	0.087292	
S.E. of regression	0.097470	Akaike info criterion	-1.585026	
Sum squared resid	0.408516	Schwarz criterion	-0.991628	
Log likelihood	64.55078	Hannan-Quinn criter.	-1.352915	
F-statistic	0.270095	Durbin-Watson stat	1.958994	
Prob(F-statistic)	0.996813			

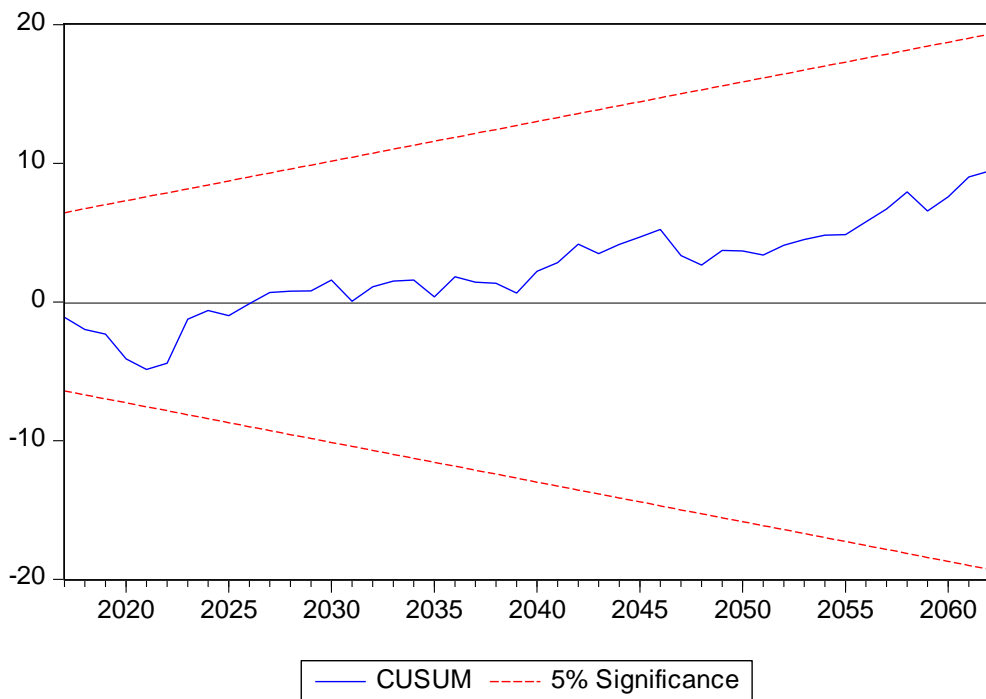
Serial correlation is checked by verifying  $R^2$  and Probability, and the Probability value is  $>5\%$ , that is,  $13.99\%$  and the observed  $R^2$  is  $>5\%$

Here, we Accept Null Hypothesis indicating that the model has no serial correlation.

Furthermore, the CUSUM and CSUMQ test for stability of the model.



**Figure 5.3:** Long run CUSUMQ at 5% Significance



**Figure 5.4:** Long run CUSUM at 5 % Significance

### 5.3.3. Measurement of Short run Causality and speed of adjustment back to the equilibrium for the export

The three tables below show that the short run impacts that flow from lag 1 to lag 3 for the independent variables is weak in the short run. This is in connection to the rejection of the null in preference for the alternative; all their probabilities demonstrate that we reject the null.

**Table 5.7:** Short run test of coefficients diagnosis for  $GDP_{E.A}$  using the Wald test

Wald Test:  
Equation: Untitled

Test Statistic	Value	df	Probability
F-statistic	1.803554	(3, 46)	0.1598
Chi-square	5.410662	3	0.1441

Null Hypothesis:  $C(5)=C(6)=C(7)=0$   
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(5)	-0.042517	0.026960
C(6)	-0.033405	0.027446
C(7)	-0.044382	0.027182

Restrictions are linear in coefficients.

**Table 5.8:** Short run test of coefficients diagnosis for Exchange rate using Wald test

Wald Test:  
Equation: Untitled

Test Statistic	Value	df	Probability
F-statistic	0.170808	(3, 46)	0.9156
Chi-square	0.512425	3	0.9162

Null Hypothesis:  $C(8)=C(9)=C(10)=0$   
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(8)	-0.059818	0.224578
C(9)	0.047995	0.228730
C(10)	0.140496	0.224846

Restrictions are linear in coefficients.

**Table 5.9:** Short run test of coefficients diagnosis for Exchange rate volatility using the Wald test

Wald Test:  
Equation: Untitled

Test Statistic	Value	df	Probability
F-statistic	2.457821	(3, 46)	0.0748
Chi-square	7.373463	3	0.0609

Null Hypothesis:  $C(11)=C(12)=C(13)=0$   
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(11)	-5.546279	2.061400
C(12)	-3.185776	2.192529
C(13)	-2.239965	1.822127

Restrictions are linear in coefficients.

Above, the short run impacts of exchange rate, GDP and exchange rate volatility does not affect export in the short run as we reject the entire null hypothesis for the alternative. Furthermore, exchange rate lag 1, lag 2 lag 3 combined together, does not have any short run effects on the exports of the euro area in the long run but joins the other studies to confirm that the recent crisis in Europe had no short run effects but rather long run impacts. The speed of recovery is 14.9% towards the long run equilibrium for the exports from the Euro area to the United States.

#### **5.4. Checking for Cointegration or Long term relationship between import variables to be estimated**

ARDL model as explained by Pesaran et al, (2001). Since there is no pre-unit-testing test here, cointegration will proceed by differencing the variables and after which we select suitable lags in the guidelines of AIC and SIC.

The optimum number of lags for the ARDL model did not have a limit, but Pesaran et al., (2001) proposed a maximum of 12 lags.

In this research, testing and selection started with 12 lags to see the model that aptly satisfies the SIC and AIC criteria. According to these criteria, the model that has been introduced a particular number of lags should have the least values. In case, the Export equation was introduced 3-lags which had the lowest values of SIC and AIC criteria.



**Table 5.10:** Test for Serial correlation

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.833503	Prob. F(3,40)	0.4834
Obs*R-squared	3.530090	Prob. Chi-Square(3)	0.3169

Test Equation:

Dependent Variable: RESID

Method: Least Squares

Date: 05/31/15 Time: 19:51

Sample: 2003 2062

Included observations: 60

Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.062068	0.162565	-0.381803	0.7046
D(M(-1))	0.284299	0.335244	0.848038	0.4015
D(M(-2))	0.097692	0.195838	0.498839	0.6206
D(M(-3))	0.053701	0.085361	0.629101	0.5329
D(GU(-1))	-0.006628	0.024129	-0.274704	0.7850
D(GU(-2))	0.001859	0.023515	0.079059	0.9374
D(GU(-3))	0.007676	0.019871	0.386296	0.7013
D(E(-1))	0.030274	0.150798	0.200762	0.8419
D(E(-2))	0.050104	0.166151	0.301559	0.7646
D(E(-3))	-0.012112	0.167070	-0.072496	0.9426
D(V(-1))	-0.398679	2.661046	-0.149821	0.8817
D(V(-2))	-0.113731	2.126115	-0.053492	0.9576
D(V(-3))	0.657586	1.642658	0.400318	0.6911
M(-1)	-0.590747	0.474155	-1.245893	0.2201
GU(-1)	0.008355	0.026547	0.314711	0.7546
E(-1)	0.024697	0.089273	0.276647	0.7835
V(-1)	1.418839	2.899096	0.489408	0.6272
RESID(-1)	0.414342	0.324104	1.278423	0.2085
RESID(-2)	0.150741	0.256113	0.588573	0.5595
RESID(-3)	0.059340	0.251452	0.235990	0.8146
R-squared	0.058835	Mean dependent var	9.48E-18	
Adjusted R-squared	-0.388219	S.D. dependent var	0.057677	
S.E. of regression	0.067957	Akaike info criterion	-2.278688	
Sum squared resid	0.184725	Schwarz criterion	-1.580573	
Log likelihood	88.36064	Hannan-Quinn criter.	-2.005617	
F-statistic	0.131606	Durbin-Watson stat	1.959821	
Prob(F-statistic)	0.999991			

Serial correlation is checked by verifying the Probability, and the Probability value is >5%, that is, 31.7%.

Here we Accept Null Hypothesis indicating that the model has no serial correlation.

## Bound test for cointegration in imports, Exchange rate, volatility and gdp

**Table 5.11:** Coefficients Diagnostics using Wald test

Wald Test:  
Equation: Untitled

Test Statistic	Value	df	Probability
F-statistic	14.50557	(4, 43)	0.0000
Chi-square	58.02230	4	0.0000

Null Hypothesis:  $C(14)=C(15)=C(16)=C(17)=0$   
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(14)	-2.114090	0.284018
C(15)	0.018413	0.025110
C(16)	-0.026649	0.079622
C(17)	-0.385780	2.429292

Restrictions are linear in coefficients.

## Bounds Test for Cointegration Results (Imports Equation)

**Table 5.12** Bound Test for Cointegration results using F-Statistics (Imports)

Critical value at	Lower Bound Value	Upper Bound Value
1%	2.72	3.77
5%	3.23	4.35
10%	4.29	5.61

Note: Computed F-statistic: **14.50557** (Significant at 0.05 marginal values).

N.B Critical Values are cited from Pesaran et al,(2001), Table CI (iii), Case 111:

Unrestricted intercept and no trend.

F-Statistics  $>4.35$  (upper limit), we thus reject the null in preference for the alternative and recall the null stated:

$$c(14)=c(15)=c(16)=c(17)=0$$

The bound tests above demonstrate that the variables both have a long run relationship as seen.

Development of the short run and long run model

Estimates are then used to form the error correction term, after that, the error correction model is re-estimated by using the same lag structure. As the variables are adjusting towards equilibrium, the coefficients are used to determine the velocity or speed of adjustment back to the equilibrium. When the coefficients are negative and also significant in magnitude, it attests strongly the presence of cointegration among the variables (Bahamani & Ardalani, 2006).

**Table 5.13:** Development of the short run and long run model

Dependent Variable: M  
Method: Least Squares  
Date: 05/31/15 Time: 20:07  
Sample: 1999 2062  
Included observations: 64

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.146099	0.172044	-0.849198	0.3991
GU	0.054067	0.028708	1.883329	0.0645
E	0.049479	0.114035	0.433896	0.6659
V	3.978425	2.527263	1.574203	0.1207
R-squared	0.080261	Mean dependent var		0.009034
Adjusted R-squared	0.034274	S.D. dependent var		0.144148
S.E. of regression	0.141656	Akaike info criterion		-1.010366
Sum squared resid	1.203988	Schwarz criterion		-0.875436
Log likelihood	36.33173	Hannan-Quinn criter.		-0.957211
F-statistic	1.745309	Durbin-Watson stat		1.529100
Prob(F-statistic)	0.167370			

The next phase is establishing the error correction term

$$d(m) \ c \ d(m(-1)) \ d(m(-2)) \ d(m(-3)) \ d(gu(-1)) \ d(gu(-2)) \ d(gu(-3)) \ d(e(-1)) \ d(e(-2)) \\ d(e(-3)) \ d(v(-1)) \ d(v(-2)) \ d(v(-3)) \ ECT(-1)$$

An Error Correction Term (ECT) is introduced in the system. The below results are a consequences

**Table 5.14:** Long run interpretation of ECT value (Imports)

Dependent Variable: D(M)  
 Method: Least Squares  
 Date: 05/31/15 Time: 20:34  
 Sample (adjusted): 2003 2062  
 Included observations: 60 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.022368	0.011282	-1.982537	0.0534
D(M(-1))	0.363699	0.237191	1.533355	0.1320
D(M(-2))	0.461781	0.161282	2.863190	0.0063
D(M(-3))	-0.010731	0.085663	-0.125273	0.9009
D(GU(-1))	-0.020131	0.021310	-0.944685	0.3498
D(GU(-2))	-0.014057	0.021502	-0.653768	0.5165
D(GU(-3))	-0.033602	0.017973	-1.869525	0.0679
D(E(-1))	-0.085798	0.171791	-0.499430	0.6199
D(E(-2))	-0.047467	0.181552	-0.261451	0.7949
D(E(-3))	0.083680	0.180580	0.463397	0.6453
D(V(-1))	-4.089601	1.823733	-2.242433	0.0298
D(V(-2))	0.100000	1.882187	0.053130	0.9579
D(V(-3))	-1.366569	1.539042	-0.887935	0.3792
ECT(-1)	-1.532035	0.301733	-5.077446	0.0000
R-squared	0.787309	Mean dependent var		0.002826
Adjusted R-squared	0.727200	S.D. dependent var		0.153454
S.E. of regression	0.080150	Akaike info criterion		-2.008881
Sum squared resid	0.295502	Schwarz criterion		-1.520201
Log likelihood	74.26644	Hannan-Quinn criter.		-1.817731
F-statistic	13.09813	Durbin-Watson stat		1.865262
Prob(F-statistic)	0.000000			

The ECT coefficient of 15.32% is acceptable as it is negative and significant as confirmed by earlier literatures, this signifies the speed of recovery back to the equilibrium at long run, the greater the speed, the faster the economy's ability to converge back to equilibrium.

**Table 5.15:** Testing for Serial Correlation in the corrected import model

Serial Correlation for the corrected model to see the residual diagnosis

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.143224	Prob. F(3,43)	0.9335
Obs*R-squared	0.593609	Prob. Chi-Square(3)	0.8979

Test Equation:

Dependent Variable: RESID

Method: Least Squares

Date: 05/31/15 Time: 20:49

Sample: 2003 2062

Included observations: 60

Presample missing value lagged residuals set to zero.

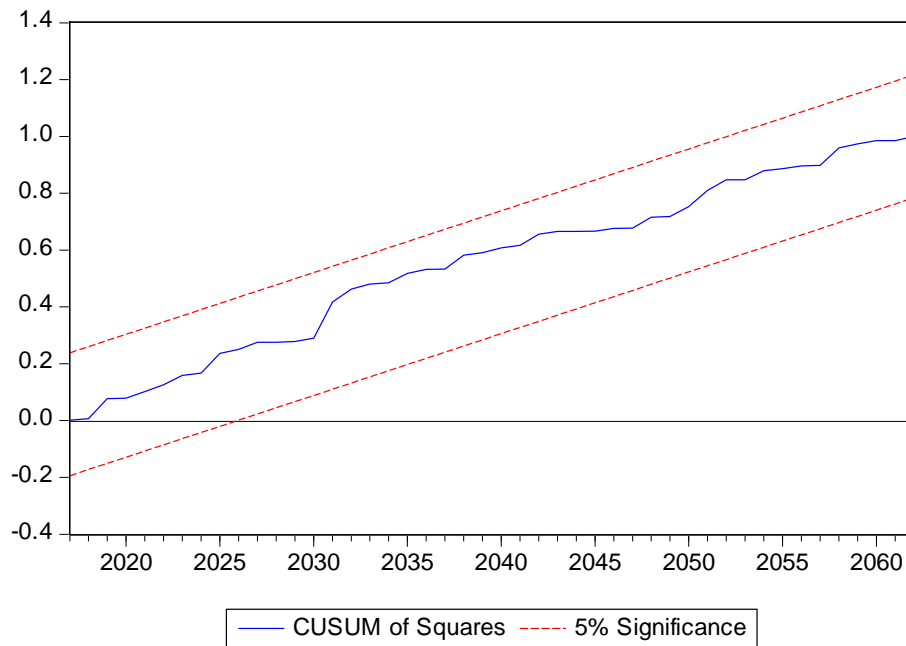
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.003760	0.015360	-0.244809	0.8078
D(M(-1))	0.025280	0.573489	0.044082	0.9650
D(M(-2))	-0.062398	0.315438	-0.197814	0.8441
D(M(-3))	0.040722	0.109891	0.370570	0.7128
D(GU(-1))	-0.017438	0.045602	-0.382390	0.7041
D(GU(-2))	-0.001068	0.037751	-0.028289	0.9776
D(GU(-3))	0.008130	0.027951	0.290848	0.7726
D(E(-1))	-0.010067	0.178316	-0.056455	0.9552
D(E(-2))	-0.001990	0.188003	-0.010584	0.9916
D(E(-3))	-0.022493	0.191151	-0.117673	0.9069
D(V(-1))	-0.846797	3.346630	-0.253030	0.8015
D(V(-2))	-0.408273	2.914776	-0.140070	0.8893
D(V(-3))	0.411792	2.105460	0.195583	0.8459
ECT(-1)	-0.301595	0.779113	-0.387100	0.7006
RESID(-1)	0.308623	0.474644	0.650220	0.5190
RESID(-2)	0.045228	0.359080	0.125954	0.9004
RESID(-3)	-0.106878	0.325282	-0.328572	0.7441
R-squared	0.009893	Mean dependent var	-1.83E-17	
Adjusted R-squared	-0.358518	S.D. dependent var	0.070771	
S.E. of regression	0.082487	Akaike info criterion	-1.918824	
Sum squared resid	0.292578	Schwarz criterion	-1.325426	
Log likelihood	74.56472	Hannan-Quinn criter.	-1.686714	
F-statistic	0.026854	Durbin-Watson stat	1.911441	
Prob(F-statistic)	1.000000			

Serial Correlation is verified by  $R^2$  and Probability, and the Probability value is  $>5\%$ , that is,  $89.79\%$  and the observed  $R^2$  is  $>5\%$

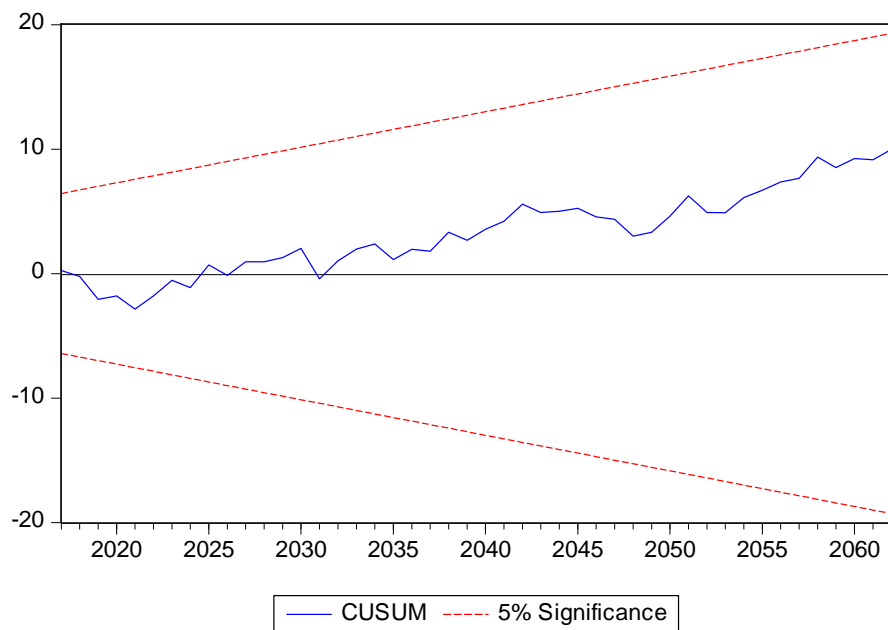
Here we Accept Null Hypothesis indicating that the model has no serial correlation.

### Short run stability via recursive estimates

The CUSUM and CUSUMQ is to test if there is stability in the model. The blue line moving in-between the red lines indicate that the model is stable.



**Figure 5.5:** Long Run CUSUMQ test



**Figure 5.6:** Long run Stability test via CUSUM at 5% Significance

### 5.4.1. Checking for Short run Causality and speed of adjustment back to the Equilibrium for Imports

The three tables below show that the short run impacts that flow from lag 1 to lag 3 and lag for in the independent variables is weak in the short run. This is in connection to the rejection of the null in preference for the alternative; all their probabilities demonstrate that we reject the null.

**Table 5.16:** Short run test of coefficients diagnosis for  $GDP_{US}$  using the Wald test

Equation: Untitled

Test Statistic	Value	df	Probability
F-statistic	1.479593	(3, 46)	0.2325
Chi-square	4.438780	3	0.2178

Null Hypothesis:  $C(5)=C(6)=C(7)=0$

Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(5)	-0.020131	0.021310
C(6)	-0.014057	0.021502
C(7)	-0.033602	0.017973

Restrictions are linear in coefficients.

**Table 5.17:** Short run test of coefficients diagnosis for Exchange rate using the Wald test

Wald Test:

Equation: Untitled

Test Statistic	Value	df	Probability
F-statistic	0.180687	(3, 46)	0.9090
Chi-square	0.542060	3	0.9096

Null Hypothesis:  $C(8)=C(9)=C(10)=0$

Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(8)	-0.085798	0.171791
C(9)	-0.047467	0.181552
C(10)	0.083680	0.180580

Restrictions are linear in coefficients.

**Table 5.18:** Short run test of coefficients diagnosis for Exchange rate Volatility using the Wald test

Equation: Untitled

Test Statistic	Value	df	Probability
F-statistic	3.448868	(3, 46)	0.0241
Chi-square	10.34661	3	0.0158

Null Hypothesis:  $C(11)=C(12)=C(13)=0$

Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(11)	-4.089601	1.823733
C(12)	0.100000	1.882187
C(13)	-1.366569	1.539042

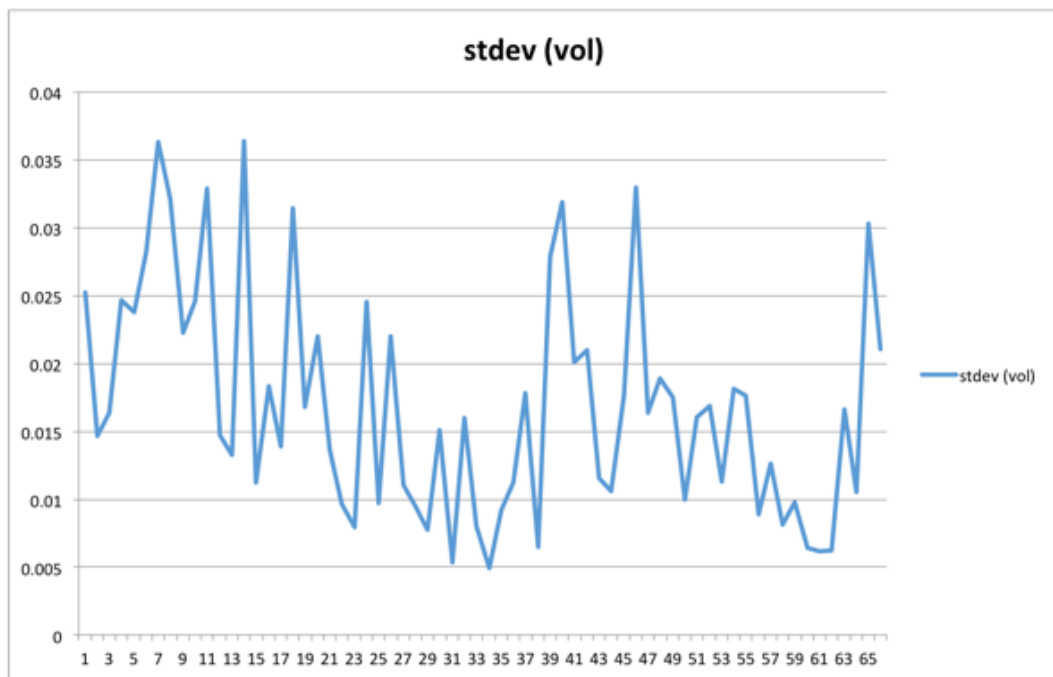
Restrictions are linear in coefficients.

Above, the short run impacts of exchange rate, GDP and exchange rate volatility does not affect imports in the short run as we reject the entire null hypothesis for the alternative. We go further to explain that the exchange rate lag 1, lag 2 lag 3 combined together, does not have any short run effects on the exports of the euro area.



The speed of recovery is 15.32% towards the long run equilibrium for the exports from the Euro area to the United States.

### 5.5. Exchange Rate Volatility Calculations



**Figure 5.7:** Exchange rate volatility calculated as standard deviation of exchange rate

The above figure shows how volatile exchange rate in the euro area has been since 1999. The figure further shows that in the early years when the euro was launched, the exchange rate was volatile and around 2008 it went again very high. The volatility calculations are based on standard deviation. The data is daily movement of exchange rate fluctuations, which is later converted to a quarterly time series data.

## **5.6. Summary of Results**

The econometric model reveals that the effect of exchange rate variations in the recent crisis affects exports more than imports. The ECT is both significant and negative, which confirms the presence of cointegration between variables (Bahmani-Oskooe & Ardalani, 2006).

In testing for a long-run relationship between variables, the study found out that there was the existence of cointegration amongst variables both at the level of exports and imports.

The study was able to distinguish the long run impacts as well as short run impacts using the Walt test to diagnose the coefficients.

The results demonstrated that long run equilibrium could be re-gained at the speed of 14.9% and 15.32% and for imports and exports respectively. The short-run causality/ effects were generally minimal as regards exchange rate in this study.

## **6. CONCLUSION AND RECOMMENDATION**

### **6.1. Conclusions**

As a major conclusion of this research, the choice of exchange rate regime matters. If the Euro area wants the effectiveness of monetary policies and effectiveness of the currency union, its important to strengthen and empower the role of the European Central Bank by setting up a fiscal union to police and regulate fiscal indiscipline, everything being equal.

The aim of this study was to find out if the present *Euro club* is an Optimal Currency Area and also to measure the impacts of the recent financial crisis in the said region. The study was able to trace divergence in the economies of Euro area member states characterized by the transmission of asymmetric shocks leading to macroeconomic disequilibrium. This thesis was equally interested in tracing the origin of the financial crisis in Europe. The study suggests Greece situation reflects the weakness that had culminated in the euro zone.

Today's arguments suggest Greece should leave the Euro area; this is because under the present the fixed exchange rate regime members of a currency union export their macroeconomic problems to the others easily. An increase in the inflation rate around 2008 in Greece led to a general rise in price levels and consequently, this went to other members of the E.A

This thesis will go further to suggest a political union for the E.A in order to cope with the management of both fiscal and monetary policies, a political union is highly solicited to wave the pain arising from cultural, political and linguistic barriers. The political willingness of states to function and regard each other as one is very necessary in an OCA-if there were no such barriers, the recent shock would not only concentrated in the Greek economy.

The ECB's response to the crisis is felt, but in a very slow pace coupled with the austerity measures that have handicapped recovery in Greece. In responding to the present challenges, this study found out that E.U monetary system needs a fiscal union to discipline budgetary policies in the E.A.

This study also joined other studies to confirm that some OCA criteria are fulfilled ex-post that were not satisfied ex-ante. The Maastricht criteria are fulfilled by the members and after satisfying the entry conditions, the economy becomes attacked by crisis like that of Greece, all justifications are based on the fiscal problems that pushed Greece to drag the E.A into this down-turn.

In trying to evaluate the effectiveness of the E.A as an OCA, the variations in exchange rate was measured to see its effects on imports and exports using E.A, and the partner, the USA. In this technical analysis, the test earlier employed by Bourdon and Korinek is repeated for the European Area countries and the USA export while they test the effects of exchange rate volatility for the period of 1999 up to 2014. In this thesis, the test covers the period where there was high expectation for the volatility of Euro in the late 2000s.

the study, traced weak short run effects on imports and exports and relatively significant impacts in the long run. Furthermore, it was confirmed in this work that exchange rate variations affects exports more than imports and their ability to recover back to the equilibrium was possible in the long run. In fact, this study found out that exchange rates are not the only drivers of trade flows, because trade imbalances may be provoked by differentials in international market process, which hampers trade balances. Exchange rate affects the current account through its impact competitiveness. In this study, an autoregressive distributed lag model was used, the results showed that in the short run, there is no short-run causality running from lag 1 to 2 and to 3, thereby contrasting the null hypothesis in favor of the alternative hypothesis as indicated by their probabilities. For the long run, an estimation of the error correction term coefficients pointed out the effects and possibility of recovery in the long run.

The econometric model reveals that the effects of exchange rate variations in the recent crisis affect exports more than imports. The error correction term is both

significant and negative, which confirms the presence of co-integration between variables. In testing for a long-run relationship between variables, the study found out that there was the existence of co-integration amongst variables both at the level of exports and imports.

The study was able to distinguish the long run impacts as well as short run impacts using the Wald test to diagnose the coefficients.

The results demonstrated that long run equilibrium could be re-gained at the speed of 14.9% and 15.32% and for imports and exports respectively. The short-run causality effects were generally minimal as regards exchange rate in this study.

This thesis was able to conclude that the euro area exhibits criteria and characteristics of an optimum currency area theory but unfortunately the recent financial crisis in the region since 2008 and the gross divergence in economic performance together with fiscal indiscipline under the fixed exchange rate demonstrate that the euro area is not a perfect example of an optimum currency area.

## **6.2. Recommendation for future studies**

From the analysis presented in this research, it's advisable that future technical analysis be broken down at the level of flows to distinguish the nature of economic activity. Testing for imports and exports as a whole, seems too vast to better appreciate and interpret results correctly

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## APPENDIXES

Table showing the quarterly time series data used for the model  
 EUR/USD=exchange rate parity; GDP-E.A=Gross domestic product for the euro  
 area; GDP-US=Gross domestic product for the United States.

Years	Quarter	EUR/USD	GDP-E.A	GDP-US	Rate of M (Imports)	Rate of X (Exports)	Volatility-Exchange rate
1999	Q1	1.073652566	0.9	0.8	0.890121526	1.129098442	0.025231604
1999	Q2	1.032737788	0.7	0.8	0.058001325	0.144071052	0.014630196
1999	Q3	1.065303079	1.1	1.3	-0.056255864	-0.041647739	0.016389569
1999	Q4	1.004419446	1.2	1.7	-0.007199173	0.008695652	0.024650318
2000	Q1	0.961168781	1.2	0.3	-0.073907733	-0.146793291	0.023772386
2000	Q2	0.951655881	0.9	1.9	0.073549658	0.058114508	0.028194025
2000	Q3	0.879352796	0.5	0.1	0.000372959	0.013151256	0.036300073
2000	Q4	0.941796949	0.8	0.6	0.018280125	0.049073531	0.032125959
2001	Q1	0.878966336	0.9	-0.3	-0.033675835	-0.10442755	0.022260185
2001	Q2	0.84932903	0.1	0.5	0.027227121	0.034640311	0.02458241
2001	Q3	0.90966979	0	-0.3	-0.085668356	0.001100293	0.032907144
2001	Q4	0.885896527	0.1	0.3	0.025474753	0.011321641	0.014741757
2002	Q1	0.87009484	0.2	0.9	-0.003637197	-0.105776754	0.013254253
2002	Q2	0.991571641	0.5	0.6	0.062807593	0.097925423	0.036374132
2002	Q3	0.981161695	0.4	0.5	-0.036753181	-0.043344579	0.011258202
2002	Q4	1.048218029	0.1	0.1	0.033636911	0.05416858	0.018327117
2003	Q1	1.079680415	-0.2	0.5	-0.176205222	-0.252431243	0.013869142
2003	Q2	1.143641354	0.1	0.9	0.051574182	0.071389662	0.031436608
2003	Q3	1.159554731	0.5	1.7	-0.008185639	0.049667324	0.016833177
2003	Q4	1.255335174	0.8	1.2	0.133140279	0.043591302	0.021979091
2004	Q1	1.21743365	0.5	0.6	-0.158871533	-0.213031256	0.013634508
2004	Q2	1.208313195	0.6	0.7	-0.019243139	-0.010372196	0.009622318
2004	Q3	1.232741617	0.3	0.9	-0.06581059	0.047364381	0.00794672
2004	Q4	1.36425648	0.3	0.9	0.146174773	0.085414107	0.024548307
2005	Q1	1.291489087	0.2	1.1	0.155413667	0.18295363	0.009717502
2005	Q2	1.206418145	0.7	0.5	0.057002466	0.095581966	0.022035276
2005	Q3	1.204529029	0.7	0.8	-0.043221381	-0.062019148	0.011061955
2005	Q4	1.184272856	0.6	0.6	-0.063105601	-0.074327885	0.009473362
2006	Q1	1.207437817	0.9	1.2	-0.061790823	-0.03426365	0.007748687
2006	Q2	1.254862593	1.1	0.3	-0.011737227	0.068786171	0.015088367

Continuation of Data

Year	Quarter	EUR/USD	G.D.P-E.U	GDP-US	Rate of M (Imports)	Rate of X Exports	Volatility- Exchange rate
2006	Q3	1.268552582	0.6	0.1	-0.001316577	-0.001756119	0.005325565
2006	Q4	1.319783555	1.1	0.8	0.058014932	0.05192435	0.015960262
2007	Q1	1.333333333	0.8	0.1	-0.218240422	-0.166182509	0.008024773
2007	Q2	1.347345729	0.6	0.8	0.081074425	0.07425457	0.004929281
2007	Q3	1.426533524	0.5	0.7	-0.042558801	-0.017013142	0.009218029
2007	Q4	1.472320377	0.5	0.4	0.099912847	0.023010523	0.01124474
2008	Q1	1.5795293	0.7	-0.7	-0.179698077	-0.15157419	0.01780028
2008	Q2	1.579279848	-0.4	0.5	0.031037405	0.086507033	0.006471416
2008	Q3	1.444669171	-0.6	-0.5	-0.085340445	-0.033308878	0.027870171
2008	Q4	1.40944327	-1.8	-2.1	0.127031655	0.071941783	0.031867356
2009	Q1	1.320655045	-2.9	-1.4	-0.135102284	-0.187703465	0.02010368
2009	Q2	1.40469167	-0.2	-0.1	0.02773301	0.078270095	0.020976824
2009	Q3	1.459002043	0.3	0.3	-0.06655836	-0.026627459	0.011537629
2009	Q4	1.43328078	0.5	1	0.11601137	0.086774727	0.010604209
2010	Q1	1.345351809	0.4	0.4	-0.162177785	-0.213025896	0.017639312
2010	Q2	1.220703125	1	1	0.026249973	0.060014156	0.03295895
2010	Q3	1.360914535	0.4	0.7	-0.071693436	-0.0169374	0.01638632
2010	Q4	1.325205407	0.5	0.6	0.140338569	0.098651096	0.018884344
2011	Q1	1.409840688	0.9	-0.4	-0.104501161	-0.217273358	0.01753814
2011	Q2	1.439055979	0	0.7	-0.033542768	0.070009595	0.009992055
2011	Q3	1.359619307	0	0.2	-0.055903351	0.031604824	0.016049232
2011	Q4	1.294833614	-0.3	1.1	0.129353375	0.082664587	0.016852543
2012	Q1	1.33386688	-0.1	0.6	0.122789221	-0.094687517	0.011304765
2012	Q2	1.257703434	-0.3	0.4	-0.085691299	-0.007319356	0.018114311
2012	Q3	1.28584287	-0.1	0.6	-0.113936338	-0.058894661	0.017632493
2012	Q4	1.321702353	-0.4	0	0.086310579	0.034176838	0.008874756
2013	Q1	1.281722635	-0.4	0.7	0.003090764	-0.070623795	0.012625185
2013	Q2	1.300897619	0.3	0.4	0.06308587	0.054642302	0.008100873
2013	Q3	1.352265044	0.2	1.1	-0.034930398	0.01524339	0.009781691
2013	Q4	1.376651982	0.3	0.9	0.085565833	0.060922094	0.00645147
2014	Q1	1.375137514	0.3	-0.5	-0.117527487	-0.239364533	0.006141587
2014	Q2	1.364815068	0.1	1.1	-0.033359336	0.068584665	0.006246839
2014	Q3	1.268552582	0.2	1.2	-0.067186394	0.032644559	0.01659998



Export Analysis

Lags	AIC	SIC
12	Insufficient Observations	Insufficient Observations
11	-2.52942	-0.69075
10	-2.06505	-0.39216
9	-1.948618	-0.438463
8	-2.055003	-0.704615
7	-1.828299	-0.634788
6	-1.987371	-0.947923
5	-2.03147	-1.143348
4	-2.123177	-1.283715
3	-1.976868	-1.383471
2	-1.698919	-1.249061
1	-1.69101	-1.382233

Import Analysis

Number of Lags	AIC	SIC
12	Insufficient Observation	Insufficient Observation
11	-3.366808	-1.528136
10	-2.615892	-0.943003
9	-2.669158	-1.50003
8	-2.289103	-0.938715
7	-2.29383	-1.10032
6	-2.37009	-1.330642
5	-2.375257	-1.487135
4	-2.373584	-1.634122
3	-2.318051	-1.724654
2	-2.111757	-1.661899
1	1.90839	-1.599613

# RESUME



## Europass Curriculum Vitae

### Personal information

Surname(s) / First name(s) **NGALIM LAWRENCE MAISHU**  
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Telephone(s) **(009) 05340776154** Mobile **00905340776154**  
Fax(es) **/**  
E-mail **[lawrencemaishu@yahoo.com](mailto:lawrencemaishu@yahoo.com)**

Nationality **Cameroonian**

Gender **Male**

### Work experience

Dates **January 2011\_ oct 2012**  
Occupation or position held **PART TIME TEACHER**  
Main activities and responsibilities **Helping/teaching Economics to students at the university of Yaoundé**

Name and address of employer	PRIVATE								
Type of business or sector	Education								
<b>Education and training</b>									
Dates	1992_1999 / FISRT SCHOOL LEAVING CERTIFICATE 1999–2004 /GENERAL CERTIFICATE OF EDUCATION....ORDINARY LEVEL 2004-2006 /GENERAL CERTIFICATE OF EDUCATION....ADVANCED LEVEL 2007_2010 /B.Sc in ECONOMICS AND MANAGEMENT 2010_2011 /MASTERS 1 in ECONOMICS AND MANAGEMENT								
Title of qualification awarded	<b>2013-PRSEENT , MASTERS STUDENT IN BUSINESS ADMINISTRATION AT ISTANBUL UNIVERSITY</b>  MAITRISE in ECONOMICS AND MANAGMENT								
Name and type of organization providing education and training	UNIVERSITY of YAOUNDE 2 SOA								
Level in national or international classification	Cameroonian national framework of qualifications.								
<b>Personal skills and competences</b>	Entertainment and Creative								
Mother tongue(s)	English								
Other language(s)									
Self-assessment <i>European level (*)</i>	<table border="1"> <thead> <tr> <th colspan="2">Understanding</th> <th colspan="2">Speaking</th> </tr> </thead> <tbody> <tr> <td>Listening</td> <td>Reading</td> <td>Spoken interaction</td> <td>Spoken production</td> </tr> </tbody> </table>	Understanding		Speaking		Listening	Reading	Spoken interaction	Spoken production
Understanding		Speaking							
Listening	Reading	Spoken interaction	Spoken production						

<b>ENGLISH</b>		B2 Independent User	B1 Independent User	B2 Independent User	B2 Independent User
<b>FRENCH</b>		B2 Independent User	B2 Independent User	A1 Basic User	A1 Basic user

(\*) *Common European Framework of Reference for Languages*

Technical skills and competences	Very creative and love doing personal research
Computer skills and competences	Good Command of Word processing, Microsoft excels, Microsoft access, Global bank Software and
Artistic skills and competences	Song writing, dancing and football
Other skills and competences	Good in designing and drawing
Driving license	No license but can drive
<b>Social skills and competences</b>	<p>II - PROFESSIONAL OBJECTIVES</p> <ul style="list-style-type: none"> <li>- Researcher</li> <li>- Administrative assistant</li> </ul> <p>III - DOMAIN OF COMPETENCE</p> <ul style="list-style-type: none"> <li>- General administration</li> <li>- Public Relations</li> </ul>
<b>Annexes</b>	Available upon request

