THE DETERMINANTS OF TRADE AND TRADE DIRECTIONS OF ARAB MAGHREB UNION (AMU)

HADI M. OTHMAN ABUHRIBA

DOCTOR OF PHILOSOPHY
UNIVERSITI UTARA MALAYSIA
MAY 2012

THE DETERMINANTS OF TRADE AND TRADE DIRECTION OF ARAB MAGHREB UNION (AMU)

By

HADI M. OTHMAN ABUHRIBA

Thesis Submitted to
Othman Yeop Abdullah Graduate School of Business,
Universiti Utara Malaysia,
In Fulfillment of the Requirement for the Degree of Doctor of Philosophy

PERMISSION TO USE

In presenting this thesis fulfillment of the requirement for a postgraduate degree from Universiti Utara Malaysia, I agree that the University Library may make it freely available for inspection. I further agree that permission for the copying of this thesis in any manner, in whole or in part, for scholarly purpose may be granted by my supervisor Dr Norehan Abdullah and Dr Hussin Abdullah or in their absence by the Dean of Othman Yeop Abdullah Graduate School of Business. It is understood that any copying or publication or use of this thesis or parts thereof for financial gain shall not be allowed without my written permission. It is understood that due recognition shall be given to me and to Universiti Utara Malaysia for any scholarly use which may be made of any material from my thesis.

Request for permission to copy or to make other use of materials in this thesis, in whole or in part, should be addressed to:

Dean of Othman Yeop Abdullah Graduate School of Business
UUM College of Business
Universiti Utara Malaysia
06010 UUM Sintok
Kedah Darul Aman

ABSTRACT

The Arab Maghreb Union (AMU) comprising Algeria, Libya, Mauritania, Morocco, and Tunisia have established a framework to enhance regional cooperation on trade facilitation. Today, the AMU countries have increased their trade integration into the world economy. Despite the effort of trade openness in the AMU, the economic growth, intra-trade and inter-trade are still lagging behind other developing countries in the Middle East, Asia, and Latin America. The objectives of this study are: 1) to examine the determinant of intra-regional trade in the AMU countries; 2) to examine the bilateral trade flows between AMU countries with selected European Union (EU) and Middle East (ME) countries; and 3) to investigate a long-run relationship between the trade and its determinants for a group of selected AMU, EU and ME countries. Using a data set of 1989-2009; the standard gravity model is used to measure the pattern and trend of bilateral trade. Overall, the results are consistent with those found in previous study where in all cases, parameters for the variables are found to be correctly signed and highly significant. A higher GDP increases trade while a longer distance inhibits trade. Larger population also results in higher trade. In terms of trade openness, the results show that the trade barriers are found to be positively and significantly correlated with openness. In short, the trade barriers are fairly effective for increasing trade. In analyzing the inter-trade of AMU with selected EU countries, namely Italy, Spain and France and selected ME, namely Egypt, Lebanon, and Syria, the results show that an increase in home GDP and partner's countries GDP cause an increase in AMU's trade. Population size, AMU's real exchange rate, and trade openness are found to be positively related to trade.

Keywords: Intra-trade, Bilateral Trade, GDP, Trade Openness, Gravity Model

ABSTRAK

Negara Algeria, Libya, Mauritania, Magribi dan Tunisia telah menganggotai negara kesatuan Arab Maghreb (Arab Maghreb Union; AMU) bagi menubuhkan satu rangka kerja meningkatkan kerjasama serantau yang berfokus kepada fasiliti perdagangan. Kini, negara-negara AMU telah mempertingkatkan integrasi perdagangan mereka ke dalam ekonomi dunia, iaitu Kesatuan Eropah (EU) dan negara-negara Arab Maghreb. Walaupun usaha keterbukaan perdagangan dilaksanakan, didapati pertumbuhan ekonomi, intra-perdagangan dan inter-perdagangan masih ketinggalan berbanding negara-negara membangun yang lain di Timur Tengah, Asia dan Amerika Latin. Objektif kajian ini adalah: 1) untuk mengkaji penentu integrasi serantau perdagangan di kalangan yang negara-negara AMU; 2) untuk mengkaji kesan perdagangan AMU ke atas negara-negara Eropah (EU) dan negara-negara Timur Tengah (ME) yang terpilih; dan 3) untuk mengkaji hubungan jangka panjang dan penentu perdagangan bagi AMU dan negara-negara terpilih EU dan ME. Dengan menggunakan set data panel bagi tempoh 1989-2009, model graviti digunakan untuk mengukur corak dan trend perdagangan dua hala. Secara keseluruhannya, keputusan adalah konsisten dengan apa yang ditemui di dalam semua kes kajian model graviti yang lain, apabila parameter pemboleh ubah didapati betul tanda arasnya dan amat signifikan. KDNK yang lebih tinggi meningkatkan perdagangan manakala jarak yang lebih jauh menghalang perdagangan. Jumlah penduduk yang tinggi akan meningkatkan perdagangan. Dari segi keterbukaan perdagangan, hasil keputusan menunjukkan bahawa sekatan perdagangan adalah positif dan signifikan di mana hubungan mereka dengan nisbah intensiti perdagangan AMU menunjukkan korelasi yang kuat. Dalam erti kata lain, halangan perdagangan adalah agak berkesan untuk meningkatkan perdagangan. Dalam menganalisis perdagangan antara-AMU dengan negara-negara EU (iaitu Itali, Sepanyol dan Perancis) dan negara ME (iaitu Mesir, Lubnan, dan Syria), hasil dapatan menunjukkan bahawa peningkatan KDNK tuan rumah dan KDNK rakan kongsi negara-negara menyebabkan peningkatan dalam perdagangan AMU. Saiz penduduk, kadar pertukaran sebenar AMU, dan keterbukaan perdagangan didapati secara positif berkaitan dengan perdagangan.

Kata Kunci: Intra Perdagangan, Perdagangan Dua-Hala, KDNK, Keterbukaan Perdagangan, Model Graviti

ACKNOWLEDGEMENT

Alhamdulillahi Robbil'alamiin. All praise would only be bestowed to Allah Subhana Wa Ta'ala, because only with His bless finally this thesis could be finished. In this occasion I would like to express my gratitude to a number people whole admission, permission, and assistance contribute to a great deal of the process of finishing this thesis.

I would like to thank to His Excellency the Chancellor of Universiti Utara Malaysia (UUM) who offered his permission to study in this beautiful and credible university. I would like to thank to Vice Chancellor of UUM and the Dean of School of Economics, Finance and Banking, College of Business (COB), who have given me a permission and support to conduct this study. I would like to thank to all of the university staff. Including Center for Graduate Studies, International Student Centre, Sultanah Bahiyah Library, Language Centre, Maybank Student Hostel, and others that I could not mention one by one, who professionally provided academic, administration and accommodation services.

I would like to present my deep thank to my beloved supervisor Dr. Norehan Abdullah and Dr. Hussin Abdullah for their guidance, patient, encouragement and professional supervision made this thesis possible to be finished.

I would also like to thank to my friends; Dr Mastfa Etagdi, Dr Kaled Elbide, Salme Hamadi and Ali Alkmasi, who had always encouraged me to endure this difficult task, given me their warmest helps along my path to graduation, and accompanying me during my most difficult time, and happiest hours in the campus.

I am greatly indebted to my family for their love supports to finish my study, especially my heartfelt gratefulness to my lovely wife Najat Naji Algany for her patience, especially for tolerating the vacuum I created during the period of this study, thanks to my daughters Kawtar and Houda, my sons Emad and Mohmad for enabling me to accomplish my lifelong dream.

Finally, I would like to dedicate my thesis to my dearest parents, my late father Mohmed and my mother, Salema Salme.

TABLE OF CONTENT

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATION

AMU	=	Arab Maghreb Union
ATC	=	Agreement on Textiles and Clothing
CENSAD	=	Community of Sahel-Saharan States
CPCM	=	Conseil Permanent Cunsultatif du Maghreb
ECOWAS	=	Economic Community of West African States
EFTA	=	European Free Trade Association
EU	=	European Union
FDI	=	Foreign Direct Investment
GAFTA	=	Greater Arab Free Trade Area
GDP	=	Gross Domestic Product
GSTP	=	Global System of Trade Preferences
ME	=	Middle East
MENA	=	Middle East and North Africa
OPEC	=	Organization of Petroleum Exporting Countries
PAFTA	=	Pan-Arab Free Trade Area
PTA	=	Preferential Trade Arrangements
TPR	=	Trade Policy Review
WTO	=	World Trade Organization

CHAPTER 1

OVERVIEW OF THE STUDY

1.1 Background of the Research

The Arab Maghreb Union comprising Algeria, Libya, Mauritania, Morocco, and Tunisia have established a framework to enhance regional cooperation on issues of common interest, focusing initially on trade facilitation. Over the last decade, the Arab Maghreb Union countries have increased their trade integration into the world economy, including in the context of the Association Agreements between the European Union and Arab Maghreb countries. However, there is a debate that, whether the Arab Maghreb countries achieve the goals of this regional cooperation or not. In addition, there were an opposite views that, the Arab Maghreb countries were affected by this regional integration. According to Brenton, Baroncelli and Mahouchel (2006) the Maghreb countries have experienced lacklustre growth rates during the last decade. Tunisia was the best performer with growth at 4.8 per cent, but even this was only average for developing countries; the other two countries grew substantially less at 3.2 per cent. While Maghreb exports of goods and services have grown at global averages in the last decade, they have not fully realized the growth potential associated with their location advantages of close proximity to the European Union (EU). Their exports have grown at less than half the rate of Turkey, Poland and Hungary in the last decade. However, according to the

statistics of the Arab monetary fund and Arabian press release (2000) indicated that member states of the Arab Maghreb Union suffered from economic dependency. He stated, that is reflected in many manifestations in the form commerce, food, technology and finance.

In view of the foregoing this research attempts to assess the cooperation between the Arab Maghreb Union countries and their trading partners in the European Union in terms of international trade, and, to examine the impact of export and import on the Gross Domestic Product (GDP) for the Arab Maghreb Union countries. In addition, the research attempts to assess the intra-Maghreb countries trade to examine to what extent the regional body has attained its goals. In essence, this study is a contribution to the policy debate on trade and investment integration in the Maghreb countries. An important aspect of such a debate is a clear understanding of the implications and benefits of further integration with regional, European and global markets, the potential adjustments that will arise and how these can best be mitigated.

This study argues that these are important issues to be addressed since the status quo is not tenable if trade is to fuel higher rates of growth and employment generation in the Maghreb member states. On the one hand, the structure of economies in the Maghreb is not conducive to sustained export growth (Brenton et al., 2006). Exports remain highly concentrated on products that are not dynamic in terms of growth of world demand. The Maghreb countries have not been successful in expanding output and exports of more advanced manufactures, partly because of the inability to integrate into global production chains and to attract the associated Foreign Direct Investment (FDI). There is

therefore a pressing need to address the barriers to diversification. On the other hand, competitive pressures in the key sectors of textiles and clothing are increasing (Brenton et al., 2006). Firstly, as trade barriers in Europe against imports from China and other large Asian suppliers have been removed with the end of the Agreement on Textiles and Clothing thereby increasing competitive pressure on Arab textile and clothing exports. Secondly, if not more important, competition is increasing from countries integrating into the European neighbourhood, such as Ukraine and Russia, which share similar location advantages to the Maghreb. The current structure of these countries exports of textiles and clothing is much more similar to those of the Maghreb countries than that of the Asian suppliers. Whilst the costs and the risks associated with lack of effective integration are increasing, there are now significant opportunities that the Maghreb countries can exploit to support trade and attract (FDI). A successful pursuit of international integration has to put together three inter-linked policy domains of trade policy - unilateral, multilateral and regional policies – into a coherent trade strategy (Brenton et al., 2006). A key element in such a trade strategy is a careful identification of the barriers to trade.

The increasing desire of many developing nations to pursue an export growth development strategy has led to increased emphasize on regional integration among developing countries. Most of the countries have also pursued trade policies that are supposed to open national economies to foreign competition and to grant them increased access to the ever-expanding international market. This has generated many studies, the results of which are intended for policy formulation and analysis. In this study, we present a model that shows the impact of two regional integrations (the AMU and the

EU) on AMU member countries' bilateral trade flows and also identify the extent of openness of trade between AMU member states and other Arab non-AMU and EU counties. We applied the gravity model technique suggested by Matyas (1997 and 1998) to determine the impact of regional integration on trade. In doing so, this study seeks to verify whether the conclusions reached by Matyas (1997 and 1998) on the use of country specific dummies are specific to his data sets or if they indeed reflect the true specification of the model for the identification of the regional integration effect.

It should be noted that the four stages of economic integration specified in the guidelines adopted by the Council of Heads of State of the (AMU) at its third meeting in Libya in March 1991 were: (1) a free *trade* area by the end of 1992, (2) a customs union by the end of 1995, (3) a common market by the end of 2000, and (4) a monetary union some time thereafter (Mohamed and Bell, 1995). Key issues related to economic integration in the Maghreb and the progress made and benefits so far should be examined. The extent to which the main prerequisites for economic integration are in place are assessed, and the challenges the Union members need to address if the AMU is to make further progress toward achievement of its objectives would be also addressed in this study.

In this regard, the Arab Maghreb countries are at a crossroads: they must decide whether to continue as before, playing the old game of the Nation-State closed in on it, or on the contrary, whether they prefer to bet on advancing towards real integration, which would allow them to gain a more solid position in the international arena. It is against this background that European Toledo para la Paz (International Peace Centre of Toledo) organized the first edition of the international seminar, Del Coste del No Magreb al

Tigre Norteafricano (From the Cost of the Non-Maghreb to the North African Tiger), which was held in May of 2006[1]. It attracted over a hundred major actors of the economic, political and intellectual spheres of the Maghreb, Europe and North America from such organizations as the (AMU) and the European Union Institute for the Mediterranean. A second edition of the seminar was organized in 2007. On the positive side of the balance sheet, there has been substantial progress over the past few years resulting in stable macroeconomic conditions, the application of certain economic reforms, an increase in foreign investment and growth in GDP. Such progress notwithstanding, there are sufficient shortcomings, evident in the fact that economic growth rates have not managed to rise on a par with demographic growth, a particularly serious matter in an area of the world where unemployment rates are expressed in two-digit figures. The same is true of direct foreign investment, which, though it is on the rise, has not reached the levels of other areas in the world. Another item on the negative side is the fact that the intra-Maghreb goods trade rate is very low and compares negatively with that achieved by other regional blocks. This can be partially attributed to the existence of little intra-regional complementariness due to the low diversity.

As mentioned earlier this study will employ a methodology based on the traditional gravity technique or model to test for the effect of regional integration on bilateral trade, involves augmenting the basic gravity model with regional integration dummies. This study will demonstrate that the appropriate econometric technique is to augment the standard gravity equation with country specific dummies instead of regional integration

[1] Senén Florensa, (2007), The Necessary Dream of Maghreb Integration, European Institute for the Mediterranean (IEMed), Barcelona, (www.weforum.org/pdf/SummitReports/ middleeast2006.pdf**)**

dummies. For this purpose, the study pursues two important objectives. First, it uses the gravity model to test for the effect of two regional integrations, the European Union (EU) and the Arab Maghreb Union on specific AMU countries' bilateral trade. These two regional integrations constitute AMU countries traditional trading partners. Second, within the framework of the gravity model and the application of a new estimation technique, the study tests for the extent of openness of AMU's non-traditional trading partners such as Egypt, Saudi Arabia (Arab non-Maghreb countries) and the United States.

In a nutshell, this study seeks to discuss a trade strategy for the Maghreb countries, with a particular focus on regional initiatives, by which trade expansion could contribute to raising and sustaining growth rates. The study will start by highlighting recent trade performance and argues that, in the light of the need to increase employment and in the face of increasing international competition in key existing markets and products, the current policy mix and economic systems are unlikely to support the necessary sustained trade expansion. The study will then seek to identify the key barriers that are constraining integration into regional and global markets and discusses how poor design and weak implementation of trade agreements amongst countries in the region limit their impact.

Essentially, this study estimates a gravity model to address the issue of whether intra-Arab trade is too little. Although gravity models have been extensively used to measure bilateral trade among countries, they have, to the best of my knowledge, never been used widely to measure intra-Arab trade. The research findings suggest that intra-Arab trade

and Arab trade with the rest of the world are lower than what would be predicted by the gravity equation, suggesting considerable scope for regional as well as multilateral-integration.

1.2 Statement of the Problem

There are, of course, many issues and challenges ahead that have to be resolved related to the regional integration. One of the major concerned of this study is related to the impact of regional integration on trade among the Maghreb countries in terms of intra-trade and inter-trade as well as regional trade.

The Maghreb countries remain amongst the least integrated both regionally and in the global economy (Brenton et al, 2006). Despite an increase of non-oil exports during the 1990s in the AMU, the share of (non-oil) exports in GDP for Maghreb countries is lower than any other region, excluding the broader Middle East and North Africa (MENA) region. The contribution of (non-oil) exports to GDP remains less than one third of that of the more dynamic regions of East Asia and Europe and Central Asia. There would appear to be plenty of scope for further integration into the global economy and for exports to be a fundamental driver of growth, as they have been in the more successful regions. In this respect this study seeks to examine the intra-regional trade and the bilateral trade effects of AMU or the effect of any other regional economic integration particularly the EU on AMU member states' foreign trade.

Countries of the Arab Maghreb Union (Algeria, Libya, Mauritania, Morocco, and Tunisia) have established a framework to enhance regional cooperation on issues of common interest, focusing initially on trade facilitation. For several years they have strengthened their economic relationship with their partners from the European Union by adopting trade openness policies. Despite these efforts in the Maghreb union, economic growth, foreign investment, intra-trade and inter-trade are still lagging behind other developing countries in the Middle East, Asia and Latin America. In other words, why has the Arab Maghreb Union lagged behind other regions in the pace of global and regional integration, in terms of trade? Whilst the costs and the risks associated with lack of effective integration are increasing, there are now significant opportunities that the Maghreb countries can exploit to support trade and the globalization era. The key issue is how to take advantage of the opportunities available from various trade agreements and trade policy options to address the underlying barriers that constrain exploitation of the inherent comparative and competitive advantages in a way that matches administrative capacity and expertise and which does not impose too many simultaneous adjustment shocks. Appropriate targeting, sequencing and timing will therefore be key themes should the Maghreb countries seek to intensify integration with regional and global markets.

Maghreb countries' trade with the Arab world and with the rest of the world is relatively small. Despite the establishment of the Arab Maghreb Union over two decades ago, the bulk of the Maghreb's trade is with Europe. The level of intra-Maghreb trade is lower than that of many of the world's trading blocs. In 2007, intra-Maghreb trade represented

less than 2 per cent of the sub region's combined gross domestic product (GDP) and less than 3 per cent of the sub region's total trade. Some of the reasons for this low performance include high barriers to trade, logistical bottlenecks, lack of production base diversification, and political considerations (World Bank, 2010).

Table 1.1
Trade in the Arab Maghreb Union (% of GDP)

	1990-1999		2000-2008	
	Exports	Imports	Exports	Imports
Algeria	26	24	42	23
Libya	29	25	57	28
Mauritania	37	48	40	68
Morocco	26	31	32	37
Tunisia	43	47	49	52

Source: World Bank, GDF and WDI data, April 2010

Overall exports accounted less than between 57 per cent to 32 per cent of GDP and import less than between 67 per cent to 28 per cent in the Arab Maghreb Union during the period 2000–2008 (Table 1). This represents a slightly increase from trade levels in the 1990s, with Libya showing the greatest increase. Mauritania and Tunisia are the most open economies in the sub region, with average trade volumes exceeding GDP during 2000–2008. The EU is the Maghreb's largest trading partner (Table 2). Exports to the EU average 60 percent of total exports, and imports from the EU a average 55 percent of total imports.

Table 1.2
Trade of the Arab Maghreb Union to EU (% of total)

	Exports to EU (% total)	Imports from EU (% total)
Algeria	52	53
Libya	77	48
Mauritania	37	46
Morocco	59	59
Tunisia	72	64

Source: World Bank, GDF and WDI data, April 2010

World Bank (2010) stated that Libya, Morocco, and Tunisia are members of the Pan-Arab Free Trade Area (PAFTA), which was signed in 1997. Morocco and Tunisia are founders of the Agadir Agreement for the Establishment of a Free Trade Zone, signed in 2004. Three Maghreb countries have signed association agreements with the EU: Tunisia in 1995, Morocco in 1996, and Algeria in 2002. All Maghreb countries are members of the League of Arab States, founded in 1945, which has historically taken the lead on integration efforts in the region. In addition, Morocco signed a free trade agreement with the United States in 2006. Mauritania withdrew from the Economic Community of West African States (ECOWAS) in 2001 and joined the Community of Sahel-Saharan States (CENSAD) in 2009. Many of these intraregional agreements have yet to become fully operational or achieve their stated objectives. For example, the AMU aimed to intensify trade among member countries in order to enable the creation of a North Africa customs union by 1995 and an economic common market by 2000. Based on that intraregional agreement, we found that yet none of these measures has

been achieved, and intra-Maghreb trade remains low despite some reform efforts on the part of Maghreb countries.

Al-Atrash and Youssef (2007) found that Maghreb countries traded less with the rest of the world than the model would have predicted. Furthermore, the level of regional trade among Maghreb countries is low compared with other trading blocs. There are some indications, however, that official data do not fully capture trade within the region. This is particularly true for trade between Libya and Tunisia, and between Algeria and Tunisia. Thus as compared with its potential, trade in the Maghreb is low in terms of both intraregional exchanges the rest of the world.

1. 3 Research Questions

On the basis of the preceding discussions, the following research questions are proposed:

- What is the impact of regional integration on trade among the Maghreb countries in terms of intra-trade, regional trade as well as global trade?

- Why has the Arab Maghreb Union lagged behind other regions in the pace of global and regional integration, in terms of trade?
- How open is trade between the AMU countries and their trading partners like Europe Union countries and Middle East countries?

1.4 Objectives of the Study

The purpose of this study is to conduct research on how the Arab Maghreb Union countries can take advantage of the opportunities available from various trade agreements and trade policy options to address the underlying barriers that constrain trade expansion in the regional body. The specific objectives of the study are:

1. To examine the determinants of intra-regional trade in the Arab Maghreb Union (AMU) countries.
2. To examine the bilateral trade flows between AMU countries with selected European Union (EU) and Middle East (ME) countries.
3. To investigate a long-run relationship between the trade and its determinants for a group of selected AMU, EU and Me countries.

1.5 Significance of the Study

This study will extend the existing knowledge and perhaps contributes to better policy formulation in regional trade. There are two main contributions of this study. First, earlier empirical studies on AMU countries have used pooled time series data from the perspective of all the countries involved in the study. Hence, their regressions are interpreted as averages for all the countries included in the study. This study diverges from that approach by using pooled time series data on intra-regional trade among AMU countries and bilateral trade between AMU and her two major selected trading partners such as EU and ME. In my opinion, this is the appropriate approach since a country

specific study is required to identify opportunities that could be exploited to make the trade is a important in AMU countries.

The second contribution relates to the econometric techniques used to analyze the effect of regional integration on bilateral trade. The traditional technique of the Heckscher-Ohlin model has been criticized by Polak (1996), and Matyas (1997, 1998) who have demonstrated that the technique leads to model misspecification from an econometric point of view, and can lead to incorrect inferences. They, therefore, proposed an alternative technique which involves augmenting the standard gravity equation with local country and target country specific dummies to cater for the regional integration effect on intra-regional trade. This paper uses a modified version of their alternative technique and demonstrates that the traditional technique leads to incorrect interpretation of the regional integration effect. Since the present study uses pooled data on bilateral trade flows between AMU and its trading partners, we include only trading partner dummies (target country dummies), and use an appropriate weighting scheme to calculate regional integration effect on bilateral trade. This version of the proposed technique also makes it possible to test for the openness of other trading partners in the sample who do not belong to the EU and the AMU. This study, therefore, is one of the first studies to apply this recommended technique to data exclusively on Arab Maghreb Union countries to investigate the effect of regional integration. Beside the application of the gravity model, we also use other statistical measure (Pedroni Cointegration Test) to determine the nature of variations in AMU countries' bilateral trade levels over the study period). The results from the analysis of these statistical measures are used to complement the results from the econometric analysis of the gravity model.

The relationship between openness and trade is a highly debated topic in the development literature. Yet, this issue is far from being resolved. In a way this study will contribute to the existing economic studies both in extant literature and applied policy development. Therefore, it is expected to contribute in economic development in many of ways. In this regard, will investigate and examine the relationship between openness and trade within the Arab Maghreb Union countries and with the European Union and Middle East countries as well.

Today, nearly every country belongs to at least one Preferential Trade Arrangement (PTA) and numerous countries are party to several agreements. A substantial number of developing countries have signed bilateral preferential agreements with an industrial country. Because of this increase in the number of agreements, the share of global trade taking place between PTA members has also risen and has reached almost 40 per cent of total world trade. Intra-regional trade is particularly large within Europe and Asia: in the European Union (EU), about 60 per cent of the countries' external trade remains within the region and in East Asia the share is about 50 per cent. Despite these trends, the share of global trade induced by PTAs such the (AMU) is believed to be declining.

This study has been carried out to understand the long-run relationships among the trade and its determinants. The long-run relation is crucial in the gravity model. Gravity models are characterized by inherited cross-sectional correlation between the panel units (country pairs). Therefore, the results of the standard panel unit root tests are biased and outperformed by the simple cross-sectional augmented panel unit root test according to

Pesaran (2007). Nevertheless, the fixed effects estimator is similar to the dynamic OLS or fully modified OLS, which take into account the non-stationarity of analyzed macroeconomic variables as well as possible endogeneity between trade and the its determinants.

1.6 Scope of the Study

The scope of the study is divided into dimensions, namely time frame and geographical location. Firstly, under the time frame dimension, the study covers the period from 1989-2009. Secondly, in the context of geographical location dimension, this study covers the trade exchanges between the Maghreb countries and the EU and other countries in the world as well as the trade exchanges within the Maghreb countries.

1.7 Research organization

This thesis is divided into seven chapters. Chapter 2 provides an overview of the AMU including its establishment, the background of member countries, and trade activities and growth of the organization. Chapter 3 critically reviews the literature and theories related to the issue of the thesis. Chapter 4 discusses the methods and techniques used in the study. In this chapter, the standard gravity model is examined and the research framework is also outlined. Analyses of data and findings of the research are undertaken in Chapter 5 and Chapter 6. These chapters present complete results and analyses of the study in the form of figures, tables or text so that the key information is highlighted.

Chapter 7, the conclusion, summarizes the arguments of preceding chapters. It also retraces the objective and core argument of the study.

CHAPTER 2

OVERVIEW ON ARAB MAGHREB UNION (AMU)

2.1 Introduction

This chapter will focus on an overview of the Arab Maghreb Union (AMU). More specifically, the study will discuss the country backgrounds of the AMU members, its establishment and trade activities. The AMU is a Pan-Arab trade agreement whose main objective is to achieve economic and political unity in North Africa. The concept for an economic union of the Maghreb began with the independence of Tunisia and Morocco in 1956. It was not until thirty years later, though, that five Maghreb states - Algeria, Libya, Mauritania, Morocco, and Tunisia - met for the first Maghreb summit. Strategic relevance of the grouping is based on the fact that, collectively, it boasts strategic resources such as phosphate, oil, and gas. Furthermore, the region is a transit centre to southern Europe. The success of the AMU would, therefore be economically important.

Aghrout (2000) in his book *From preferential status to partnership: The Euro-Maghreb relationship* evaluates the outcome of EC/EU policy toward the AMU region in terms of its objectives. Aghrout (2000) defines the Euro-Maghreb relationship and analyzes the underlying environment of its development. He also evaluates the trade arrangements of the 1960s; cooperation under the EC's so-called ‘global’ Mediterranean policy of the 1970s, which addressed a broad range of issues, including trade, financial assistance,

and labor; sources of potential instability in the Maghreb region; and the immediate effects and future prospects of the EU's partnership initiative of the 1990s, which is centered around the gradual establishment of a free trade area. Almost all countries have sought integration with other countries, and not necessarily always with neighbors. Preferential trade arrangements (PTAs) have been the central elements of all regional agreements. Furthermore, successful trade agreements have in some cases evolved to a customs union, a common market, and finally to an economic and monetary union. In this context, it is not surprising that Arab Maghreb countries are also striving for greater regional integration. Despite geographic proximity and cultural affinity, North African countries, currently barely trade with each other. Regional trade is substantially lower in North Africa. The framework treaty on creating the Arab Maghreb Union represents an important effort to enhance regional cooperation. Against this background, it may be useful for policy makers, academics, and society in general to look at the growing international experience with PTAs and the implications for the design of AMU.

Despite the trend toward regionalization, many economists argue that regional integration can harm member countries if the evolving PTA does not pursue a policy of openness towards other countries. By restricting market access of more efficient producers from outside the PTA, they can lead to welfare losses at home and abroad. But economic theory also offers some broad insights for conditions under which PTAs are likely to be welfare enhancing. In a way regional integration, if done right, can work. Moreover, if done right, PTAs can be stepping stones toward multilateral liberalization. Once formed, a PTA can be thought of as an entity participating in international trade just like individual countries constitute such entities. From international trade theory, it

follows that the best trade policy for this larger entity towards the rest of the world is free trade. Thus, it is in a PTA's own interest to pursue multilateral trade liberalization.

2.2 Background of AMU countries

According to Cammett (1999), a different set of international economic pressures contributed to the establishment of the AMU. The grouping was created largely as a response to "the expansion and consolidation of the European Community in the 1980s". Thus, the prospect and potential of increasing protectionism in Europe, the dominant trading partner of the AMU members, had a huge effect on these countries. The AMU agreement had obvious utility for political relations among its member countries. These members had prior history of tense relations. Two alliances preceded the treaty and resulted in a shift in Maghreb alliance formation from geopolitical to economic terms. The first, signed in February 1988, restored diplomatic relations, between Tunisia and Libya. The second treaty in May 1988, declared reconciliation between Morocco and Algeria.

It should be pointed out that there have been problems of traditional rivalries within the organization. For instance, in 1994, Algeria decided to transfer the presidency of AMU to Libya. This followed the diplomatic tensions between Algeria and other members, especially Morocco and Libya, whose leaders continuously refused to attend AMU meetings held in Algiers. Algerian officials justified the decision, arguing that they were simply complying with the AMU constitutive act, which stipulates that the presidency

should in fact rotate on an annual basis. Algeria accepted to take over the presidency from Tunisia in 1994, but could not transfer it due to the absence of all required conditions to relinquish the presidency as stipulated by the constitutive act. Moreover, traditional rivalries between Morocco and Algeria, and the unsolved question of Western Sahara's independence have blocked union meetings since the early nineties, despite several attempts to re-launch the political process. The latest top-level conference, in mid-2005, was derailed and affected by Morocco's refusal to meet, due to Algeria's open support for Saharan independence. Western Sahara is a former Spanish colony south of Morocco that was incorporated by the kingdom of Morocco. Algeria has consistently supported the Western Saharan liberation movement, POLISARIO.

According to Amiot and Salama (1996), without a competitive transport industry, the Maghreb countries will not truly benefit from reform aimed at increasing the region's share of international trade. A study of barriers to the region's trade, especially with countries of the European Union, identified more than 30 barriers, in four categories: barriers to imports, to exports, of infrastructure and equipment, and of intra-Maghreb trade. These include: 1) direct barriers including: (a) from traditional distortions (price, discriminatory access to markets); (b) nontariff barriers (administrative, regulatory and tax-related restrictions); (c) traffic agreements (protecting national flags); and (d) lack of infrastructure and equipment; and 2) indirect barriers deriving from: (a) trade harmonization (simplified customs procedures and tariffs structures, elimination of quotas, reduction of customs tariffs on transport equipment); and (b) technology lags (telecommunications and handling).

The authors quantify barriers in terms of tariff equivalents, expressed as a nominal rate of protection based on the free- on-board value of the merchandise. But the nominal rate of protection measures only the direct costs of distortions. The effective rate of protection measures both direct and indirect effects, and effective rates are generally twice as high as nominal rates. To reconcile macroeconomic and microeconomic approaches to measuring effective rates, the authors use a partial equilibrium model (SMART model) to estimate the impact on the balance of payments of eliminating excess costs. Most of the corrective policies they recommend concern multimodal transport in the trade between Europe and the AMU. The challenges are considerable: not only does such a system pave the way for cost and time savings, but it also adopts the logistics management that the most advanced European enterprises use to orchestrate their raw material purchasing, production and marketing functions. As such a multimodal transport system will allow them to reduce inventories significantly and to respond better to volatile demand. Essential for just-in-time multimodal transport and logistics management include efficient modern transport techniques, efficient communications systems, efficient modern merchandise handling, and appropriate regulations. These conditions are still not fully in place in the Maghreb countries, except partially in some parts of the clothing and textile industry.

2.3 Establishment of AMU

The regional bloc was established in 1989. As indicated earlier, the increasing exposure to international export markets were important catalysts for the formation of the AMU. The AMU agreement stipulated two main provisions that promoted cooperation. Firstly,

it called for the gradual realization of the free movement of people, goods, services and capital throughout the region. Second, it sought the adoption of common diplomatic, military, economic and cultural policies (Cammett, 1999). The Maghreb case clearly shows the reactive nature of regional integration in developing countries. The Arab Maghreb Union (AMU) encompasses five North African countries (Algeria, Libya, Mauritania, Morocco, Tunisia) that have strong historical, cultural, and language affinities. The first Conference of Maghreb Economic Ministers in Tunis in 1964 established the Conseil Permanent Cunsultatif du Maghreb (CPCM) between Algeria, Libya, Morocco, and Tunisia, to coordinate and harmonize the development plans of the four countries as well as inter-regional trade and relations with the EU. However, for a number of reasons, the plans never came to fruition. It was not until the late 1980s that new impetus began to bring the parties together again. The first Maghreb Summit of the five Heads of State, held at Zeralda (Algeria) in June 1988, resulted in a decision to set up the Maghreb High Commission and various specialized commissions. Finally, on February 17, 1989 in Marrakech, the Treaty establishing the AMU was signed by the Heads of State of the five countries. As of May 1997, there have been a total of 37 Maghreb conventions.

The main objectives of the AMU Treaty are to strengthen all forms of ties among Member States (in order to ensure regional stability and enhance policy coordination), as well as to introduce gradually free circulation of goods, services, and factors of production among them. Common defense and non-interference in the domestic affairs of the partners are also key aspects of the Treaty. The Treaty highlights the broad economic strategy to be followed, namely, the development of agriculture, industry,

commerce, food security, and the setting up of joint projects and general economic cooperation programs. Finally, the agreement provides the possibility for other Arab and African countries to join the Union at a later stage.

Since 1990, the five countries have signed more than 30 multilateral agreements covering diverse economic, social, and cultural areas. While member countries have ratified varying numbers of these agreements, only five have been ratified by all members of the union. These include agreements on trade and tariffs (covering all industrial products); trade in agricultural products, investment guarantees; avoidance of double taxation; and phyto-sanitary standards.

Since 1989, the Governors and technical staff of the five central banks of the AMU have been meeting regularly. In December 1991, the five banks signed a multilateral agreement to help facilitate interbank payments within the union. The agreement sets unified modalities of payments between the five central banks, and provides for monthly settlement of balances between any two countries without charge of interest on interim balances. The unit of account is the SDR and the settlement currency is chosen by the creditor country.

2.4 Trade activities and growth of AMU countries

The Maghreb economies have made important strides over the past two decades. Financial and economic stability was established during the 1980s and the 1990s under government reforms supported by the IMF. Stable macroeconomic conditions have been

maintained over the last few years. As a result, these economies have seen some growth and have made some progress in reducing poverty. But, throughout the region, economic growth has remained below its potential, unemployment is still much too high, and poverty remains pervasive. This suggests that there are important constraints on the economies that need to be addressed. What are these and what can be done?

The economies of Algeria, Morocco and Tunisia share many features. In all three countries, agriculture is important; the state dominates the economy to varying degrees; and external trade regimes generally remain quite restrictive, despite more open trade with the European Union. The greatest structural difference is that Algeria is predominantly an oil-exporting country, while Morocco and Tunisia are more diversified.

The IMF sees the slow progress in opening these Maghreb economies to multilateral trade and investment as a key obstacle to achieving higher growth rates and reducing high unemployment. The Maghreb countries represent relatively small, fragmented markets, whose best chance for development lies in openness and integration. In practice their restrictive trade regimes and cumbersome investment regulations have discouraged domestic private investment and attracted only limited amounts of foreign direct investment, outside the hydrocarbon sector.

The countries of the region are aware of the benefits of more open economies. They have established Association Agreements with the European Union and have concluded trading arrangements among themselves. But at present, these arrangements are not

being fully exploited. Bilateral trade among the three countries accounts for a tiny fraction (less than 2 percent) of each country's total trade and remains well below potential. Their fragmented markets are also an incentive for European and other foreign investors to locate their operations in Europe to benefit from economies of scale and to export to each country under the separate bilateral trade arrangements with Europe.

Greater regional economic integration would yield important benefits. It would create a regional market of more than 75 million consumers, similar in population size to many leading trading nations. It would bring efficiency gains and make the region more attractive for foreign investors. And, most important, the complementary economic structures of the Maghreb countries would create opportunities for mutually beneficial trade within the region.

To take greater advantage of the potential of the EU Association Agreements and the Wider European Neighborhood, it is in the Maghreb countries' interest to facilitate trade among them as well as with the European Union. They should build the institutions that are necessary to pursue common goals and share best practices, including in banking reform, tax reform, and capital account liberalization. To this end, stronger efforts are needed to coordinate economic, institutional and legal reforms within the region, for instance by strengthening the secretariat of the Arab Maghreb Union and its regional cooperation mechanisms. The Wider European Neighborhood also provides a forum for harmonizing the Maghreb's institutions and legal frameworks with European standards.

The IMF can help in a variety of ways. It can play a catalytic role in the dialogue among the Maghreb countries to help them benefit from each others' experiences. Through its policy advice, it can help them move forward with economic reforms important for the region, and can assist them in implementing the Wider Europe Neighborhood initiative. The IMF's annual "Article IV" consultations are the main vehicle for this advice, and these consultations are supplemented by technical assistance at the request of the authorities.

Increasingly, the IMF is developing a regional perspective in its activities, and discussions are frequently held on regional issues. In order to promote discussion of integration within the region, during my visit I proposed to the authorities of Algeria, Morocco, and Tunisia that the IMF organize a regional seminar on trade facilitation in the Maghreb countries in Algiers in November 2005. The Maghreb has the opportunity to be a trailblazer for the Middle East and North Africa region and other developing countries. Few countries have achieved success without adopting an outward orientation in their policies, and even fewer have achieved sustained growth without establishing strong trading and investment links with their neighbors.

It should be stressed that Algeria, Morocco and Tunisia have made important strides toward economic prosperity in recent years. Stable macroeconomic conditions and a steady pace of economic reforms have led to a significant rise in per-capita incomes. In addition to ongoing reforms, a key factor behind these favorable developments has been the increasing openness of the region; in particular it's growing economic integration

with the European Union in the context of the Association Agreements signed by the three countries.

While the three economies have already started to reap the benefits of policies that favor private initiative and investment, they still face a major challenge. All three countries need to speed up economic reform to increase growth with a view to reducing unemployment and raising living standards. To this end, greater regional economic integration in the Maghreb could play a crucial role. It would create a regional market of more than 75 million consumers, similar in population size to many large trading economies. It would also bring efficiency gains and make the region more attractive for foreign investors. And, most importantly, the complementary economic structures of the Maghreb countries would create opportunities for mutually beneficial trade within the region. The AMU member countries specific trading activities are examined below:

2.5 Tunisia

At the end of the 1980s, Tunisia, with few natural resources, adopted a development strategy based on integration into the world economy with a view to stimulating growth and improving well-being. A wide range of reforms, steadily and progressively introduced and accompanied by sound macroeconomic management, has enabled Tunisia to position itself more advantageously, to adapt harmoniously to the requirements of globalization and to benefit from an open and competitive economy. As noted in the World Trade Organization's Press Release of 5 and 7 October 2005, the trade regime in Tunisia needs further liberalization (Press/TPRB/252, 5 & 7 October

2005). According to a World Trade Organization (WTO) Secretariat report on the Trade Policies and practices of Tunisia, the macroeconomic reforms introduced by Tunisia since the mid-80s have contributed to its good recent economic performance that has reduced poverty and contained inflation and the budget deficit,. But the reforms have not substantially liberalized trade, according to the report, and the strategy to promote exports, while heavily protecting enterprises that supply the local market, has created a dualism within the economy, between an export sector, strongly supported, and a domestic sector that is still heavily protected. Tunisia's trade regime remains generally protectionist. Its participation in different preferential trade agreements further complicates the regime. The report notes that the simplification of the tariff structure, including the reduction of the rates, should enable Tunisia to adhere more closely to the principles of the WTO. Such reforms, together with further improvement of Tunisia's tariff binding commitments, should make its trade regime more transparent and predictable.

The application of the rules and provisions of the multilateral trading system and the implementation, since 1996, of the free-trade area with the European Union (EU) and, since 1998, of the Greater Arab Free Trade Area (GAFTA) have enabled Tunisia to progress rapidly with the liberalization of its trade and to achieve an openness ratio (imports + exports of goods and services/GDP) of 96 per cent in 2004. The liberalization of investment since 1994 and the adoption of a proactive policy of attracting foreign direct investment have enabled Tunisia to record a 9 per cent annual average rate of increase in FDI, with more than one third being earmarked for manufacturing industry.

Tunisia's GDP is relatively diversified with manufacturing accounting for 20 per cent and services for over 54 per cent. The structure of the country's GDP and rate of increase in 2004 is captured below in figure 2.1.

Figure 2.1
Structure of GDP and rate of increase

Sector	Agriculture and fishing	Manufacturing industry	Non-manufacturing industry	Tourism	Transport	Communications	Other services
Percentage of GDP in 2004	14.3	20.2	11.4	6.4	6.3	4.1	37.3
Rate of increase of value added in 2004	9.0	4.3	3.6	7.5	6.2	20.5	6.7

Source: Trade Policy Review – Tunisia, 5 and 7 October 2005.

According to Tunisia's Trade Policy Review of 2005, between 1998 and 2004, exports grew strongly at an average rate of 12 per cent a year. During the period 2000-2004, exports accounted for an average of 45.5 per cent of GDP as compared with an average of 42 per cent in 1990-91. Alongside tourism, the manufacturing sector, which accounts for more than 50 per cent of total exports, and more particularly the textiles and clothing sector, is the linchpin of this export drive. Moreover, 24 per cent of exports consist of products requiring a high input of skilled labour and modern technology, as compared with 21.2 per cent in 1997.

Due to its good climate, Tunisia has also enjoyed comparative advantages for the production of several agricultural-foods' products, such as olive oil, harissa, and dates, of which it is one of the world's leading exporters. Fishing is another important sub-sector, currently undergoing restructuring following the depletion of fish stocks. In its

quest to ensure food self-sufficiency, Tunisia has encouraged the expansion of livestock breeding and cereal growing by means of investment subsidies, price controls and trading monopolies. Not surprisingly, most imported agricultural-food products are subject to trade barriers such as very high customs duties and complex technical regulations. Tunisia is also facing the prospect of a substantial adjustment of its manufacturing sector. It is losing its share of the European textiles and clothing market which, up to 2005, was protected by import quotas. The importance of this sector was highlighted in 2003, when textiles and clothing industries accounted for about one-fifth of the total value of Tunisian exports of goods and services. In other manufacturing activities, the maintenance of export production will depend on the capacity of enterprises to specialize in activities in which they are truly competitive, in the new context of free trade with the European Union. Growth is currently centred on headlamps and automotive components in general, thanks to the proximity of the European motor vehicle market for which many Tunisian enterprises sub-contract. Some industries and sub-sectors, particularly in the chemicals, wood, household appliance and consumer electronics sectors, have been established on the basis of the import substitution model and have not been exposed to competition.

On the contrary trade policy on services is being progressively liberalized. Substantial amounts of hard foreign currency earnings are currently being derived from services such as tourism, health and wellbeing, medical, and engineering and accounting services. However, for strategic reasons the principal infrastructure services, such as energy (distribution of petroleum products, gas and electricity), telecommunications, postal and courier services, and financial services, have been opened up to competition

only to a very limited extent. Nevertheless, because these services are essential to the performance of other sectors downstream, considerable liberalization in this sector will produce multi-sectoral effects by improving the quality-price ratio of the services offered to user industries (World Trade Organization, , 7 September 2005).

An improved business environment and a more competitive economy, together with macroeconomic stability, have made it possible for Tunisia to record rapid and sustained growth. As indicated in Trade Policy Review of 2005, during the decade which followed the structural adjustment of the mid-80s, GDP increased on average by 4.3 per cent and growth rose from 5.2 per cent during the period 1997-2001 to 6 per cent in 2004. In real terms, per capita GDP rose by one third during the 90s. This impressive economic growth helped to reduce poverty levels in the country particularly from the mid-90s. Unsurprisingly, by 2000, only 4 per cent of the population was still living below the poverty datum line. Notably, poverty was reduced in rural as well as urban areas. There is no doubt that considerable progress has been made in improving living standards of Tunisians. As a result life expectancy has increased, illiteracy has been eradicated among the young, and electricity and drinking water have been brought to 98 per cent and 96 per cent of the population, respectively.

The impressive economic growth rates that have been enjoyed by Tunisia since the 1990s are indicative of sound macro-economic policymaking. For instance, the maintenance of principal balances is a constant feature of Tunisian economic policy. Prudent demand management made it possible for the country to reduce the inflation rate

from more than 6 per cent at the beginning of the 90s to an average of 2.4 per cent during the period 2000-2003. Crucially, for most of the 90s, the structural current account deficit remained at around 3 per cent of GDP. It was brought down to 2 per cent only at the end of 2004. During the period 2002-2004, the budget deficit was reduced to average levels of approximately 2.4 per cent of GDP mainly due to the efforts made to raise own resources and control budget expenditure in spite of existing pressures characteristic of this period, in particular, the decline in tax revenue due to tariff reductions.

Similarly, the implementation of a flexible exchange rate policy towards the end of the transitional period of the FTA with the EU has helped the country to liberalize trade and preserve the competitiveness of the Tunisian economy. Tunisia has also adopted a prudent policy in relation to debt management and controlling the burden of public debt. In 2004, Tunisia's total external debt amounted to 50.4 per cent of GDP as compared with 52 per cent in 1999. In recent years, the debt service ratio has been brought down to less than 15 per cent of exports due to austerity measures. Recently, it has been possible for Tunisia to build up foreign currency reserves, due to the improvement in export performance and tighter control over the debt servicing level. In this regard, net foreign exchange assets rose from 2 810 million dinars, or 74 days of import cover, in 2001 to 4733 million dinars and 107 days in 2004. Against this background, Tunisia has emerged as one of few developing countries to have earned the rating of investment grade. More importantly, due to its prudent macroeconomic policies and greater creditworthiness, Tunisia has also gained easier access to international financial markets, enabling it to raise long-term loans on relatively favourable terms.

One of the factors that have shaped Tunisia's development thrust is its human capital. Tunisia has a skilled and productive labour force of international standard. This is complemented by its internationally competitive wage levels. The country's renowned human resources are a reflection of the hugely successful programme of educational reform. This has ensured a steady supply of university graduates who represent more than half the additional demand among those entering the labour market for the first time. It is anticipated that by 2016 workers who have received a higher education will account for 23 per cent of the working population, as compared with 10 per cent in 2001, whereas the percentage of less educated workers (primary education) should fall from 61 to 40 per cent.

In Tunisia, emphasis has been placed on promoting private investment in the traditional sectors and on opening up new areas, such as transport, telecommunications and higher education, to private sector participation, as well as on increasing the share of services, in particular, those with a high technological content and high value added. Accordingly, special attention has been paid to the various components of the investment promotion system both at business environment level and in relation to the business creating mechanisms. The action taken has included support for competitiveness and business financing mechanisms and for improved relations between business and government. The measures to encourage business creation have been mainly concerned with financing investment by strengthening the venture capital investment companies (SICAR), facilitating financial market transactions, improving the ability of businesses and banks to resort directly to the international financial market, encouraging

production-related research, and making the conditions and procedures for establishing new businesses more flexible.

This combination of policies enabled the Tunisian economy to withstand the shocks experienced during the years 2002 and 2003, which were marked by an overlapping set of adverse circumstances: the continuation of the four-year drought, the prolonged impact of the events of 11 September, the outbreak of war in Iraq, and the slowdown in the economy and world trade. During the years in question, these factors had a negative effect on the development of certain sectors, in particular, tourism and international transport. Nevertheless, despite a slowdown, GDP (excluding agriculture) recorded an increase of 3.5 per cent in 2002, in particular thanks to services and more especially telecommunications. Investment's share of GDP amounted to about 25 per cent during the period 2002-2004.

In Tunisia, the broad outlines of trade policy are formulated through the preparation of five-year plans coordinated by the Ministry of Trade and Crafts in collaboration with other institutions and government agencies (including the private sector). In some situations, the proliferation of institutions involved in formulating trade policy has increased the risk of their activities overlapping, particularly where the promotion of exports and investment is concerned. Tunisia has been a member of the GATT since 1990, and is an original member of the WTO (World Trade Organization, 7 September 2005). It accords at least most favored nation (MFN) treatment to all its trading partners. Tunisia has not signed any of the plurilateral agreements concluded under the WTO; neither is it a signatory to the Information Technology Agreement or the

Pharmaceutical Understanding (World Trade Organization, 7 September 2005). Within the multilateral trading system, Tunisia takes the view that rules oriented toward economic development should facilitate the integration of developing countries and help to eliminate poverty. It therefore proposes that special and differential treatment be strengthened in order to ensure better access to advanced-country markets for goods and services originating in the developing countries. Tunisia also urges the facilitation of the international movement of natural persons.

In Tunisia the consolidation of the principle of freedom of trade and current transfers has formed the basis for the reform of external trade. It was firmly established and formalized by Law No. 94-41 of 7 March 1994 and organized by means of a series of implementing texts published in August of the same year. This reform of external trade was accompanied by a restructuring of the trade-monitoring agencies and mechanisms which capacitated the bodies and institutions responsible for conformity assessment and market safety. To this end legislation on unfair import practices such as dumping and subsidies and on safeguard measures were adopted in 1998 and 1999 respectively even though it has been used only sparingly. Nonetheless the process of trade liberalization has proceeded at a pace sustainable both for businesses, simultaneously confronted with the loss of tariff protection as a result of the establishment of the free-trade area with the EU, and for Tunisia's external balances. More importantly, at the beginning of 2000, a new reform process was launched with a view to facilitating external trade by speeding up processes such as completion of foreign trade operations, rationalizing procedures and documents and reducing transaction costs. In this regard, the first programme to be implemented (2000-2004) resulted in the setting up of an integrated system of electronic

management of external trade procedures involving all the major stakeholders, in particular, customs, the banks, and the ministries responsible for trade and transport. Moreover, a second facilitation programme was introduced at the beginning of 2005 as part of a huge export development project. It involves the establishment of a customs risk management system, more transparent and effective standards technical regulations and conformity assessment procedures, and a system for measuring trade efficiency indicators. This development complemented action that had already been taken to further simplify import and export procedures, harmonize the activities of the various departments concerned, rationalize the documentation and reduce the number of documents required. In a way, the ongoing review of the Customs Code will make procedures and processes more transparent, strengthen the rights of economic operators and make customs more efficient.

Generally, all the reforms implemented since 1994 have been aimed, among other things, at fulfilling Tunisia's commitments to the World Trade Organization (WTO). Significantly, Tunisia has been able to introduce these reforms at a pace adapted to its economic and social development objectives. As an original member of the WTO, Tunisia has demonstrated its commitment to the multilateral trading system and the establishment of a balanced and inclusive world economic order designed to promote growth and sustainable development.

Successful Regional Integration: Furthermore Tunisia considers that the processes of multilateral and regional integration are two complementary and mutually reinforcing movements, in as much as the common objective is to facilitate trade liberalization by

reducing and indeed progressively eliminating barriers to trade. In conformity with the WTO Agreements, Tunisia is endeavouring to ensure appropriate interaction between the multilateral and regional systems, with both development needs and the requirements of progressive liberalization and integration being taken into account. Tunisian trade has always been rooted in the Mediterranean region with a heavy European component amounting to approximately 80 per cent of its total external trade. The Association Agreement between Tunisia and the European Union is a reflection of their close links, sustained and reinforced, among other things, by intensive and fruitful trade. This is a bilateral global agreement which anticipated the Euro-Mediterranean partnership process inaugurated by the Barcelona Conference in 1995. The free-trade area forming part of this agreement is an extension of the special trading and economic relationship but, above all, an expression of Tunisia's strategic decision to integrate more closely into the world economy and the Euro-Mediterranean area in particular, with a view to narrowing the development gap and improving the lot of the peoples of the Southern and Eastern Mediterranean.

Tunisia-EU relations entered a new phase of development and integration with the implementation of the action plan agreed and adopted by the two partners in 2005. Among other things, this action plan, an extension of the Association Agreement, defines the main areas of cooperation at global economic policy and sectoral levels. Several of its components, in particular those relating to trade, incorporate a Euro-Mediterranean regional dimension which is strategic to Tunisia. Tunisia, in conformity with WTO provisions, has concluded bilateral and regional trade agreements with a view

to achieving a higher level of integration into the world environment. Thus, Tunisia is a member of:

- The Maghreb Arab Union (Tunisia-Algeria-Libya-Morocco-Mauritania), created on 17 February 1989, which envisages the establishment of a free-trade area, as decided by the Council of the Presidency of the MAU in 1994;

- the League of Arab States (1947), which has 22 member countries and under whose auspices the Greater Arab Free Trade Area entered into force in January 2005;

- the Barcelona (Euromed) Process, inaugurated on 15 November 1995 for the purpose of establishing a FTA by 2010 and characterized by progressive integration at the vertical (North-South) and horizontal (South-South) levels. (*Source: Trade Policy Review* – Tunisia, 5 and 7 October 2005).

To give concrete expression to this South-South dimension, Tunisia concluded The Arab-Mediterranean Free Trade Agreement, signed on 25 February 2004 and providing for the establishment of a free-trade area initially comprising Tunisia, Morocco, Egypt and Jordan, while remaining open for accession to all the other Arab Mediterranean countries which have signed association agreements with the EU. Furthermore a free trade agreement with Turkey, signed on 25 November 2004. Notably, Tunisia has also concluded bilateral free trade agreements with its Maghreb and Arab partners. A free trade agreement complementing the regional agreements already signed was concluded with the European Free Trade Association (EFTA) on 17 December 2004 and ratified in 2005. Tunisia's aims in concluding these agreements, within the context of its open-market policy, are geared specifically to strengthen and diversify its economic and trade cooperation relations, to benefit from technology transfer and to further consolidate its position in order to attract more FDI.

Undoubtedly, the macroeconomic reforms introduced by Tunisia since the mid-80s have contributed to its good recent economic performance. Since its last Trade Policy Review (TPR) in 1994, real GDP has grown by an annual average of 5 per cent; real per capita income has also progressed, reaching almost 2,300 Euros in 2004 (World Trade Organization, , 7 September 2005). Poverty has been significantly reduced. Inflation has been largely contained and for example, it was 3.6 per cent in 2004. The same applies to the budget deficit (about 2.6 per cent of GDP in 2004) and to the deficit on current account (2.1 per cent of GDP in 2004). Nonetheless, the dinar is still not completely convertible and the unemployment rate remains high, about 14 per cent in 2004(World Trade Organization, , 7 September 2005).

A closer examination of developments indicates that the reforms have not substantially liberalized trade. In fact, for more than 30 years, the strategy pursued by Tunisia has consisted in promoting exports, especially manufactured goods, while heavily protecting enterprises that supply the local market. This policy of strategic integration has created a dualism within the economy, between an export sector whose competitiveness depends largely on concessions (including tax, customs and foreign exchange concessions) and a domestic sector that is still heavily protected (despite the opening up of bilateral trade in non-agricultural products under the Association Agreement with the European Union).

In terms of contribution to GDP, services are still the leading sector (over 60 per cent) followed by the manufacturing, agricultural, and mining and energy sectors. In addition to textiles and clothing (one-fifth of the total value of exports of goods and services in 2003), Tunisia mainly exports tourism services and motor vehicle components. It

chiefly imports agri-food products and inputs, partly for use in the manufacture of exports. Nearly 70 per cent of its merchandise import trade, and 83 per cent of its export trade, is with the European Union.

The difficulties being experienced by the principal export industry, textiles and clothing, following the expiration of the WTO Agreement on Textiles and Clothing (ATC) have highlighted the need for new growth poles capable of generating jobs. A highly trained labor force, the proximity of the European market and its social and institutional stability will doubtless enable Tunisia to develop its position as a production base for a good many multinational enterprises seeking to conquer the regional market, provided that the appropriate reforms are effectively implemented.

As mentioned earlier, Tunisia has signed several regional preferential trade agreements, including the Association Agreement with the European Union, the Agreement on the Greater Arab Free Trade Area (GAFTA), the Arab-Mediterranean Free Trade Agreement, the Free Trade Agreement with EFTA, the Maghreb Arab Union Agreement, and bilateral agreements. These agreements differ with respect to geographical coverage, trade liberalization programs, implementation periods, trade policy instruments and their objectives. Some of them overlap. Consequently, Tunisia's trading partners have market access which differs according to the agreement to which they are party and its degree of implementation; those which are party to several agreements can trade with Tunisia under any of them. The same applies to Tunisian exports to these markets. Apart from the cost in human resources, this situation could distort trade and preferences, in an unpredictable way, and lead Tunisia to enter into

mutually incompatible commitments. The investment regime aims to be generally liberal, particularly in relation to export activities. Concessions are selectively granted in order to encourage investment in activities considered to have priority or to support enterprises in difficulty.

In addition to participating in the multilateral trading system, Tunisia also participates in several preferential trade agreements in order to promote its exports. These agreements have considerably liberalized the trade between Tunisia and its main partners, in particular, the EU. However, its simultaneous participation in several agreements, some of which overlap or conflict with each other, adds to the complexity of Tunisia's trade regime. The limits of the dual strategy of export promotion and import substitution, adopted by Tunisia in order fully to exploit its preferential access to the European market, have become increasingly obvious and apparent, especially since the expiration of the ATC. Aware of the need for reforms aimed at adjusting this oxymoronic dualism created within the economy by this strategy, Tunisia is in the process of exploring suitable alternatives. These reforms should result in the rationalization of the concessions currently available to exports and allow for a better allocation of resources. The elimination or reduction of tax incentives presupposes a rationalization of the tax system, so as to make it better reflect the structure of the economy and enable Tunisia to exploit its comparative advantages to better effect. Tariff reforms (in particular, the simplification of the tariff structure and the reduction of duty rates) should enable Tunisia to adhere more closely to the principles of the WTO. An extension of Tunisia's multilateral tariff commitments to other categories of non-agricultural products and a reduction in bound rates, so as to bring them more closely into line with the applied

tariffs, should make its trade regime more transparent and predictable. In conjunction with the continuation of structural reforms, these adjustments will like continue to attract more investment for the country. Trading partners could contribute to the success of the trade reforms by facilitating access to their markets for goods and services of interest to Tunisia.

2.6 Libya

At the time of independence, the Libyan economy was based mainly on agriculture, which was divided more or less evenly between field (including tree) crops and livestock products. Agriculture provided raw materials for much of the country's industrial sector, exports, and trade; employed more than 70 percent of the labor force; and contributed about 30 percent of the GDP, dependent on climatic conditions (WTO News, 28 July 2004). For the most part, agricultural resources were limited to two comparatively narrow stretches along the Mediterranean Sea and a few desert oases. The cropland had been maltreated, and the pasture had been overgrazed. Erosion was common, production methods were primitive, and close to a quarter of the agricultural area was held on a tribal basis and was being used inefficiently. Rainfall was unpredictable, except that usually it was scarce and ill-timed. When the rains did come, however, they were likely to be excessive. Groundwater was in short supply in the agricultural areas. In some locations it had been so excessively drawn upon that it had become brackish or saline and was no longer suitable even for agriculture. Because the country has no perennial rivers, there was only limited potential for irrigation and even less for hydroelectric power. At the time of independence, the apparently abundant subterranean water

supplies located in the Lower Sahara had not yet been discovered. Even if officials had known about the water, its presence, while encouraging, would not have been very helpful in the short term because of lack of development funds and inadequate transport and storage facilities. In 1986, although agriculture contributed a very small share to the GDP, it still provided employment opportunities for a large portion of the population and was therefore still important. Shortage of water was the main drawback to expansion of cultivable land, but reclamation and irrigation schemes and the introduction of modern farming techniques held promise for the future.

Furthermore at independence, Libya possessed few minerals in quantities sufficient for commercial use, although iron ore was subsequently found in the Wadi ash Shati in the south-central part of the country. In turn, because of the absence of coal and hydroelectric power, the country had little energy potential. In the modern sense, Libya had practically no industry and, given the limitations of the agricultural sector, could produce few exports to be exchanged for the import commodities the country needed. At independence, illiteracy was widespread, the level of skills was low, and technical and management expertise and organization were at a premium. (The lack of sufficient numbers of skilled Libyans in the labor force remained a problem in the 1980s; despite large sums of money having been spent on training Libyans, the government still relied on foreign workers.) A large part of the national life was lived under nomadic or semi-nomadic, rather than settled, conditions. The high birthrate added to the country's poverty. The rapid population increase strained the agricultural economy and resulted in the drift of excess unskilled laborers to urban centers, but these centers, too, lacked sufficient adequately paid employment.

In terms of resources, including human resources, the outlook at independence was bleak. Throughout the 1950s and early 1960s, international and other foreign agencies--mainly the United States and Italy--continued to finance the gap between Libya's needs and its domestic resources. The foreign community was not in a position, however, to undertake an across-the-board and sustained development program to set the economy on a course of immediate self-sufficiency. During much of a 1950s, the country's administrative apparatus was unable even to utilize all the resources made available from abroad. During the decade after the discovery of petroleum, Libya became a classic example of the dual economy, in which two separate economies (petroleum and nonpetroleum) operated side by side. For practical purposes, no connection existed between them except that the petroleum companies employed limited quantities of local labor and paid a portion of their profits to the government in royalties and taxes. The financing and decisions affecting the activities of the petroleum economy came not from the domestic nonpetroleum economy but rather from outside the country. Although this sharp dichotomy was in the process of relaxation after 1965--perhaps especially after 1967-- it appears not to have been attacked conceptually, at least not with fervor, until after the 1969 change of government.

The laissez-faire arrangement came to an end with the military coup d'état of September 1, 1969. The previous government's personnel and much of its administrative framework were scrapped, and the oil companies were put on notice that they were overdue on large payments for unpaid taxes and royalties. In other respects affecting the economy, the new government marked time, except for its policy of ‘Libyanization’ which was the

process of replacing foreigners and foreign-owned firms in trade, government, and related activities with Libyan citizens and firms. In mid-1970, the government embarked on a program of progressive nationalization.

In addition to establishing at least a temporary veto power over the activities of the oil companies, the nationalization program included sequestration of all Italian assets, socialization (state ownership) of the banking and insurance system, Libyanization of all forms of trade, and steady substitution of Libyans for foreign administrative and management personnel in resident foreign concerns--another aspect of Libyanization. In the petroleum sector, the government put a constantly increasing financial bite on the companies. By the end of 1974, the government either had nationalized companies or had become a participant in their concessions and their production and transportation facilities. The regime thus had a larger share of the profits than under the previous royalty and tax arrangements. However, despite varying degrees of nationalization of foreign oil firms, in 1987 Libya was still highly dependent on foreign companies for the expertise needed in exploitation, marketing, and management of the oil fields and installations that remained the primary basis of the country's economic activity. After 1972 the government began supplementing its policy of nationalization with an ambitious plan to modernize the economy, modeled largely on neighboring Algeria's experience. The key component of this plan was an intensive effort to build industrial capacity, placing a special emphasis on petroleum-related industry. The industrialization program had two major goals: the diversification of income sources and import substitution. In this latter respect, the plan met with some success, as several categories of imports began to decline in the late 1970s.

In 1981, when oil prices started to fall and the worldwide oil market entered a period of glut, the present phase of independent Libya's economic history began. The decline in oil prices has had a tremendous effect on the Libyan economy. By 1985 Libyan oil revenues had fallen to their lowest level since the first Organization of Petroleum Exporting Countries (OPEC) price shock in 1973. This fall in oil revenues, which constituted over 57 percent of the total GDP in 1980 and from which, in some years, the government had derived over 80 percent of its revenue, caused a sharp contraction in the Libyan economy. Real GDP fell by over 14 percent between 1980 and 1981 and was continuing to decline in late 1986. The negative trend in real GDP growth was not expected to reverse itself soon. .

The decline in real GDP placed great strain on government spending, reduced the level of imported goods available in Libyan markets, and increased Libya's debt repayment problems--all of which combined to lower living standards. The decline in oil revenues also caused the Libyan government to revise its somewhat haphazard way of making economic policy decisions, because it no longer possessed the financial resources to achieve its many goals. Thus, during the early and mid-1980s, development projects were subjected to a more rigorous cost and benefit analysis than during the easy money time of the 1970s. As of 1987, however, it was too early to judge the effectiveness of the government's response to falling oil revenues.

Libya is a hydrocarbon-rich country with one of the least diversified economies in the Maghreb region and among the oil-producing countries. The export product

concentration ratio has increased from 76.2 (on the scale of 0 to 100) in the late 1990s to 79.9 in 2006, substantially above the latest available regional (47.7) and upper-middle-income (35.4) country group means. Its primary commodity export is oil (94 percent of total exports in 2005), while its major imports are manufactured products. Its main destination markets in 2005–06 were the European Union (particularly Italy, Germany, Spain, and France), the United States, and Turkey, while imports were predominantly obtained from the European Union, China, and Tunisia.

As of the early 2000s, Libya's MFN applied simple (17 percent) and import-weighted (25.1 percent) tariff averages, albeit slightly lower than in the mid to late 1990s, were higher than the corresponding averages for the Middle East and North Africa (MNA) region (23.2 percent and 17.9 percent respectively) (WTO 2001). Similarly, its trade regime was more restrictive than the averages of upper-middle-income countries (11.4 percent and 10.6 percent, respectively), and of low-income countries (14.2 percent and 12.2 percent, respectively). Its maximum MFN tariff rate of 400 percent was also very high. In recent years, however, Libya has taken initial steps towards establishing a more open economy by abolishing licenses and import tariffs on most goods, reducing some subsidies, reducing the number of state import monopolies, limiting the number of import bans, pursuing membership to the World Trade Organization (WTO), and announcing plans for privatization. However, some trade restrictions remain on a few products for which imports are reserved to state enterprises. Also, consumption tax and service fees are imposed in a discriminatory manner on some imports.

While not a Generalized System of Preferences (GSP) beneficiary with either the European Union or the United States, Libya is member of the Global System of Trade Preferences (GSTP) among developing countries. Regionally, it is a member of the Arab Maghreb Union and the Arab Common Market. The Working Party on Libya's WTO accession was established in 2004,the same year that the United States lifted the majority of its longstanding sanctions against the country (World Bank, 2007). It is in the process of finalizing its Memorandum of the Foreign Trade Regime and expected to hold its first WTO accession Working Party meeting before the end of 2008. As is typical for a commodity exporter, its MFN duty free exports represent a very high share (79.5 percent) of all exports, considerably higher than in an average MNA (44.8 percent) country, or low-income (44.6 percent), lower-middle-income (35.3 percent), and upper-middle-income (35.9 percent) countries. It should also be noted that Libya has been given the green light to negotiate WTO membership. In fact, WTO members agreed on 27 July 2004 to start talks with Libya on its membership bid. The country is looking forward to WTO membership with the aim of achieving economic development, diversification of its sources of income, the attainment of economic benefits and the consolidation of good trade and economic relations with WTO member states, for the accomplishment of economic development for all.

2.7 Algeria

Algeria is a unique case in the Arab Maghreb region. Whereas this country is vast and very rich in natural resources, it has not managed to benefit from this potential natural

base. Consequently, the country has been unable to secure a better living standard for its people. Data show that in addition to low growth and being subject to international prices fluctuations of the energy products, the rate of unemployment has continued to increase. Compared with other Arab countries, especially Tunisia, in 1960 Algeria had an income per capita that was 60% higher than that of Tunisia. Thirty years later, Tunisia exceeded Algeria by 7%, which represents an increase of 67% (Chemingui1, 2003). Contrary to Algeria, Tunisia is a small country endowed with little natural resources, but surprisingly its economic performances have exceeded those of Algeria. Although Algeria has profited tremendously from significant oil revenues since the mid-sixties, the country's economic experience often is regarded as a spectacular failure. This verdict has been reached despite the exceptional investment effort in infrastructures and heavy industries since its independence. The significant variation in the economic performances between the two Arab Maghreb countries shows that there is something wrong in the Algerian experience.

Algerian's economic history can be subdivided into four sub-periods, namely: i) 1962-1985: this is the period that Algeria laid foundations for the subsequent high and stable economic growth. ii) 1986-1988: this is the period of macroeconomic instability, difficult adjustments and poor economic growth; iii) 1989-1994: this era corresponds with the first implantation of a structural adjustment programs and a reduction of economic declining; and iv) Since 1995: this is the period of implementation of the second new economic reforms and improvement of economic growth (Chemingui1, 2003). Overall, Algeria can be regarded as one of the fastest growing economies among AMU countries. For instance, the average annual growth rate between 1962 and 1999 is

a respectable 5.0 percent. However, this relative high growth rates were not achieved yearly. In fact, since its independence, economic growth in Algeria is marked by a 4 succession of ruptures. The period from 1962 till 1985 is clearly the time when Algeria enjoyed its highest economic growth, averaging 7% annually. This high growth was led principally by the growths in manufacturing sector which benefited from intensive public investment. On the other hand, the period from 1986 till 1988 is no doubt the most difficult period in Algerian's economic growth history, declining on an average of 0.7% annually. The third period from 1989 till 1994 is the period of implantation of the first adjustment program and during which economic growth remained in declining period with nearly 0.1% annually. In the last period (1995 till 2000), Algerian's economic growth re-emerged with an improved annual growth rate of 3.4% which was largely due to the country's adoption of the second economic reform supported by the World Bank and IMF.

The poor economic growth in Algeria since 1995 can be attributed to internal policies, more than on exogenous factors. In fact, Algeria has not succeeded to take advantage of its natural resources due to imprudent macro-economic management of the economy. Essentially, Algeria has not succeeded to improve its economic policy making, deregulate its economy and increasing investment rate; which may help to explain its weak and lethargic economic performances. There are other factors that have contributed to this general decline in economic performance such as a difficult political context (civil war), and strong corrupt practices which continue to slow down the economic takeoff of the country. Instructive examples of corruption in Algeria include the rigging of public markets and imports licenses granted exclusively to special interest

groups in the Algeria's government. Other structural factors continued to block all initiatives of reforms and economic takeoff in Algeria. In this context, the weakness of the private initiative, the dominance of the public sector, the weakness of the financial system and other factors, all militate against effective economic reforms and governance.

According to Chemingui1 (2003) three policies should be implemented in Algeria to improve growth by supply-side. First, Algeria should accelerate trade liberalization reforms. Delays in liberalization usually send negative signals to potential investors and may delay or prevent domestic and foreign investment in export oriented industries. Second, Algeria should aggressively improve its investment climate through deepening financial markets reforms; improving the judicial and administrative systems governing private activity; and enhancing the privatization process. Third, Algeria should also adopt policies intended to accelerate the rate of productivity by adopting an "export push" strategy consisting of three essential elements, that is, (i) accelerating trade liberalization to reduce anti-export bias; (ii) institutional reforms for trade liberalization; and (iii) targeted investments in trade related infrastructure.

In recent times, growth in Algeria has slowed down, in the face of the global economic crisis. In effect, despite the Algerian government's efforts to diversify the national economy, to a great extent it remains annuitant, premised on the use and sale of its hydrocarbons. In a way Algeria's economy is heavily reliant on the hydrocarbons sector, which accounts for 60% of the country's revenues and some 30% of GDP. It also accounts for a massive 95% of Algeria's exports, by value. The Algerian government is

also committed to opening up trade, and to encouraging inward investment, particularly by Western companies interested in using Algeria as a manufacturing base, or in doing joint ventures with local companies to help them boost export activities. When he came to power in 1999, on the promise of implementing a range of political, economic and social reforms, President Bouteflika boosted the country's ailing economy with a US$18 billion public-sector spending program. This generated four years of steady growth and won Bouteflika a second term of office. It also reduced the country's massive unemployment, bringing it down to 23%. It currently stands at around 13%.

Meanwhile, the oil and gas prices have slumped following the financial crisis and consequently Algerian exports have decreased significantly in value. In order to promote the growth of the domestic market, the Algerian government has launched a major construction policy, namely in the sector of transport infrastructures. Today, this policy is castigated because of two reasons. First, at the time when this programme was undertaken, the price of the oil barrel was very high. Current global market conditions have changed considerably and some observers question the suitability of this policy. More so because Algeria is running on a 'negative multiplier', which means that the resources injected into the economy are much higher than the wealth generated. The current unemployment rate in Algeria is officially at 8% but independent analysts maintain that it is closer to 20%. The GDP/ inhabitant were USD 4,600 in 2008. Notably there is a large discrepancy between the urban and rural living conditions.

The main branch of industry is agriculture which contributes about 8% of the GDP and employs almost 25% of the active population. The main crops are wheat, barley, oats,

citrus fruit, wine grapes, olives, tobacco and dates. Algeria also produces a large quantity of cork and has a significant amount of livestock farming. The oil and gas sector accounts for the majority of budgetary income, and almost all of export income. Algeria is the second biggest gas exporter in the world. It is ranked 14th for its petroleum reserves and seventh for its gas reserves. The ores mined in big quantities are iron, lead, phosphate, uranium, zinc, salt and coal. The main activities of the manufacturing sector are industrial food processing, textile, chemical products, metals and construction materials. The tertiary sector contributes about a third of the GDP.

Algerian exports have grown by 223%, between 2002 and 2008 (CIA World Factbook). This godsend is mainly due to hydrocarbon exports, which represent nearly 98% of the total exports and to the explosion of world prices. The logical consequence, given the opening up of the Algerian economy, is the parallel growth of imports (+133%). During this period, the trade balance has generated a significant surplus and Algeria now has foreign currency reserves of nearly USD 100 Billion. Unfortunately, the drop in global oil prices and the sustained levels of imports have threatened the Algerian trade balance in 2009. The main trade partners of Algeria are the European Union, the NAFTA countries (Free Trade Agreement between United States, Canada, and Mexico) and China.

Nonetheless, Algeria has a more restrictive trade regime in comparison to its regional and income group comparators, although less so since the early 2000s. Its latest Trade (MFN) Tariff Restrictiveness Index (TTRI) at 12.7 percent is higher than group averages for Middle East and North Africa (MNA) (12.6 percent) and lower-middle-income (8.6

percent) countries, yielding a rank of 106th out of 125. After averaging 20 percent in the early 2000s, Algeria's MFN applied simple average tariff declined to 18.6 percent in 2006, still higher than MNA and country group averages. As is typical of oil-and gas-producing countries, Algeria's exports as a whole face very few barriers to international markets. The country was ranked 5th (out of 125) on the 2007 Market Access TRI (including preferential rates). Already a party to a Trade and Investment Framework Agreement (TIFA) with the United States, Algeria also signed a Free Trade Agreement (FTA) with the European Community in 2005. Regionally, Algeria is a member of the Arab Maghreb Union (UMA) and is currently involved in the Euro-Mediterranean Free Trade Area (EMFTA) negotiations. In addition, its exports to developing countries enjoy preferential treatment through the Global System of Trade Preferences (GSTP). Algeria initiated the WTO accession process in 1997 but has not made significant progress since.

Algeria's real growth in total trade of goods and services decelerated from 5.1 percent in the early 2000s to 0.4 percent in 2005–06, and there was negative growth rate at -4.2 percent in 2007. The resultant trade outcome ranking was next to last on trade outcome performance out of the 160 countries. The 2007 trade share in GDP of 64.9 percent was below the comparators' openness ratios. The hydrocarbons sector is at the core of Algerian economy, with the seventh-largest reserves of natural gas in the world, the third-largest exports of natural gas, and the tenth-largest oil exports. Hydrocarbons constituted 98.5 percent of total exports in 2007, which was reflected by Algeria's high export product concentration ratio of 60.6 in 2007. More than half of Algeria's exports are exported to the EU. The latest boom in oil prices has led to substantial trade surpluses and record foreign exchange reserves.

2.8 Mauritania

Since the end of the 1980s, but particularly since the beginning of the 1990s, Mauritania has embarked upon economic reforms intended to liberalize its economy and foreign trade and strengthen the country's regulatory framework. The major reforms have focused on liberalizing prices and eliminating barriers to international trade; liberalization of the exchange regime; stabilizing the financial sector; gradual privatization of State enterprises; and fiscal, customs and judicial reforms (World Trade Organization. Trade policy reviews, Press Release, PRESS/TPRB/200, 13 September 2002). The structural reforms have laid the bases for sustained economic development and have decisively improved the business climate in Mauritania. These reforms, together with prudent and proper macro-economic policies and foreign support, have allowed Mauritania to register a steady GDP growth, a modest level of inflation, and a marked improvement in public finance and the balance-of-payments. Since 1993, Mauritania's GDP has risen at an average annual rate of 4.5 per cent, sustained mainly by government investment (often financed by external funds) and to a lesser degree by exports. Real GDP per capita has increased substantially since 1992. The WTO Secretariat report t says that despite the progress achieved, there is still a high level of poverty in Mauritania. The country is classified as a least developed country (LDC). Furthermore, Mauritania's external debt remains at a high level (around US$2.5 billion in 1999), equivalent to over 260 per cent of its GDP (World Trade Organization. Trade policy reviews, Press Release, PRESS/TPRB/200, 13 September 2002). Mauritania's economy remains highly vulnerable to external shocks because of its narrow production

and export base. This is further compounded by Mauritania's dependence on food imports, largely due to its arid and harsh climate.

Mauritania's trade regime has been reformed over the past years, with the objective of eliminating barriers to international trade and enhancing the competitiveness of Mauritania's exports. Customs procedures have been simplified and the majority of customs duties rationalized, while most non-tariff measures have been removed. The simple average MFN import duty (excluding a 3 per cent statistical fee) is 10.6 per cent. A study carried out by the World Bank in 2001 shows that, despite sustained growth in the economy and significant trade reforms, Mauritania is still not well integrated in the global economy. The key obstacles and hindrances to the development of Mauritania's trade include supply-side constraints (especially the very limited number of exportable products), limitations in port and road infrastructure, and the lack of human and institutional resources needed for more effective participation in the multilateral system. In order to tackle these constraints, a coherent program of integrated technical assistance is needed. It is therefore not surprising that Mauritania is one of the first three pilot countries for the implementation of the Integrated Framework for Trade-Related Technical Assistance to LDCs.

The WTO Secretariat report also made a number observations pertaining to reforms in Mauritania. It is noted that Mauritania's foreign trade remains highly concentrated, especially in terms of products; iron and fisheries products account for almost all exports. Bridging the gap between bound tariff rates and those applied, while maintaining the current level of openness in the market, would enhance the predictability

of Mauritania's tariff regime. The export regime has also been liberalized. Furthermore, Mauritania does not impose any bans or quantitative restrictions on exports and does not require export licenses. In the past, the Mauritanian Government pursued a food self-sufficiency policy, but the agricultural sector has now been liberalized. One of the principal features of the reform has been the development of agricultural credit, formerly reserved for rice production, and subsequently made available for other activities. Fishing is one of the key sectors of the Mauritanian economy. The Government's policy in the sector is focused principally on the protection of resources, improvement of the sector's performance, and the withdrawal of the State from production and marketing activities. The mining sector is considered to offer great potential for Mauritania. It is also one of the key sectors, and iron ore exports account for around 60 per cent of Mauritania's total exports. The Mauritanian manufacturing sector is comparatively undeveloped. The processing of fisheries products excluded, the sector contributes about 4.2 per cent to GDP (8.4 per cent including the processing of fisheries products). The tourism sector is largely open to foreign participation and, since the adoption of a new law in 1996, investment in the sector has increased. The liberalization and privatization of services such as financial or insurance services was initiated at the end of the 1980s and almost all the banks have been privatized. The liberalization of air transport and basic telecommunication services got under way in the early 1990s with Air Mauritanie and Mauritel being privatized in 1999 and 2001 respectively.

In view of the foregoing, it is therefore not surprising that the Trade Policy Review Body of the World Trade Organization (WTO) concluded its first review of Mauritania on 11 and 13 of September 2002 with members commending the ambitious reforms

undertaken. In particular members commended Mauritania for the ambitious structural reforms undertaken since the early 1990s, which have transformed the country significantly, both in economic and political terms. These reforms which are aimed at reducing poverty and improving the population's standard of living clearly represent the country's pressing and vital objectives. Moreover, Mauritania considers international trade to be an essential tool in achieving those aims, and has made trade liberalization a key element of its reform program. This has resulted in the revision of numerous trade-related laws and regulations in order to modernize and bring them into line with multilateral rules. Mauritania was encouraged to continue its liberalization efforts, and to further enhance the transparency and predictability of its trade regime. Mauritania's institutional constraints were also noted by members, as were the problems that these impose on its fuller participation in the multilateral system, including the timely submission of notifications to the WTO. As indicated earlier, Mauritania is among the first three pilot countries selected for the implementation of the Integrated Framework for Trade-Related Technical Assistance to least developed countries. In this regard, Mauritania indicated that one of its priorities is to attain a better understanding of WTO Agreements, including notifications and other multilateral commitments and issues. Another priority for the country is capacity-building for negotiations in light of the Doha Development Agenda. Members concurred with Mauritania that the time had come to translate the studies undertaken in the context of the Integrated Framework into practical action.

On specific trade measures, several WTO Members drew attention to various issues concerning Mauritania's tariff regime, including the relatively high tariffs applied to

certain products, mainly textiles and clothing, footwear, headwear, and some motor vehicles. They also pointed out the important gap between applied and bound tariff rates, which undermines predictability, and suggested that this gap be, reduced in the context of the current market access negotiations. Members also encouraged Mauritania to extend its tariff bindings to the non-agricultural sector and to transpose all bindings into the Harmonized System nomenclature (World Trade Organization, Trade Policy Reviews: Second Press Release and Chairperson's Conclusions, Press Release, PRESS/TPRB/201, 13 September 2002). Members also appreciated and acknowledged the amendments to the customs valuation legislation, the harmonization of the VAT rates, the elimination of fiscal exemptions for state enterprises, the new investment code, as well as the rationalization and reduction of MFN duties and taxes. They also valued the limited number of non-tariff barriers. However, concerns were expressed about the application of labeling requirements, and delegations stressed that such requirements should not discriminate between domestic and foreign producers. It was noted that Mauritania receives non-reciprocal preferential access to the markets of key trading partners.

On sectored policies, services and agriculture are the most important sectors in terms of their contribution to GDP, but that manufacturing remained embryonic and still to emerge. Mauritania should be commended for having liberalized its agricultural sector. As the fisheries and mining sectors account for almost all merchandise exports, Mauritania has continued to expand this sector in its quest to address its supply-side constraints, and to diversify its production and export base. Mauritania has also

embarked on liberal efforts such as privatizing and removing market access barriers in services sectors such as telecommunications, banking, and air transport.

The foregoing overview has outlined Mauritania's achievements, particularly since the beginning of the 1990s, and of the significant challenges that as a least developed country it still faces. Nonetheless, Mauritania has demonstrated the importance it attaches to trade liberalization as a development instrument, and to its fuller participation in the WTO and other regional regimes like the AMU.

2.9. Morocco

Since 1983 Morocco has pursued a process of economic and trade reforms, although the momentum of change has differed between sectors. Generally, Morocco's trade policies and practices include a significant push to liberalize certain services areas, in particular banking, and to privatize state-owned enterprises. Similarly, regulations limiting foreign holdings of Moroccan companies have been abolished, exchange regulations and operations relating to foreign investment and borrowing have been eased, and joint ventures with foreign companies are now being encouraged. High protection for local production, including raw materials, has tended to affect the competitiveness of downstream activities such as tourism, and more advanced manufacturing activities. On the export side, Moroccan goods, especially those with a high level of local processing, have been promoted by means of tariff and tax concessions (WTO Press Release PRESS/TPRB/23 1 January 1996). Morocco's merchandise exports comprise three main product groups, namely, agricultural produce and seafood, textiles and clothing, and

phosphate and phosphate derivatives. These products account for some 80 per cent of the country's merchandise export earnings. Morocco is the world's leading phosphate supplier. The European Union is Morocco's main commercial partner. It supplies over half of the country's merchandise imports, receives more than 60 per cent of its exports and originates three-quarters of Morocco's inward foreign investment. Trade with Japan and the United States is increasing. Morocco's economy has gained from its recent efforts to develop its services economy. With the decline of agricultural activities, services now contribute more than 50 per cent of the country's GDP. This trend is likely to continue, states the report, especially since the sector was the one to benefit most from recent trade liberalization and privatization measures. With the WTO Agreements in place, and also its membership in the AMU, Morocco has an opportunity to pursue and extend its liberalization policy and revitalize its economic development.

Confronted with internal and external payment imbalances, in 1983 Morocco embarked on a series of economic adjustment programs. The monetary and budgetary policy and trade liberalization measures adopted had to a large extent yielded significant results. The government deficit and inflation was contained and at the end of 1994 foreign exchange reserves represented about five months of exports (WTO. Trade Policy Review Body: Morocco Report by the Secretariat – Summary Observations, 1995). . The dirham had been made convertible for current transactions and for capital transactions effected by non-residents. The dirham has since held up relatively well against the principal foreign currencies. The external debt fell from more than 100 per cent of GDP in the mid-eighties to less than 70 per cent in 1994, but debt service ratio continued to be high and absorbing almost one third of current revenue in the balance of payments.

However, the country's present problems include unemployment and drought, which has been a frequent occurrence in Morocco for many years. These adverse climatic conditions have aggravated the rural to urban migrations and also unemployment, which has now reached about 16 per cent of the labor force at national level. The social impact of unemployment has been softened by the existence of an extensive informal sector which, however, is having a negative effect on government revenue and helping to increase the burden on tax-paying enterprises.

Morocco's merchandise exports comprise three main groups of products which account for about 80 per cent of the country's merchandise export earnings: agricultural produce and seafood, textiles and clothing, and phosphate and phosphate derivatives. As mentioned earlier, Morocco possesses more than half the world's phosphate reserves and, internationally, is the leading phosphate exporter. Moreover, it is phosphates that enable Morocco to maintain a presence in a large number of foreign markets. However, the structure of Morocco's merchandise imports has changed in recent years to reflect the needs associated with the investment encouraged by economic adjustment and growth. The shares of food and energy imports are declining whereas imports of machinery and other capital goods, together with imports of raw materials needed by the chemical industry, are increasing. The services sector in Morocco is mainly driven by tourism which is flavored by the natural beauty of the country and its cultural heritage. Tourist activities bring in as much foreign currency as agricultural and seafood exports combined (about 30 per cent of merchandise export earnings). European tourists represent about 60 per cent of the total. Although considerable, tourist earnings and the

remittances from Moroccans working abroad are not sufficient to absorb the structural deficits of the trade balance.

The European Union continues to be Morocco's main trading partner. It supplies about 54 per cent of merchandise imports, receives 63 per cent of exports and every year is responsible for about 75 per cent of direct foreign investment. Within the Union, France, Spain, Italy and Germany have the largest shares in the trade with Morocco. Outside the EU, Morocco's trade with Japan and the United States is on the increase. The factors that have favored trade with the EU include both Morocco's lower labor costs and the preferential treatment granted to many Moroccan products. However, it should be noted that some categories of agricultural products are subject to tariff quotas and the country has also agreed to restrict its exports of trousers to the Union. Morocco and the European Union intend to conclude an association agreement which should eventually make it possible to establish a free-trade area.

Morocco has actively engaged in international trade and it acceded to the GATT in 1987. It participated actively in the Uruguay Round negotiations and hosted the Marrakesh Summit in April 1994. It has accepted the WTO Agreements and has therefore committed itself to pursue the liberalization of its external trade in a multilateral context. Within the framework of the WTO, Morocco has completed the binding of all its tariff lines. The country has also bound its fiscal import levy and, like other members of the WTO, it has undertaken the tariffication of the quantitative measures which affect agricultural products. In June 1993, Morocco introduced tariff equivalents of between 100 and 365 per cent for live animals, meat, dairy products and

some of their derivatives. Other tariff equivalents are to be introduced in 1996. For some meat categories the ceiling rates reach 380 per cent. Morocco has also entered into commitments under the General Agreement on Trade in Services. It has bound the conditions of market access for certain categories of services, especially professional services, other business services, value-added telecommunications services, environmental services, and financial and tourism services. It is also participating actively in the work of the maritime transport services and basic telecommunications negotiating groups.

Within the Arab Maghreb Union (AMU), of which Morocco is a key member, Tunisia and Algeria are the two most important destinations for Moroccan products. Exports to these markets are exempt from import duties (in the case of Tunisia for certain products) or pay a countervailing tax of 17 per cent rather than a higher rate. The volume of trade within the Union is still limited but the Member countries are planning to establish a free-trade area. Furthermore, Morocco is a member of, inter alia, the Organization of the Islamic Conference and has concluded bilateral trade and tariff agreements with several Arab and Sub-Saharan African countries.

Morocco's current trade policy is dualistic because it combines progressive import liberalization with the promotion of industrial exports and heavy protection for certain agricultural staples. On the import side, domestic production is protected by a number of measures such as the licenses required for a few products, import duties, the fiscal import levy and a quasi-fiscal tax. Subsidies have been granted in order to encourage the consumption of certain locally-produced agricultural products. By 1993, Morocco had

considerably simplified its import tariff by reducing the number and the maximum level of duty rates; the maximum rates had generally been reduced to 35 per cent, except for certain products which were subject to duty at 40 or 45 per cent. Since then, the maximum rates have been raised, more particularly as a result of the introduction of certain tariff equivalents. At the end of the first half of 1995 the simple average duty rate was 23.5 per cent. This average conceals a progressivity of duties in the industrial sector, especially as regards products which have been or could be manufactured in Morocco. Naturally, the vulnerable agricultural sector, whose importance resides not only in the proportion of the population that it employs but also in the food security policy now in place, is the sector that receives the most protection. To this end cereal, in particular soft wheat, and oilseed, sugar, milk and meat are the products mostly protected. The Foreign Trade Act provides for variable levies on imports of certain staple foods. Farmers are exempt from taxation.

On the export side, Moroccan goods, especially those with a high level of local processing, are being promoted by means of tariff and tax concessions. These concessions include relief and exemption from or reduction of duties and levies, especially on imported inputs, and concessions with respect to the tax on exporters' profits (tax holidays). Most goods earmarked for export are exempt from value-added tax. There is provision for refunds on exports of certain agricultural products in surplus on local markets, but so far there appears to have been no instances of this measure being applied. Industrial zones, in which State assistance is available for the purchase of land, and a free zone, have been operational. Except for hydrocarbons and certain services, duties and taxes on exports have been progressively eliminated. For instance,

the taxes levied on agricultural and mining exports were abolished by the 1995 Finance Act.

2.10 Conclusion

This chapter outlines of the background of Arab Maghreb Union (AMU) countries, the establishment of the regional trade bloc and respective trading activities of member states. Overall profound changes have took place in the overall economic environment in which AMU countries trade policies developed since the 1980s. In recent times AMU member countries have pursued policies of economic reorganization and restructuring that focused in particular on modernization and liberalization of the economy, greater openness to the exterior, and strengthening and consolidation of the macroeconomic framework. Generally, the policies implemented in this context were aimed especially at strengthening market forces and eliminating distortions and bottlenecks, so as to achieve a more efficient allocation of resources among the various economic sectors while at the same time creating favorable conditions for the development of the private sector's role in economic activity.

CHAPTER 3

LITERATURE REVIEW

3.1 Introduction

This chapter reviews literature and theories related to the topic of the study. It is meant to be the base for the analytical section of the thesis. The growing influence of gravity model is reshaping the analysis of international trade analysis at breathtaking speed. In the past decades, the gravity has received a substantial share of attention from many scholars. It is therefore not surprising that the literature on the gravity model is extensive and varied. This literature is mainly in the form of books and journal articles. The general aim of this literature review is to determine what has been written about the gravity model, international trade and regional trading blocs. More specifically this literature review helps the writer to identify the research gaps that need to be filled in this study.

3.2 Theories on International trade

Amiot and Salama (1996) stated that in order to strengthen strategic alliances with European trading and industrial partners, Maghreb firms should rethink the logistics of their distribution strategy in Europe, taking recent changes into account and adjusting their trade practices. In that regarded it was pointed out that these firms needed to

strengthen interdependency with European partners, develop just-in-time multimodal transport and logistics management, and negotiate maritime and inland freight rates in the context of general transport contracts. Without a competitive transport industry, the Maghreb countries would not truly benefit from reform aimed at increasing the region's share of international trade. A study of barriers to the region's trade, especially with countries of the European Union, identified more than 30 barriers, in four categories: barriers to imports, to exports, of infrastructure and equipment, and of intra-Maghreb trade. These include: 1) direct barriers including: (a) from traditional distortions (price, discriminatory access to markets); (b) non-tariff barriers (administrative, regulatory and tax-related restrictions); (c) traffic agreements (protecting national flags); and (d) lack of infrastructure and equipment; and 2) indirect barriers deriving from: (a) trade harmonization (simplified customs procedures and tariffs structures, elimination of quotas, reduction of customs tariffs on transport equipment); and (b) technology lags (telecommunications and handling).

Amiot and Salama (1996) went on to quantify barriers in terms of tariff equivalents, expressed as a nominal rate of protection based on the f.o.b. value of the merchandise. But the nominal rate of protection measures only the direct costs of distortions. The effective rate of protection measures both direct and indirect effects, and effective rates were generally twice as high as nominal rates. In order to reconcile macroeconomic and microeconomic approaches through measuring effective rates, Amiot and Salama (1996) used a partial equilibrium model (SMART model) to estimate the impact on the balance of payments of eliminating excess costs. Most of the corrective policies they recommend concerned multimodal transport in the trade between Europe and the Arab Maghreb

Union. The challenges were considerable: Not only did such a system pave the way for cost and time savings (just-in-time transport), but it also adopted the logistics management that the most advanced European enterprises used to orchestrate their raw material purchasing, production, and marketing functions. This multi-model transport system allowed them to reduce inventories significantly and to respond better to volatile demand. Essentials for just-in-time multimodal transport and logistics management include efficient modern transport techniques, efficient communications systems, efficient modern merchandise handling, and appropriate regulations. These conditions were still not fully in place in the Maghreb countries, except partially in some parts of the clothing and textile industry.

Brenton et al., (2006) discussed a trade strategy for the Maghreb countries, with a particular focus on regional initiatives, as trade expansion could generate higher and sustained growth rates, and employment. The analysis was based upon identification of the key internal and external barriers that were constraining integration into regional and global markets and discussed how poor design and weak implementation of trade agreements amongst countries in the region limited their impact. The study observed that Maghreb countries would reap significant benefits from enhancing their integration with regional partners, with the EU and with global markets. This entailed careful design of trade policy to ensure complimentarily between the three domains of trade policy: unilateral actions, regional trade agreements and the multilateral agenda. Integration needs to be broadly based to include services so as to enhance productivity on an economy-wide basis and to increase the scope for trade and for new employment opportunities. Integration should also be deep to cover key elements of competitiveness

relating to issues such as standards, conformity assessment, transport and logistics. Such trade policy initiatives are all the more effective when part of a broad and coherent reform process and bolstered by support for those who bear the brunt of the costs of adjusting to the new, more open regime (Brenton et al., 2006).

Only a few empirical studies have examined whether regional economic integrations had trade creation effects or trade diversion effects. At cross-country level, Endoh (1999) found that the European Economic Community (EEC) had a trade creation effect, the Latin American free Trade Association (LAFTA) to have had a trade diversion effect, and the Council of Mutual Economic Assistance (CMEA) to have had a relatively stronger trade creation effect than the trade diversion effect. Aitken (1973) as cited in Musila (2004) found that the EEC to have no significant trade creation effects. Pelzman (1977) also as quoted by Musila (2004) finds the CMEA to have a trade creation effect. At individual country level, Endoh (1999) found the EEC and LAFTA to have had no statistically significant effect on Japanese trade but found the CMEA to have had greatly reduced trade with Japan (i.e. trade diversion). Pelzman (1977) found the CMEA to have had a trade diversion effect in the case of Czechoslovakia and East Germany (Musila, 2004). Most of the early studies, however, do not tell us clearly whether the regional organizations have the effects of trade creation or trade diversion. This is because the methods used in these studies do not distinguish between trade creation and trade diversion. In order to measure the degree of trade creation and trade diversion, the early studies estimate the trade flows during the pre-integration periods (which eliminated the effect of integration) and the trade flows during integration periods, then they compare the estimates. They attributed the differences in estimates on the regional organizations.

This method, however, has been criticized for relying on pre-integration periods that have long passed. This study is not aware of any empirical study that examines the trade creation or trade diversion effects of AMU or the effect of any other regional economic integration (EU) on AMU member states' foreign trade. Thus this study attempts to fill that void.

Darku (2009) demonstrated that the appropriate econometric technique of testing for the effect of regional integration on bilateral trade was to augment the standard gravity model with country specific dummies instead of regional integration dummies. Using data on bilateral trade between Tanzania and her 23 trading partners over the period 1980-2004, the paper reported three important results. First, contrary to results from the traditional approach, estimates from the new econometric technique indicated that both the EU and the EAC have had moderate trade creation effects on Tanzania's bilateral trade. Secondly, Tanzania's non-traditional trading partners such as Japan, India, Singapore, Hong Kong and the USA are relatively more opened to Tanzania's exports. Third, the results also indicated that whereas it is difficult for Tanzania's exports to penetrate foreign markets, foreign goods easily penetrated Tanzania's market. The policy implication is that the government should continue with its efforts to strengthen the EAC, and to gain more exports market to the non-traditional trading partners, if the export growth development strategy is to become a reality in Tanzania.

On the same theme, Ghosh and Yamarik (2004) and Siliverstovs and Schumacher (2006) found that the North American Free Trade Agreement (NAFTA) had led to reduction in trade among members. PTAs involving Asian countries have also received a lot of

attention in the literature. Those studies have mainly focused on the trade impact of the Association of South East Asian Nation Free Trade Agreement (AFTA), the South Asian Association for Regional Cooperation Preferential Trade Agreement (SAPTA) and the Asia-Pacific Economic Cooperation (APEC). Lee and Park (2002) have argued that ASEAN+3 (China, Japan and Korea) is emerging as a promising regional integration more than other PTAs in the East Asia Region. Rahman (2005), Lee and Park (2005), and Pusterla (2007) have all concluded that AFTA has enhanced trade among members. Similar results have been found for SAPTA. With regards to PTAs among African countries Hannik and Owusu (1998), Cernat (2001) and Pusterla (2007) have found that the formation of COMESA has fostered bilateral trade among members. Hannik and Owusu (1998) and Oguledo (1996) also concluded that beside the positive ECOWAS integration effect, economic growth in the region is the strongest determinant of trade flows. Foroutan and Pritchett (1993) used the gravity model to investigate if the level of intra SSA trade is below what one would expect. Their gravity model predicted very well the low level of intra SSA trade. Kirkpatrick and Watanabe (2005) have studied the impact of African PTAs and have concluded that the formation of EAC, ECOWAS and SADC have had positive impact on intra-bloc trade.

3.3 The Research model (The Gravity Model) and trade

One of the most established models for empirical studies in international trade is the gravity model. In the last decades the model has acquitted itself remarkably well as empirical framework for explaining bilateral trade. As a result many scholars include this study have based their research techniques in a gravity equation. The standard

gravity model has increasingly been used to predict international trade flows since it was first introduced by Tinbergen in 1962. Poyhonen (1963) is also credited as one of the pioneers in applying the gravity equation to analyse international trade flows. The model predicts that bilateral trade level is a function of two important economic variables: trade enforcement variables, including a measure of national output of both importing and exporting countries; and trade resistance variables, including distance, and a dummy variable for common border. Output of the exporting country represents the ability to supply and the output of the importing country represents the propensity to demand. Hence, trade flows are expected to be positively related to the exporting and importing countries output.

After being popularized by Linneman (1966), the gravity model has been used in many empirical trade studies. These studies have mainly focused on the effect of preferential trade agreements (PTAs)/regional integration (RI) on bilateral trade in almost every sub-region of the world. The results so far have been mixed. Since then, the gravity model has become a popular instrument in empirical foreign trade analysis. The model has been successfully applied to flows of varying types such as migration, Foreign Direct Investment (FDI) and more specifically to international trade flows. Basically, this model implies that exports from country i to country j are explained by their economic sizes (GDP and GNP), their populations, direct geographic distances and a set of dummies incorporating some kind of institutional characteristics common to specific flows.

It should be pointed out theoretical support of the research in this field was originally very poor, but since the second half of the 1970s several theoretical developments have appeared in support of the gravity model. Anderson (1979) as cited in Martinez-Zarzoso (2004) made the first formal attempt to derive the gravity equation from that assumed product differentiation. Bergstrand (1985; 1989) also explored the theoretical determination of bilateral trade in a series of papers in which gravity equations were associated with simple monopolistic competition models. Helpman and Krugman (1985) used a differentiated product framework with increasing returns and scale to justify the gravity model. More recently Deardoff (1995) has proven that the gravity equation characterizes many models and can be justified from standard trade theories. Finally, Anderson and Wincoop (2001) derived an operational gravity model based on the manipulation of the CES expenditure system that can be easily estimated and may help to solve the so-called border puzzle. The differences in these theories help to explain the various specifications and some diversity in the result of the empirical applications.

Musila (2004) uses the gravity model to examine the impact of the Common Market for Eastern and Southern Africa (COMESA) on the flow of Kenya's exports. The empirical results of this study suggest that COMESA has the effect of trade creation. No evidence for trade diversion was found. Accordingly, COMESA has helped to improve Kenya's export performance and, in turn, assisted in the effort to achieve the Millennium Development Goals. The results also show that nominal GDP of importing countries, distance, adjacency, and common official language have a statistically significant impact on the flow of Kenya's exports. Micco et al. (2003), Hassan, (2001), and Walsh (2006) have used the gravity model to examine the effect of EEC/EU and EFTA on bilateral

trade. They concluded that the PTAs have fostered trade among members and between members and non-members. However, evidence of trade diversion for the EEC/EU agreement has been found by Westerlund and Wilhelmsson (2006) and Kien and Hashimoto (2005). Study by Breuss and Egger (1999) has also showed that the formation of NAFTA has led to increase in intra-PTA trade.

Eita (2008) investigated factors determining Namibian exports for the period 1998 to 2006 using the gravity model. The study then investigates whether there is unexploited trade potential among Namibia's 38 trading partners. This study shows that increases in importer's GDP and Namibia's GDP cause exports to increase, while distance and importer's GDP per capita are associated with a decrease in exports. The study also indicates that Namibia's GDP per capita and real exchange rates do not have an impact on export. Namibia exports more to countries where it shares a common border and SADC as well as to the European Union. The study indicates that there is unexploited export potential to among others, Australia, Belgium, Kenya, Mauritius, Netherlands, Portugal, South Africa, Switzerland and the United Kingdom. These findings are significant for trade policy formulation in order ensure that Namibia's export potential is exploited in order to enhance economic growth and generates employment.

Similarly, Lawless (2009) utilizes a gravity model approach in order to examine the geographical patterns of Irish exports. As indicated earlier, the gravity model in international trade has been demonstrated to be an extremely robust empirical method. In this study, Lawless first applied the gravity model to aggregate Irish exports from 1980 to 2007. Distance is found to have a strong negative effect on exports. On the other

hand, exports are positively related to sharing a common language and when communications infrastructure is well developed. The gravity model was shown to be a perfect fit to the data. The study then used firm-level data on indigenous Irish exporters to divide the effects of trade costs into how they influence the number of firms exporting to each market and the average exports per firm. Finally, the firm data was divided into four broad sectors to examine if there was any sectoral variation in the standard results. The significance of this study is its limited focus to firm level data reporting that captures both the quantity and the destination of each firm's exports. It should be noted that almost all of the previous studies on the gravity relationship in international trade had focused on aggregated data, which sum up bilateral exports over sectors or whole economies. In a way, this study expands on the traditional gravity approach by using a unique survey of Irish firms over a five-year period, which contains detailed information on exports to over fifty markets. This firm level data is used to decompose the gravity model into an extensive (number of firms) and intensive (average export sales per firm) margin. Theoretical predictions imply that the extensive margin is negatively affected by both fixed and variable trade costs, but the prediction for the intensive margin contains counteracting terms whose overall sign is vague and unclear. Consistent with the gravity theory, all of the variables capturing language, internal geography, and import cost barriers in the study have significant and appropriately signed effects on the extensive margin. However, almost none of these variables are found to have a statistically significant relationship with the intensive margin. Moreover, distance is found to have a particularly strong effect on traditional manufacturing compared to more high technology sectors. The result that the distance impact works primarily through the

extensive margin holds across all sectors. Notably, the coefficient for English is highest in the traded services sector.

Alam, Uddin, and Taufique (2009) examines the existence of the gravity theory for the imports of Bangladesh with its eight major trading partners, that is, India, China, Singapore, Japan, Hong Kong, South Korea, USA and Malaysia. As mentioned earlier, the model says that there is negative relationship between geographical distance and trade volume which shows that the lower distance influences for more trade and vice versa. As the imports of Bangladesh are geographically shifting, this study seeks to analyze the impact of the gravity theory on Bangladesh. In this respect, this study is an attempt to explore the imports of Bangladesh which is one of the most significant factors responsible for the country's unfavorable and chronic deficit in trade balance. Unsurprisingly, the main objective of this study is to explore initiatives that may ultimately reshape the trade balance of Bangladesh with her foreign trade partners. The data set of this study comprised yearly data from 1985 to 2003 in a panel approach. The main finding of the study was that the gravity theory was consistent with the imports of Bangladesh. This implied that the geographical distance of Bangladesh with its partner countries had significant impacts on its imports. This means transport costs and other transaction costs, such as, the probability of surviving intact of perishable goods still have huge impacts on its imports. The results also indicated that in the near future this may change because of different factors such as profitability, easy trade procedures, and product delivery time which can influence the imports decision more than does the geographical distance. As a result, policy makers need to conduct further research to find

out the relationship, if any, between trading pattern, geographical distance and trade deficits of Bangladesh.

The above study also showed a mixed relationship between the GDP and imports of Bangladesh. It indicated that the imports of Bangladesh influenced the domestic production very little because the country mostly imports consumer goods rather than capital goods. Furthermore, it was found that the population of Bangladesh had significant impacts on imports which in turn implied that the country was incapable of producing adequate consumer goods to meet the increased demand resulted from this high population growth. Moreover, this study also showed that partner countries' GDP had significant positive impacts and partner countries' population had mixed impact on imports of Bangladesh. Finally, this study indicated that it will be an alarming situation for trade balance of Bangladesh if the imports continued to increase in such a pattern that the rate increases five to eight times more in respect of population increases whilst simultaneously the ratio of capital goods in proportion of total imports decreases. What this study shows is that the economic development of Bangladesh is also, to a large extent, affected and shaped by the trade flows with partner countries. In this regard, the study by Alam et al., (2009) confirms that the gravity model is an important tool that describes the trade flows between different geographical entities. More importantly, this study also establishes the impacts of home GDP, partner countries' GDP, home population, and partner countries' population on the imports of Bangladesh.

Pojoran (2001) studied the gravity model of trade in light of the increasingly acknowledged findings of spatial econometrics and interprets the findings in view of

some recent theoretical developments from the economic literature that contribute to its foundation. It is argued that when the inherent spatial effects are explicitly taken into account, the magnitude of the estimated parameters changes considerably and with it, the measures on the predicted trade flows. This result is illustrated for the case of predicted trade flows between the EU and some of its potential members. The importance of this study is that it explores the empirical performance of the gravity model when the inherent spatial effects are explicitly accounted for within the framework of spatial econometrics. Thus the emphasis is on the size and significance of the estimated parameters, given the practical relevance of the calculated potential trade flows they generate. This research finds that, when inherent spatial effects are explicitly taken into consideration, the magnitude of the estimated parameters changes considerably and, with it, with it, the measures on the predicted trade flows. More specifically, the traditional formulation seriously overestimates the size of the trade flows to and from 'island' countries, while underestimating it for countries that have trading neighbours. Moreover, the large explanatory power of regional trading bloc membership dummy variables vanishes when spatial effects are included in the model specification. The overall performance of the alternative specification proposed is superior to the one of the currently prevailing formulation.

Johnston et al. (2003) criticize Pojoran's study on trade flows and spatial effects on three methodological grounds. Firstly, Pojoran's paper includes two of the gravity model independent variables as relative rather than absolute numbers. Secondly, the dummy variables included are not binary but interval. Thirdly, the sample of the countries creates a non-normal distribution of inter-country distances, undoubtedly creating

heteroscedasticity problems. Because of these problems, the author concludes that Pojoran's model is mis-specified, and the results thereby obtained are unreliable.

Carrington (2003) argues that the findings reported there are robust to alternative specifications. Furthermore, it is indicated that the proposed formulation takes spatial effects into account while separating the impact of distance from far way trading partners from the neighbourhood effect, particularly within regional trading blocs.

Byers et al. (2000) provide evidence on the effects of an economic and political union by studying the trade flows of three Baltic States after the break up of the former Soviet Union. The authors specify and estimate a gravity model of exports for the Nordic countries which enables them to determine the size and direction of trade flows in the Baltic states had they not been affected political institutions of the Soviet Union. Two dummy variables are used in the model. One is to determine whether the respective countries share a boarder and the other to indicate a trade agreement with each other. The Gross Domestic Income (GDI) and population data were obtained from the IMF's International Financial Statistics (IFS). In order to convert Gross Domestic Product (GDP) data reported in local currency units to the US dollar, the mid-year exchange rate was used, and where this was not available, the end period rate was used. These exchange rate data were also obtained from the IFS. Export data came from the IMF's Direction of Trade Statistics, which reports exports and imports by country in US dollars. Export data are used as they are more readily available than import data. Also, the gravity model is reported to perform consistently better with export data than with import data as export data are reported Freight on Board (FOB), while import data include insurance and freight. The distance between the two trade partners is obtained

from, Bali online 1997) which uses data on cities co-ordinates from the University of Michigan geographic server. Results indicate that Baltic foreign trade was not only reduced significantly but also diverted to the members of the former Soviet Union. It is also established that the consequences of the former political union are quickly dissipating, and the Baltic countries are increasing their share of exports to the EU and the US.

Martinez-Zarzoso, Inwald and Nowak-Lehman (2003) applies the gravity trade model to assess Mercosur-European Union trade, and trade potential following the agreements reached recently between both trade blocks. The model was tested for a sample of 19 countries, the four formal members of Mercosur plus Chile and the fifteen members of the European Union. Crucially, a panel data analysis is used to disentangle the time invariant country-specific effects and to capture the relationships between the relevant variables over time. The study found out that the fixed effect model should be preferred to the random effects gravity model. Additionally, a number of variables, namely, infrastructure, income differences and exchange rates added to the standard gravity equation, are found to be important determinants of bilateral trade flows. The findings concerning infrastructure might have some important implications for economic policy.

Martinez-Zarzoso, Inwald and Nowak-Lehman (2003) viewed infrastructure as an international public good raises the question of how the cost of infrastructure should be shared between trading partners. In this study, for Mercosur-EU trade it seems that only exporter infrastructure fosters trade, therefore investing to improve the trading-partner infrastructure appears not to have spill-over benefits for the investor. When testing intra-

bloc trade effects, both preferential dummy variables present a positive sign and are statistically significant, suggesting that belonging to one of the two preferential arrangements fosters trade. However, since in this study there was no considering the difference between trade creation and trade diversion, these findings have to be taken with caution. In a nutshell the findings of this study indicate that exporter and importer incomes, as expected, have a positive influence in bilateral trade flows. Thus, income elasticity's are close to unity as predicted by the theory. Similarly, exporter population has a large and negative effect in exports indicating a positive absorption effect, whereas importer population has a large and positive effect on exports, showing that bigger countries import more than small countries.

Ok (2010) propose several extensions of the standard gravity model to examine what determines intra-EU trade. To this extent, the modified equation is tested using panel data of 140 observations over the period 2000–2008. This yielded a specification that allows for (i) a more flexible income response; (ii) a competitiveness effect with a general and a specific component; and (iii) an alternative and consistent measure of remoteness. More importantly, the proposed gravity equation was tested and validated with EU manufacturing data over nine years, demonstrating that the extensions are significant factors in explaining intra-EU trade.

Martinez-Zarzosso (2008) evaluates the determinants of bilateral trade flows among 47 countries and, particularly, the impact of preferential agreements between several economic blocs and areas, namely, European Union (EU), North-American Free Trade Area NAFTA), Caribbean Community (CARICOM), Centro-American Common

Market (CACM), and other Mediterranean countries (MEDIT). The period under study was from 1980-99. Martinez-Zarzosso (2008) estimated a gravity equation that allows the comparison of the weight of the influence of preferential agreements and also, infers the relevance of other determinants of bilateral trade flows such us geographic proximity, income levels, population, and cultural similarities. Crucially, the analysis was undertaken for each year of the sample in order to capture the temporal evolution of the impacts on trade of the different variables considered. Using the estimation results as a base, trade potentials resulting from new free trade agreements were calculated. The findings indicate that the variables traditionally included in the gravity equation presented the expected signs and highlight the role played by intra-bloc effects. The estimated coefficients present, in most cases, the expected signs and magnitudes. Income elasticities (exporter and importer) are positively signed and are close to unity according to the theory. On the other hand, the income elasticity of the exporter is higher than that corresponding to the importer which shows the importance of a country's production capacity in fostering exports.

The estimated coefficient for the exporter population variable is negatively signed which shows an absorption effect, the greater the size of the exporter, the lower the exports. Nonetheless, the estimated coefficient corresponding to the importer population is only negatively signed until 1990. From 1991 onwards, the sign is positive which points towards the growing significance of the role played by scale economies and market-size effects in international trade models. Concerning geographic distance, its coefficient presents a negative sign with elasticity's around 1.5. Interpretation of the integration dummies indicates that intra-EU trade in 1995 is 177 percent higher than anticipated

from the gravity equation results. Also, intra-NAFTA trade in 1995 was 103 percent higher than expected from normal levels of trade. Estimated trade potential for EU-Mexico, Spain-Mexico and Mexico-EU suggested high expectations for the near future derived from the application and consolidation of the EU-Mexico free trade agreement Martinez-Zarzosso (2008).

Flandreau and Maureen (2005) studied the impact of monetary arrangements on trade integration and business cycle correlation in late 19th century Europe. The authors estimate a gravity model and show that tighter monetary integration was associated with substantially higher trade, as in recent studies using contemporary data. For example, the study cites the Austro-Hungarian monetary union as having had improved trade between member states by a factor of 3. They also compared their methodology with those used in related. In effect, their approach departs from Frankel and Wei (1993) in one crucial respect, namely its econometric treatment of endogeneity. According to Flandreau and Maureen (2005), the signs of the key parameters of the endogeneity debate are heavily influenced by estimation methods. By contrast, using an alternative estimation technique, they found evidence that the effect of trade integration is truly negative. The inference is that the debate boils down to determining which the correct estimation strategy is. In order to support their results the researchers performed a number of robustness tests, in the form of Hausman tests. First, the study tested whether, in a standard gravity like equation, monetary union is endogenous. On this score the result shows that the exogeneity of monetary arrangements cannot be rejected in their sample. In view of this finding the authors argue that this is evidence of the exogenous character of monetary arrangements and a serious empirical justification of the methodology they

adopted and advocated, namely, the use of monetary union variables as instruments is a legitimate one (Flandreau and Maureen, 2005).

In a recent synthesis, Deardoff (1998) indicates that a gravity equation can encompass a variety of models, such as a Hecksher-Ohlin model with countries producing different goods and transportation costs, and models with monopolist competition, and product differentiation. A gravity equation of trade basically attempts to explain the size and pattern of a country's trade by linking them to the size as measured by GDP and population and proximity of a country's trading partners. Ceteris paribus, the bigger and closer a given trading partner is, the more important it should be in terms of its share of a country's trade. Also, the gravity approach can take into account that economic and political alliances may affect trade flows.

There are a substantial number of empirical applications in the literature of international trade which have contributed to the improvement of performance of the gravity equations. First, Matyas (1997: 1998), Chen and Wall (1999); Breus and Egger (1999) and Egger (2000) improved the econometric specification of the gravity and highlight the advantages of using panel data methodology. Second, Berstrand (1985); Helpman (1987); Wei (1996) among others contributed to the refinement of the explanatory variables considered in the analysis and to the addition of new variables.

3.4 The limitations of the gravity model

Given its often acclaimed empirical robustness, the gravity model of trade has never lost its appeal over the nearly five decades since it was introduced by Tinbergen (1962) and Linnenmann (1966). Certainly, the 1990s witnessed a revival in the application of the gravity model, with numerous scholars employing it to assess the potential for trade between the European Union and transforming economies of Central Eastern Europe. Krugman (1991), the fact that geography matters were trade is concerned is now an open secret. Nonetheless, the rich empirical work on the gravity model of trade does not explicitly account for the role of location, and neither does it take seriously Anselin and Griffith's (1998) explanation on ways in which standard econometric techniques fail to remain applicable in the spatial context. According to Pojoran's study in 2001 when the spatial effects are taken into account the gravity model is found wanting as the traditional formulation seriously overestimates the size of the trade flows to and from island countries while underestimating it for countries that have trading neighbours.

What is clear from the foregoing is that despite its empirical success, the gravity model has not been free from criticism and attack. Indeed, this model is not infallible. According to Leaner (1994) as cited in Pojoran (2001) a frequent complaint relates to the model's lack of theoretical foundations. However this view is no longer prominent in light of new developments. Evenett and Keller (1998) indicate that much of the success of the gravity equation relies on theories of trade based increasing returns to scale. The foregoing analysis is however, focused proportionality the volume of trade to the trading

countries' incomes and not on relationships of the volume of trade to trade resistance or on the role of the demand side.

Focusing and concentrating more on the role of distance, Asilis and Rivera-Batiz (1994) as quoted in Pojoran (2001) develop a geographical theory of inter-regional trade in which space plays a central role. As far as the role of demand is concerned, the dominant argument remains the Linder hypothesis, to which differences in taste deter trade due to the cost of tailoring a product to the local requirements. It should be noted that this hypothesis is normally interpreted in the sense that the intensity of bilateral trade decreases with differences in per capita income. While reviewing similar contributions of the gravity model, Deardorff (1998) reconciles the gravity model with the classical theories of trade, showing how the equation can be derived from a factor endowment model.

As noted by Pojoran (2001), most relevant to the line of argument that location matters are certain developments captured in Asilis and Rivera-Batiz (1994) and Bougheas et al., (1999) studied. The first study extends and formalizes the basic features of the gravity model, thus making location an endogenous variable. In essence, in this study trade occurs as a result of endogenous geographical dispersion of factors of production and population. To put it differently, what makes regions different from each other is their location in space. On the other hand, the second study introduces infrastructure in the bilateral trade model and shows that location and endowment play a decisive role in determining whether two partner countries will decide to enhance their trading opportunities by developing infrastructure to reduce transport costs.

Grossman (1998) brings together old and new theoretical approaches of trade with reference to the gravity equation. The explanatory power of the income variables for the trading partner countries is due to specialization since "some degree of specialization is at the heart of any model of trade. In the context of specialization, a longer output of the exporting country means a larger quantity available for consumers in the importing country regardless of the supply side considerations that gave rise to specialization. Grossman (1998) points out that the use of distances as a proxy for transports costs in particular, and transaction costs in general has both theoretical relevance and empirical appeal. He also concurs with the anticipated and estimated negative relationship between bilateral trade flows and distance. Apparently, Grossman (1998) also questions the size of the estimated parameters.

Similarly, at the empirical level, Polak (1996) is also concerned with the misspecification and inherent bias in the gravity model. He is supported by Hamilton and Wintetrs (1992) in calling for a more differentiated measure of distance. This point is also taken up by Frankel & Wei (1998) and Brulhart and Kelly (1998) who include it in their ordinary least squares (OLS) estimation of a remoteness indicator which is calculated as the average indicator of a country's distances to its trading partners, weighted by the partners income. According to Pojoran (2001) researchers such as Fik and Mulligan (1998) have questioned the appropriateness of the widely used highly restrictive log linear specifications of the gravity-type model and suggest the use of Box-Cox transformations. Their findings show that parameter estimation bias comes from both inappropriate choice of explanatory variables and functional misspecification.

Nonetheless, most researchers continue to estimate, and report OLS estimates for a model of the type described in the foregoing and in the process ignoring the misspecification caused by the nature of measurement problems associated with data collected for aggregate spatial limits and the by the implications of violated standard assumptions that underline their regression analysis. As noted by Pojoran (2001) an instructive example is Frankel (1998) study which is a valuable collection of both theoretical and empirical studies on the regionalization of the world economy. In its opening chapter, the study highlights that the most interesting aspects of regional trading blocs require the introduction of a geographic dimension which is often neglected in most of the past international trade research. Ironically, none of the empirical papers that come after the opening chapter accounts explicitly on the afore-mentioned factor. Instead subsequent papers continued with the tradition of reporting results obtained from using standard regression analysis applied to spatial data.

In a related study, Anselin (1998) quoted in Pojoran (1998) clarifies that such data are characterized by the presence of spatial effects, namely, spatial dependence which is caused by various degrees of spatial aggregation, spatial externalities, and spillover effects and spatial structure or heteroskedasticity. In such situations, traditional econometric techniques are no longer applicable, since spatial effects do separately or in combinations impact upon the properties of the traditional estimators and statistical tests. Thus, in the presence of spatial effects the appropriate method or technique is that of spatial econometrics, which allow researchers to test for multiple sources of misspecification in spatial models and for spatial dependence when other forms of misspecification are present. Moreover, such techniques can deal with multi-directional

nature of spatial dependence that often precludes the use of ordinary least squares (OLS).

Darku (2007) used pooled time series data from the perspective of all the countries involved in the study. For this reason, the coefficients obtained from their regressions were interpreted as averages for all the countries included in the study. However, this study uses time series data on bilateral trade flows between Tanzania and her 23 major trading partners. Therefore, the coefficients are specific to Tanzania. Not all countries were observed for every year due to missing values. In total there were 541 observations on annual bilateral trade flows. The sample includes developed countries, mostly European Union countries, and developing countries. Various sources of data were used. Bilateral trade data was obtained from the UN-COMTRADE database and data on GDP (which represents income in the gravity equation) was obtained from World Bank database. The distance data, measured as air distance between Tanzania and capital cities of trading partners, was obtained from the University of Michigan Geographic Name Server and Supplementary database of world cities. In essence Darku's study demonstrates that the appropriate econometric technique of testing for the effect of regional integration on bilateral trade is to augment the standard gravity model with country specific dummies instead of regional integration dummies.

Darku (2007) study suggests three important results. First, on the contrary the results from the traditional approach, estimates from the new econometric technique indicate that both the EU and the EAC have had moderate trade creation effects on Tanzania's bilateral trade. Second, Tanzania's non-traditional trading partners such as Japan, India,

Singapore, Hong Kong and the USA are relatively more opened to Tanzania's exports. Third, the results also indicate that whereas it is difficult for Tanzania's exports to penetrate foreign markets, foreign goods easily penetrate Tanzania's market. The policy implication is that the government should continue with its efforts to strengthen the EAC, and to gain more exports market to the non-traditional trading partners, if the export growth development strategy is to become a reality in Tanzania.

3.5 Exchange rate volatility and trade flows

Bahmani-Oskooee and Hegerty (2007) attempted to assess the main trends in modelling and estimating these trade flows at the aggregate, bilateral, and sectoral levels. An argument put forward by the opponents of the floating exchange rates is that such rates introduce uncertainty into the foreign exchange market, which could deter trade flows. However, a theoretical argument is put forward by some to show that uncertainty could also boost trade flows if traders increase their trade volume to offset any decrease in future revenue due to exchange rate volatility. The empirical literature reviewed in this paper supports both views. This study classified the empirical studies into three categories. The first includes studies that used aggregate trade data between one country and the rest of the world. The second category includes studies that used disaggregate data at the bilateral level such as trade flows between two countries. Finally, the third category includes those studies that disaggregated the trade data further by commodities or by sectors between two countries. For each group a table is provided which summarizes each paper by its main features.

Martinez-Zarzoso and Nowak-Lemann (2004) applies a modified gravity model annual exports disagregated by sector from Southern Common Market (MERCOSUR)+ Chile to the EU member states. The authors aimed to classify sectors according to their sensitivity to geographical and economic distance and to identify which commodities enjoy export strength even without progress in trade liberalization with the EU. In the estimation, the study made use of two additional explanatory variables which are found to be relevant when explaining trade, namely, infrastructure and exchange rates. An exchange rate index is built that takes into consideration protection. The research findings support the view that different sectors have a different sensitivity to distance and highlight the importance of using disaggregate data when analyzing international trade flows.

Martinez-Zarzoso and Nowak-Lemann (2004) study also helps us to understand the effects of geographic and economic distance. When analyzing potential trade between pairs of countries or pairs of economic blocs engaging in free trade agreements two different types of trade can be distinguished as pointed out by Hirsch and Hashai (2000). According to Hirsch and Hashai (2000) geographical distance refers to miles or kilometers between capitals of trading countries. Since local products are cheaper than products transported over long distances, it is expected that geographical distance hinder trade. The second type, economic distance refers to absolute differences in the per capita income of the trading countries. These differences are expected to play a crucial role in explaining trade between the Arab Maghreb Union and other major trading blocs.

3.6 Econometric analysis of the potentialities of regional blocs

Hossain et al. (2005) focused on the development of an econometric model which measures the changes of gross domestic product (GDP) for the members of Organization of Islamic Conference (OIC) countries. In particular, it analyzes the growth of GDP in the OIC countries and their implications for expanded marketing opportunities for goods and services. The study also discusses some challenges marketers may face in future if the formation of OIC countries block become an economic identity and set up some sort of confederation. The data for the estimation of this model came from a website associated with the OIC. The data used with this model include the 57 countries over ten years: total consumption; total investment (public and private); total exports; total imports; and GDP. The data was cross-sectioned measuring the percentage change in variables. The changes were measured in an eight-year period 1987-1993 (to give the largest sample size) with the base year as 1990. The study shows that the problem of multi-collinearity needs to be solved if the model is not going to change. The recommended solution is to acquire more data on the countries that were absent from the original sample. This may be hard to obtain due to some countries not having a process for collecting accurate statistics.

Economidou et al., (2006) examines empirically the linkages between international integration and economic growth in a panel of 47 developing countries and 18 trade blocs over the period 1970-1989. Specifically, it attempts to identify through which channel(s) notably, specialization according to comparative advantage and increased efficiency, exploitation of increasing returns from larger market, and technology

spillovers through investment and trade-trade blocs can affect the economic growth of their member countries. The investigation is limited over the period of 1970-1989; the longest period where the maximum information is available for all countries and variables in the analysis. The study uses a growth equation and several variables characterizing trade bloc membership and trade bloc characteristics are included, such as a dummy variable whether a country is a member of any trade bloc as well as other dummies indicating whether the trade bloc is a preferential trade agreement (PTA), a free trade area (FTA), or a custom union (CU). Specifically, the interest lies in examining which type of trade agreement promotes growth the most.

A panel data approach is adopted in the study to fully exploit the cross-section and time-series variation techniques. Annual data from various sources are used including from World Bank's (2002) Direction of Trade Statistics. Data on human capital are from Barro and Lee (1996). Since the human capital dataset is available only every five years, the data is averaged in five-year time intervals. A sample of 47 developing countries is employed. Among these countries, six of them belong to no regional integration schemes, while the rest belong to one or more of the 18 regional integration schemes (trade-blocs) included in the sample. The panel of the countries includes almost all different income categories for developing countries: low- income, middle-income, and high-income. The findings of the study by Economidou et al., (2006) suggest that (1) intra-bloc trade does not affect growth significantly; (2) income diversion among member countries contributes positively and significantly to growth; and (3) the size of the trade bloc does matter in the sense that the bigger is not always the better for the welfare of the member countries.

Raimi and Mobolaji (2008) highlight the advantages of initiating economic integration among Muslim countries across the globe, drawing special lessons from Europe's experience; its successful economic integration and challenges which trailed the process. The methodology is basically descriptive and analytical. The authors developed a theoretical construct and model on economic integration for adoption by the Muslim countries. The model seeks to enhance their economic strength through intra and inter trade relations and reduces their weaknesses through specialization. The paper established that integration is plausible and beneficial; however, a concerted effort must be made in promoting technological development, raise human capital, and improve the product diversification among Muslim countries while developing stable institutions and infrastructures. Secondly, the findings suggest that the potential benefits of integration exceed the costs. The emphasis needs to be, not in cutting costs/inputs (reductionist approach), but on generating more wealth/revenue/income (incrementalist approach) that results in reducing the huge external debt, poverty, diseases, frustration, and corruption in most Muslim countries. The third major finding is that the key to Muslims' socio-economic happiness is through mutual cooperation for growth and development. The practical implication of the paper is the recommendation to establish a Muslim Economic Bloc because Muslim countries are economically heterogenous group, with uneven development and growth pattern. The study is a major contribution in the field of Islamic economics and applied economics. Contrary to conventional economics, this study advocates a faith-based economic model and bloc in a globalized world economy.

Clearly, this study is also relevant to the Maghreb Union which is constituted by Muslim countries.

3.7 Tariffs, other trade costs and the gravity model

Emlinger et al. (2008) evaluates the role of tariffs in the overall trade barriers faced by Mediterranean countries that export fruit and vegetables to the European Union (EU), using a gravity model. Because of data constraints, two model specifications were investigated. First, to evaluate the obstacles that prevent Mediterranean countries from accessing the European fruit and vegetable market, we estimated the border effect faced by the Mediterranean countries on entry to EU markets using annual data. Market access is not restricted by tariff barriers. Other obstacles, such as norms and transport costs, may impede trade. However, as noted by Mayer and Zignago (2005: 10), 'it is difficult to capture all impediments to trade related to the existence of the national borders, through their impact on trade flows". Most impediments are hard to measure individually and a global image is therefore useful. One solution proposed by these two authors is to use the border effect methodology developed by McCallum (1995). This methodology aims to compare imports from foreign countries with intra-national trade, the latter providing a benchmark for the best possible market access, namely, and access by national producers. The second specification was based on the seasonal data for trade and protection to evaluate the extent to which tariff elasticities vary over the year. It aims to identify whether the impacts of tariffs are different from one period to another, and thus whether the impacts of liberalisation could differ seasonally.

Agostino et al. (2007) and Cardamone (2007), most gravity models analysing impacts of preferential trade agreements suffer from some misleading methodological choices. The first one is that they generally use a dummy variable to proxy the preferential trade agreement. However, this procedure does not take into account the heterogeneity in the levels of preferences that are applied by an importing country to its different suppliers. Emlinger et al. (2008) chose a different approach, using an explicit measure of the tariff applied by the EU to each of its trading partners, computed from the TARIC database. A second problem often encountered in gravity-based specifications comes from the use of aggregate export flows to analyse the effects of trade preferences that apply on a product-by-product basis (Agostino et al., 2007). To allow for the heterogeneity of the fruit and vegetable sector, Emlinger et al.(2008) worked at a very disaggregated level, that is, the product level (six digits), which enabled them to account for the different tools used by the EU to protect its markets. Moreover, at this level of disaggregation, it was possible to include the degree of product perishability in the measure of transport costs, this also being a key issue in the sector.

Garcia Alvarez-Coque and Martı´-Selva (2007) used a similar approach, at an aggregate level, to investigate the impacts of the preferential trade agreements between the EU and Mediterranean countries on EU-Mediterranean trade in fruit and vegetables. They found that these agreements have a positive impact on fruit and vegetable exports from Mediterranean countries to the EU. Emlinger et al. (2008) and others' approach extend their analysis and is focused on two specific questions, namely, what is the role of trade protection in the overall obstacles to trade? And to what extent do the impacts of tariffs vary during the year? The research findings indicated that the 'conventional' variables of

the gravity equation are in line with the authors' expectations in both specifications. It is established that distance restricts trade between two countries, whereas having a common border and a common history stimulates trade between partners. Moreover, bilateral price competitiveness has a significant impact on trade. In other words, the higher the production price of the exporting country compared with the internal price on market the lower the volume of exports. The study also established that 'exotic' goods have a competitive advantage, ceteris paribus. An interesting finding of the result is that the importing country-fixed effect coefficient for Spain is strongly negative. This due to the fact that Spain's high level of production targeted at the domestic market, means that it imports relatively less than the other EU countries.

Distance has a significant and negative effect on trade in annual and seasonal specifications because perishability increases transport costs. In both specifications of the study, the effect of distance on trade is smaller in group 1, which includes less perishable products (nuts, dried fruit, etc), than in the other three groups. Moreover, in the annual specification, the impact is significantly higher in groups 3 and 4 (the groups with the most perishable products) than in other groups but there was no significant difference in impact between these two groups. As a result transport should have more impact on trade for perishable fruit and vegetables, which may reduce the effect of liberalisation for these products. For less perishable products, further opening of the European market should potentially have greater impact, but it is important to recall that for most products of this group, trade is already almost liberalised, or subject to very low MFN tariffs.

The significance of Emlinger et al. (2008) study is that better access to the European market for fruit and vegetable exports is a major concern not only for Mediterranean countries but also Maghreb member states. It is important to note that three member states of the Maghreb countries, that is, Morocco, Tunisia and Algeria are members of the Mediterranean countries which are subject to the study by Emlinger et al., (2008). Furthermore, fruit and vegetables also constitute a significant share of the main agricultural exports of Maghreb countries. However, European producers fear increased competition in their own markets. Given the seasonality of production and the perishability of many fruit and vegetables, European producers are highly sensitive to the volume and timing of foreign imports. In this context, it is important to assess the likely impact of further liberalisation of Maghreb fruit and vegetable trade with the EU. The EU protection system applied to fruit and vegetable imports is particularly complex. A number of studies have analysed its functioning (Garcia Alvarez-Coque, 2002; Cioffi and dell'Aquilla, 2004; Grethe et al., 2005) and have assessed its efficiency in protecting the European market from certain imports (Chemnitz and Grethe, 2005; Goetz and Grethe, 2007). Seasonality is one of the main characteristics of the system and this feature is particularly challenging when measuring the impact of the EU protection on trade (Garcia Alvarez-Coque et al., 2007).

Expectedly, tariffs have a negative impact on trade for most partners of the EU, with the exception of countries in the Southern hemisphere (for which the tariff coefficient is, surprisingly, positive), and of Turkey, for which the coefficient is not significant. However, the impact of tariffs on trade differs from one Mediterranean country to another and such a relationship may be instructive for Maghreb countries. For instance,

exports from Israel are very sensitive to the tariffs applied by the EU (coefficient of 21.18). This result can be explained by the product specialisation of this country. Israel's main exports (grapefruits, avocadoes, peppers, potatoes) face lower levels of European protection than the products Israel exports in smaller quantities. However, this country has to face higher tariffs at EU borders, compared with other Mediterranean countries.

The tariff elasticity for the group of other Mediterranean countries (including Maghreb countries) is also high compared with the other zones (20.77). This result may also be explained by the product composition of these countries' exports. Certainly a large share of their exports are composed of products with very low levels of protection (dates, figs, grapes), whereas these countries export smaller quantities of products with higher tariffs.

Morocco's tariff elasticity suggests that tariffs remain an important barrier for its exports. In fact, Morocco, A Maghreb member state benefits from high level of preferences at European borders for most of its exports (tomatoes, oranges, strawberries, green beans) during their exporting season. Comparatively, products with higher tariffs are currently not exported, which may lead to this high tariff elasticity. According to the study, tariff elasticity for another Maghreb member state Tunisia is much lower. However, Tunisia also export products with low tariffs, like dates and enjoy substantial negotiated preferences during the exporting season. It is instructive to note that for Morocco, the coefficients are not significant in the equation of selection because the tariffs have an impact on the volume of trade but no impact on their decision to export to the EU.

A key finding of this study is that other trade costs prevent countries from exporting to the EU. Compared with national producers, all foreign suppliers face a border effect when entering the market of an EU member state (all the coefficients of the exporting-country dummies are negative). This is also true for European exporters as the coefficient of the EU dummy is 24.97. This result suggest that each EU country trades fruit and vegetables more with itself than with other EU countries, even when price and distance are controlled for. Hence, despite the Single Market, frontiers between countries still represent a significant trade barrier in the fruit and vegetable sector. This reflects the 'EU market fragmentation 'outlined by Head and Mayer (2004), which is due not only to consumer preferences, but also to incomplete harmonisation of phytosanitary regulations in the single European market (Emlinger et al., 2008). European market fragmentation may also be the result of numerous private norms of retailers that differ from one country to another. The border effect at entry to European markets differs from one Mediterranean country to another. Emlinger et al., (2008) point out that Israel is the country with the best access to the European market, once tariffs and transport costs are taken into account. Unsurprisingly, Israel has an even lower 'other trade cost' effect (22.55) than EU countries (24.97). Israel therefore has an advantage over all the other suppliers of the EU in its access to the European Market. This comparative advantage may be caused by a strong overall competitiveness based on the country's organisational and logistic capacities, as well as to its capacity to adapt to European demand. The foregoing help to explain the share of Israel on the European market despite the high level of protection it has to face and the high tariff sensitivity we estimate in the model. In this regard, Morocco a Maghreb member state is depicted as occupying an intermediate position regarding the border effect at entry to the EU.

Though the country is disadvantaged in comparison with Israel or the EU, it is however advantaged relative to the other suppliers. On the contrary the border effect is very high for Tunisia and the group of 'other Mediterranean countries' (Algeria, Lebanon, Syria, Jordan). These trade resistances, possibly due to weak capacity in terms of organization, logistics and adaptation to norms, may explain why trade is so low for Lebanon in particular, even though nearly all tariffs have been removed. Finally, the results of the study appear to show that Southern hemisphere countries appear to enjoy better access to the European market than do other suppliers (except EU suppliers and Israel), but this result is due to these countries' specialization in off-season products. Indeed, products exported by the Southern hemisphere countries to the EU are not really in competition with those of European countries.

Despite the above findings, the impact of full EU-Mediterranean trade liberalization in the fruit and vegetables sector is highly contentious. On the other hand, one can expect that the effects would be significant because the current protection is much targeted, uses complex instruments and focuses on specific products and specific periods. The level of protection seems to be a crucial issue, as illustrated by the complaints of some Mediterranean countries, particularly about the narrowness in the tariff windows. On the other hand, one can argue that trade preferences allowed to Mediterranean countries are already significant and that further liberalization would not affect EU producers very much. Two econometric specifications of a gravity model were investigated in order to contribute to this debate. A specification based on annual data measured the border effect faced by products from Mediterranean countries entering EU markets, enabling us to assess the role of tariffs in overall trade costs. The second specification aimed to

evaluate whether tariff impacts are stable throughout the year. Both models are specified at the product level, which allows both the degree of product perishability and (in the seasonal model) the seasonality of tariffs to be taken into account.

Fundamentally, the research findings lead to two main conclusions. First, trade costs other than transport costs and tariffs barriers seriously hinder exports from Mediterranean countries to the European market. Crossing a border has a negative impact on trade, even between European countries: even after transport costs and tariffs barriers are taken into account, domestic producers in EU countries enjoy significant advantages over other suppliers in terms of access to their own market. Thus, exporting countries face trade resistances including non-tariff barriers, costs of information and of adaptation to norms when trying to enter EU markets. Moreover, we showed that transport costs and their impact on trade vary with the degree of product perishability. By showing that tariff barriers are not the only obstacles to trade, the results help to put the impact of trade liberalisation into perspective. They also emphasize the fact that negotiations should be conducted on a product-by-product basis.

The second key conclusion is that there are marked differences among Mediterranean countries with respect to their access to the European market, their sensitivity to tariffs and other trade barriers. The tariff levels applied by the EU to fruit and vegetable imports vary considerably with the exporting countries. Furthermore, the findings reveal that the impact of tariffs and non-tariff barriers on trade also varies considerably from one exporting country to another. Thus, the challenge of liberalization will not be the same for all the Mediterranean suppliers. Hence, the impact of EU–Mediterranean

liberalisation must be discussed country by country and on a product-by-product basis. Israel appears to be the country for which trade liberalisation would have the greatest impact on its exports of fruit and vegetable (without taking into account production constraints or changes in demand): it faces high tariffs, is the most sensitive to tariffs and faces the lowest 'other trade costs'. A reduction in EU tariffs could consequently have a marked impact on EU imports from Israel. The main contribution of this study is that it refined the result obtained by Garcia Alvarez-Coque et al. (2007) showing that Israel performs better than North African countries. Emlinger et al., approach allows them to show that tariffs remain a barrier for Israeli exports, in spite of their competitiveness. Morocco also faces low 'other trade costs', but also much lower tariffs, and is less sensitive to tariffs than Israel. This might indicate that trade liberalization would have less impact on the volumes exported by Morocco. Concerning the 'other Mediterranean countries', the main result is that non-tariff obstacles would limit the benefits their exports would gain from a decrease in EU tariffs. The seasonal specification shows that impacts of tariffs may vary within the year for some countries. Thus, it may define the stakes involved in trade negotiations more clearly because for some countries, in order to have more effect, negotiations should be limited, to specific periods. For example, it is stated that Egyptian exports are only sensitive to EU tariffs from March to October, and they could significantly benefit from an improvement in access to EU markets in this period. Finally, the importance of the other trade costs, as highlighted in main findings results, indicates that further research is needed to understand more fully the nature and the role of non-tariff barriers in the trade between Mediterranean countries and the EU.

In a related study Breus (2004) uses a computable general equilibrium model to analyze the four most prominent trade disputes between the EU and the USA, which we call ‘‘mini trade wars:’’ the Hormones, the Bananas, the Foreign Sales Corporations and the Steel cases. Since its inception in 1995, more than 312 disputes have been raised under the World Trade Organization (WTO) Dispute Settlement System. Despite the apparent success of this system, several shortcomings call for a revision under the auspices of the Doha Development Round. Breus study revealed several flaws and peculiarities. The study concluded that as a rule, retaliatory tariffs are detrimental to welfare of the retaliating country and amount to ‘‘shooting oneself in the foot” (Breus, 2004). As such trade wars can only be won by large countries. The WTO arbitrator’s estimation of the trade loss in case of non-compliance never translates into equivalent damage to economic welfare. The study finds that a mechanism to control the collection of retaliatory tariff revenues is missing as is a system to compensate the firms suffering the damage. The major conclusion therefore is that tariffs are very bad instruments for counter measures. The author believes that the sanctions mechanism of the Dispute Settlement System should be improved, and should base on a mechanism of direct transfers.

3.8 Conclusion

What is clear from the foregoing literature review is that there is disagreement among experts and other observers about the role and impact of the gravity model in international trade analysis. A general picture one gets is that there is a substantial extant literature on the gravity model which is used as the empirical framework in this study.

However, despite this extensive literature not much has been written on the impact of regional integration on trade among the Maghreb countries in terms of intra-trade, regional trade as well as global trade. Whereas a great deal has been written from all manner of perspectives about the gravity model in various countries and between regional trading blocs, the resulting corpus of literature has seldom applied the gravity model to the Arab Maghreb Union (AMU) in order to understand the trading dynamics affecting this bloc. This research attempts to fill the gap in the extant literature.

CHAPTER 4

METHODOLOGY AND DATA

4.1 Introduction

This chapter begins by explaining the research model, the overall research approaches, rationale, pros and cons for the methods selected. It then discusses the design and methodology used in this study. The data collection methods are also explained in this chapter.

There is a general consensus on the fact that trade policies of leading economies have a strong impact on the world economy and serve as a catalyst for the new trade patterns. While economists will continue to debate whether multilateral trade agreements or regionalism constitute the most effective strategy, the ongoing financial crisis makes it clear to major economic powerhouses (United States, European Union, and China) that the pristine markets in Areb Maghreb Union represent the best opportunity for a sustainable recovery.

The AMU has sought to establish itself as a veritable trading regime on par with the European Union (EU) in terms of scope and depth, but the organization's goals have not been realized, nor have the region's economies come even close to the integration found between other regional organizations. In theory, the AMU would be an effective organ, as other trading blocs.

The formalization of an organization to supersede bilateral trading agreements remains the most likely path through which regional economic integration among the countries of AMU will occur. Regionalizing isn't zero-sum, in that acceding to a Mediterranean Union comes at the detriment of the AMU, but AMU economies will most likely still opt to associate with Europe in the short term, which will lead to a formalized partnership in the long term. The European Union is Morocco's largest economic partner, absorbing close to three-quarters of Morocco's exports and providing 63 percent of FDI flowing to Morocco (José et al., 2010).

Like other developing countries, the countries in the Middle East and AMU increased the pace of trade integration reforms to harness the opportunities offered by the changed global market. However reform has been limited compared with that of other regions. including a large number of countries in the Middle East and AMU that rely heavily on fuel and commodity exports for their income - experienced a marked drop in export prices and a corresponding deterioration in their terms of trade (José et al., 2010).

In this study the intention is to fill the lack of literature for the three selected EU countries: Spain, France, and Italy, and three selected ME countries; Syria, Lebanon, and Egypt. The three selected EU countries are along the northern rim of the Mediterranean have long pursued strong trade policies with their southern neighbours, reflecting the benefits of a strong Euro abroad, historical trade ties, and the prospects of AMU liberalization, which has presented firms with a host of off-shoring opportunities in AMU.

Another reasons that we choose were six countries (selected EU and ME) namely; (i) these countries are the AMU's major trading partners; almost 50 percentage of trade contributed by these selected countries to AMU's total trade since 1989 to 2005 as shown in Table 4.2 and Table 4.3, (ii) these six countries have similar characteristic distance which is near to the AMU countries as shown in Table 4.1. This is supported by Limao and Venables (2001) calculate that landlocked countries trade about 60% less than their coastal counterparts with otherwise similar characteristics. Irwin and Tervio (2002) find that geographic characteristics explain about 30 to 40% of the variance of the log of the bilateral trade share of GDP.

Table 4.1
The distance between the Arab MaghrebUnion and the most important trading partners. Figures in the nautical mile

No	EU Countries	Libya	Tunisia	Algeria	Morocco	Mauritania
1	**Belglum - Lux**	1145.8	879.8	846.7	1095.3	2165.7
2	**Denamark**	1371.3	1141.2	1201.1	1504.3	2577.7
3	France	1,075.1	801.4	628.1	1,171	2,355
4	**Germany**	1183.8	959.4	1044.3	1386.2	2460.3
5	**Greece**	1113.8	643.3	973.1	1466.6	2364.1
6	Italy	619.0	320.9	528.1	1,183.0	2,342.5
7	**Ireland**	1491.6	1215.3	1082.6	1154.5	2158
8	**Neatherlands**	1235.8	973.5	949.2	1190.4	2257.8
9	**Portogal**	1134.9	918	592.2	291.2	1269.2
10	Spain	919.7	674.6	441.5	651.0	1471.3
11	**UK**	1263.6	990.3	903.2	1074	2127
	ME Countries					
1	**Jordan**	1140.3	1295.7	1631.3	2112	2874.2
2	**Emirates**	2239.7	2396.9	2733.1	3215.2	3927.8
3	**Bahrain**	1975.4	2138.3	2474.1	2953.6	3661.8
4	**Saudi Arabia**	1816.2	2000.4	2332.8	2801.7	3463
5	**Sudan**	1472.2	1737.5	2007.6	2376.9	2753
6	**Syria**	1160.1	1294	1630.3	2117.1	2913.8
7	**Somalia**	2574.5	2836.8	3110.5	3467.9	3700.3
8	**Iraq**	1561.9	1683.9	2019.2	2509.5	3316
9	**Oman**	2442	2601.4	2937.5	3419	4119
10	**Qatar**	2045.7	2212.2	2547.6	3025.7	3722
11	**Kuwait**	1799.3	1946.7	2283	2767.8	3518.6
12	**Lebanoun**	1114.7	1247.5	1583.9	2070.7	2870.6
13	**Egypt**	937.1	1123.5	1453.5	1921.3	2641.6
14	**Yemen**	1982.7	2217.2	2668.6	3080.2	7145.4

Source: http://www.happyzebra.com/distance-calculator/

Table 4.2
Total Export and Import between AMU Countries with EU Countries from 1989-2005. Figures in millions of U.S. Dollars

	Libya		Tunisia		Algeria		Morocco		Mauritania	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
Belgium-Lux	1,512	1,001	1,991	2,435	4,500	2,109	1,075	1,419	349	276
Denmark	74	346	168	456	79.82	626	72	657	0.06	42
France	10,936	4,564	27,218	35,898	36,923	46,617	32,835	37,509	858	2,747
Greece	4,842	938	495	882	861	559	457	294	47	137
Ireland	35	392	149	270	33	591	425	815	1	18
Italy	74,117	15,345	20,260	25,196	52,389	18,023	5,747	10,562	932	426
Neatherlands	1,687	2,418	2,532	2,975	16,415	3,225	2,606	3,536	63	404
Portogal	2,103	59	267	527	4,619	570	911	1,472	78	37
Spain	21,355	1,719	4,111	6,096	26,304	13,093	13,221	17,357	657	775
U.K	4,240	5,416	1,997	2,996	5,289	3,208	6,166	6,298	220	385
Total	151,084	41,080	71,195	93,351	157251	1012	67,865	89,485	3,489	5,886

Source: Arab Monetary Fund; http://www.amf.org.ae/

Table 4.3
Total Export and Import between AMU Countries with ME Countries from 1989-2005. Figures in millions of U.S. Dollars

	Libya		Tunisia		Algeria		Morocco		Mauritania	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
Jordan	145	215	295	93	31	327	127	54	0.21	0.26
Emirates	59	273	101	163	2	328	113	1,472	0.00	14
Bahrain	0.49	19	31	104	912	86	5	72	0.10	2
Saudi Arabia	2	163	554	842	1,042	412	1,036	8,371	0.00	45
Sudan	1,314	33	21	89	0.32	10	4	1	0.00	1
Syria	217	316	187	345	78	918	191	235	0.35	18
Somalia	0.00	0.56	0.11	0.17	0.00	0.07	0.06	0.13	0.00	0.84
Iraq	0.00	0.19	316	208	157	11	153	1,852	0.00	0.00
Oman	3	22	45	18	0.08	6	20	9	0.00	2
Qatar	0.47	0.58	60	35	0.77	24	7	105	0.01	0.20
Kuwait	0.00	0.62	85	135	1	16	43	389	0.44	0.02
Lebanon	184	270	154	75	68	179	104	116	12	10
Egypt	1,114	1,261	345	617	1,405	801	179	733	19	19
Yemen	2	0.79	19	8	0.99	0.79	35	31	0.10	2
Total	3,046	2,579	2,218	2,739	3,703	3,125	2,023	13,445	32	118

Source: Arab Monetary Fund; http://www.amf.org.ae/

4.2 The Standard Gravity Model

This chapter focused on the model specification based on the theoretical arguments in the literature reviewed. There are a number of studies that have attempted to provide a theoretical foundation for the gravity model and validate its application in international trade research. Since its several appearance decades, there have been numerous applications of the gravity model in analyzing international trade flows. And this study is one of the studies that have applied the gravity model. The analysis used the standard Gravity model and also utilized simple trade intensity indices (export intensity index and import intensity index) to measure the pattern and trend of bilateral trade between AMU member countries and their selected major trading partners. A brief description of data employed in the study is given in the Section 4.5. In this chapter, the empirical model that will be estimated is discussed. The empirical model was used to test the pattern and trend of bilateral trade between AMU member countries and their selected major trading partners. The simplest model based on the standard Gravity model presented and the extension of the model is then extended based on the existing literature.

4.2.1 Research Model and Specification

Several methods have been used to analyze the intra-regional trade effects of regional economic integration. A frequently used approach, however, is the gravity equation (see Endoh, 1999). The gravity equation or model of international trade, originally developed by Tinbergen (1962, 1964), showed to be compatible with a range of international trade theories such as the factor endowment models of trade (Bergstrand, 1989, 1990; Deardorff, 1998) and increasing returns-to-scale model (Evenett and Keller, 1998). Endoh (1999) proposes a traditional approach of estimating the effects of regional organizations on the flow of trade by introducing dummy variables into the gravity equation to account for intra-regional trade and bilateral trade effect. Although this approach is easy to implement and less costly in terms of data, this study will demonstrate that the appropriate econometric technique is to augment the standard gravity equation with country specific dummies instead of regional integration dummies. Accordingly, the present study takes the lead from Darku (2009) in estimating the effects of AMU and EU on AMU member countries' import and export trade. In a basic gravity equation of international trade, a country's exports flow is positively related to the size of the importing countries (usually proxied by nominal GDP – when using nominal value of exports as depended variable – and population) and negatively related to distance. In this study, additional variables that are regarded as restricting or facilitating trade are also incorporated. They include adjacency of the countries (i.e. a common border or a small body of water between the two trading countries) and the most common official language. Since the study also aims at evaluating whether or not

AMU and EU creates or diverts AMU member countries export trade, dummy variables to estimate the effects of intra-regional trade and bilateral trade are used.

The standard gravity model has increasingly been used to predict international trade flows since it was first introduced by Tinbergen (1964). The model predicts that bilateral trade level is a function of two important economic variables: trade enforcement variables, including a measure of national output of both importing and exporting countries; and trade resistance variables, including distance, and a dummy variable for common border. Output of the exporting country represents the ability to supply and the output of the importing country represents the propensity to demand. Hence, trade flows are expected to be positively related to the exporting and importing countries output. After being popularized by Linneman (1966), the gravity model has been used in many empirical trade studies. These studies have mainly focused on the effect of preferential trade agreements (PTAs)/regional integration (RI) on bilateral trade in almost every subregion of the world. The results so far have been mixed. Micco *et al*. 2003, Hassan, 2001, Adam *et al*. (2003) and Walsh (2006) have used the gravity model to examine the effect of EEC/EU and EFTA on bilateral trade. They concluded that the PTAs have fostered trade among members and between members and non-members. However, evidence of trade diversion for the EEC/EU agreement has been found by Westerlund and Wilhelmsson (2006) and Kien and Hashimoto (2005). Breuss and Egger (1999), and Managi *et al*. (2005) have also showed that the formation of NAFTA has led to increase in intra-PTA trade. On the contrary, Ghosh and Yamarik (2004) and Siliverstovs and Schumacher (2006) found that NAFTA has led to a reduction in trade among members.

The traditional technique used by the studies discussed above to test for the effect of regional integration on bilateral trade, involves augmenting the basic gravity model with regional integration dummies. This study demonstrates that the appropriate econometric technique is to augment the standard gravity equation with country specific dummies instead of regional integration dummies. For this purpose, this study pursues one important objective, that is, it uses the gravity model to test for the effect of regional integrations particularly the European Union (EU) on AMU's individual member states' bilateral trade. In essence the EU constitute AMU's key traditional trading bloc. Clearly, within the framework of the gravity model and the application of a new estimation technique, this study tests for the extent of openness of AMU's traditional trading partners such as Spain and Italy.

Before proceeding with the application of the gravity model to AMU countries' bilateral trade relationship, this study will utilize simple trade intensity indices (export intensity index and import intensity index) to measure the pattern and trend of bilateral trade between AMU member countries and their selected major trading partners. According to Yamazawa (1970) cited in Darku (2009), the trade intensity model concentrates on the structure of departures of actual trade flows from trade flows estimated in gravity models. He proved that in a simplified gravity model where bilateral trade is solely determined by the GDPs of country i and j, the index (export or import intensity index) is always equal to unity. An index greater than unity reflects the importance of various factors such as distance, favorable trade agreements, and strong complementarities of comparative advantages in determining trade flows. Hence, the dynamics in these

intensities must be consistent with the predictions of the gravity model that captures these factors.

An export intensity index measures the extent to which the proportion of a country ***i'***s export to another country ***j*** differs from the proportion of exports from the rest of the world to country *j*. The index is given as:

$$\mathrm{EX}_{ij} = \left[\frac{\mathrm{X}_{ij}}{\mathrm{X}_{i}}\right] / \left[\frac{\mathrm{X}_{wi} - \mathrm{X}_{ij}}{\mathrm{X}_{w} - \mathrm{X}_{i}}\right] \tag{4.1}$$

where EX_{ij} is the exports intensity index of country ***i*** with trading partner ***j***, X_{ij} is the exports of country ***i*** to trading partner ***j***, X_i is the total exports of country ***i***, X_{wj} is the total exports to country ***j***, and X_w is the total world exports. The index measures the extent to which country j is over or under-represented as country i's export market. The index will take a value of unity if the proportion of country ***i***'s exports to country j is the same as the proportion of the rest of the world's exports to country ***j***. If the value exceeds unity, country ***j*** is said to be over-represented as country ***i***'s exports market. A value less than unity imply relative under-representation.

Similar to the analysis of exports, an import intensity index measures the extent of AMU member country's import dependence on its trading partners. This index is given as:

$$\mathrm{IM}_{ij} = \left[\frac{\mathrm{M}_{ij}}{\mathrm{M}_{i}}\right] / \left[\frac{\mathrm{M}_{wi} - \mathrm{M}_{ij}}{\mathrm{M}_{w} - \mathrm{M}_{i}}\right] \tag{4.2}$$

where IM_{ij} is the imports intensity index of country i with trading partner j, M_{ij} is the imports of country *i* to trading partner *j*, M*i* is the total imports of country i, M_{wj} is the

total world imports from country *j*, and M*w* is the total world imports. The index is equal to one if an AMU member country's import from a particular country as a proportion of its total imports is the same as the proportion of the rest of the world's imports from that country. If an AMU member country is over-dependent on a particular country for its import, then the ratio will be greater than one. On the other hand, if the ratio is less than one, then an AMU member is under-dependent on that country.

The analysis of trade intensity indices which will be conducted earlier will establish important stylized facts on AMU member countries' bilateral trade which serve as the starting point of a rigorous econometrics analysis to determine the characteristics of their bilateral trade. In this study, the researcher will examine these stylized facts in the gravity model framework while analyzing the effect of the AMU, on its member countries' bilateral trade. In a nutshell, the study examines the extent of openness of AMU members' trading partners and the AMU itself. In light of this, study seeks to empirically show that the appropriate econometric technique of testing for the regional integration effect is to augment the standard gravity equation with country specific dummies instead of the traditional approach which augments the standard gravity model with regional trading block dummies. The variables included in the standard gravity equation are income of both the importing and exporting countries, and distance.

Income of the importing country represents the purchasing power or its absorption capacity, while the income for the exporting country represents the country's production and supply capacity. Distance is used as a proxy for transportation cost.

In this section, the discussion is focused on trade as a dependent variable and the expansion explanatory variable in the Standard Gravity Model. That means country's foreign currency reserves and the real exchange rate between the two countries as the independent variables beside the others basic independent variables (i.e. GDP, population and distance). Equation (4. 3) is extended from Equation (4.1) and Equation (4.2). In order to examine the gravity model of AMU (first objective) and between AMU and the European Union as well as the Middle East (second objective), we proposed our empirical model as follows:

$$lnY_{ijt} = \beta_0 + \beta_1 lnGDP_{it} + \beta_2 lnGDP_{jt} + \beta_3 lnPOP_{it} + \beta_4 lnPOP_{jt} + \beta_5 lnDINS_{ij} + \beta_6 lnFCR_{ij} + \beta_7 lnRER_{ij} + \beta_8 lnOPENNESS_{ij} + \beta_9 AGMT_{ij} + \beta_{10} LAN_{ij} + u_{ijt} \quad (4.3)$$

where lnY_{ijt} is the trade variable between country *i* (AMU, EU and ME) and country *j* at time *t*; $lnGDP_{it}$ is a measure of income of country *i* at time *t*; $lnGDP_{jt}$ is a measure of income of country *j* at time *t*; $lnPOP_{it}$ and $lnPOP_{jt}$ are local and target populations, respectively at time *t*; $lnDINS_{ij}$ is the distance between countries ***i*** and *j;* $lnFCR_{ij}$ is the target country's foreign currency reserves at time *t*; $lnRER_{ij}$ is the real exchange rate between the two countries at the time *t*. $lnOPENNESS_{ij}$ is the most basic measure of trade intensity is the so-called ''trade openness'' that is the ratio of exports plus imports to GDP. LAN_{ij} is a dummy variable for trading partners sharing a common language. Ability to communicate in a common language is predicted to reduce the costs of trade.

We use measure for English as a common language. $AGMT_{ij}$ is a dummy variable which evaluate the effects of preferential trading agreements. *ßi* (i = 1,2,..,7) are parameters of the equation, and u_{ijt} is a white noise disturbance term. All variables are in logs so the estimated coefficients are interpreted as elasticities.

4.2.2 Estimation Procedure

i. Fixed and Random Effects: The Fixed Effects Model in Concept

One way to practice this is to estimate a "fixed effects" model that gives Luxembourg and every other unit in our study its own intercept. The most intuitive way to do this would be by including a dummy variable for N-1 units. We still assume that the bet as pool across units, so in essence we have N parallel regression lines. Observations across time in each unit vary around a baseline level specific that unit. Note that any substantive explanatory variables that do not vary across time in each unit will be perfectly collinear with the fixed effects, and so we cannot include them in the model (or estimate their effects).

$$y_{it} = \alpha_i + \beta x_{it} + e_{it} \tag{4.4}$$

We could just include dummy variables for all but one of the units. If we have panel data, though, this sacrifices a lot of degrees of freedom. And with so many units and very few time periods, these intercepts may be picking up on a lot of random errors and thus be quite inconsistent. We're not going to learn much of substance from these

"incidental" or "nuisance" parameters. So this frees us to estimate the effect of our substantive coefficients in a slightly different way that preserves the substantive story of fixed effects without costing us so many degrees of freedom. We convert our x and y for each observation into a deviation from the mean in that unit. This "sweeps out the unit effects" because when you mean deviate variables, you no longer need to include an intercept term. So the model regresses $y_{i,t}$ – mean(y_i) on $x_{i,t}$ – mean(x_i). This is often called this "within" estimator because it looks at how changes in the explanatory variables cause y to vary around a mean within the unit.

ii. Fixed and Random Effects: The Random Effects Model in Concept

Instead of thinking of each unit as having its own systematic baseline, we think of each intercept as the result of a random deviation from some mean intercept. The intercept is a draw from some distribution for each unit, and it is independent of the error for a particular observation. Instead of trying to estimate N parameters as in fixed effects, we just need to estimate parameters describing the distribution from which each unit's intercept is drawn. If we have a large N (panel data), we will be able to do this, and random effects will be more efficient than fixed effects. It has N more degrees of freedom, and it also uses information from the "between" estimator (which averages observations over a unit and regresses average y on average x to look at differences across units). Another nice property is that you can still have explanatory variables that don't change over time for a unit. If we have a big T), then the difference between fixed effects and random effects goes away.

$$y_{it} = \mu + \alpha_i + \beta x_{it} + e_{it} \quad (4.5)$$

4.3 Extension of the Model

The former model explained is the Gravity model. The panel gravity model occurs in several variants. Rose (2000) explains bilateral trade (exports plus imports) by national income of countries, their incomes per capita, free trade area and currency union dummies, and time-invariant variables such as distance. On top of that model, in this study we pool cross-section and time series data to study relationships between trade and determinants of trade using a single equation tests which have been developed by Pedroni (1997, 2003). Pedroni (1997, 2003) develop tests for the null of no cointegration in the bivariate case. Glick and Rose (2002) extend the model by using fixed country-pair specific intercepts to correct for all time-invariant trade determinants, and in a robustness check they also include fixed time effects to account for all country-pair invariant variables. Pedroni (1999) generalizes these tests to the multivariate case. Pedroni (1999) uses the following model:

$$y_{it} = \alpha_i + \delta_i t + \beta_{1i} x_{it} + \cdots + \beta_{Ki} x_{KIT} + e_{it} \quad (4.6)$$

where there are K regressors, which are allowed to be endogenous.

Equation (4. 7) was extended from Equation (4.3) and Equation (4.6). In order to to investigate a long-run relationship between the trade and its determinants for a group of selected AMU, EU and ME countries (third objective), we proposed our second empirical model as follows:

$$lnY_{ijt} = \beta_0 + \beta_1 lnGDP_{it} + \beta_2 lnGDP_{jt} + \beta_3 lnPOP_{it} + \beta_4 lnPOP_{jt} + \beta_5 lnDINS_{ij} + \beta_6 lnFCR_{ij} + \beta_7 lnRER_{ij} + \beta_8 lnOPENNESS_{ij} + u_{ijt} \quad (4.7)$$

where lnY_{ijt} is the trade variable between the country ***i*** (AMU, EU and ME) and the country *j* at time *t*; $lnGDP_{it}$ is a measure of income of the country ***i*** at time *t*; $lnGDP_{jt}$ is a measure of income of the country *j* at time *t*; $lnPOP_{it}$ and $lnPOP_{jt}$ are local and target populations, respectively at time *t*; $lnDINS_{ij}$ is the distance between countries ***i*** and *j;* $lnFCR_{ij}$ is the target country's foreign currency reserves at time *t*; $lnRER_{ij}$ is the real exchange rate between the two countries at the time *t*. $lnOPENNESS_{ij}$ is the most basic measure of trade intensity is the so-called ‘‘trade openness’’ that is the ratio of exports plus imports to GDP. *ßi* (i = 1, 2... 7) are parameters of the equation, and u_{ijt} is a white noise disturbance term. All variables are in logs so the estimated coefficients are interpreted as elasticities.

Before we conduct tests of cointegration between those variables, it is necessary to perform unit root tests. Unit root and cointegration tests in the time series dimension suffer of low power and/or size distortion. The addition of the cross-section dimension, however, brings an improvement to the power of unit root and cointegration tests by acting as repeated draws from the same distribution.

4.3.1 Panel Unit Root Tests

In order to investigate the possibility of panel cointegration, it is first necessary to determine whether real per capita GDP and the independent variables evolve as unit root processes. There are several unit root tests specifically for panel data which have been introduced in past decades. Among them are Quah (1992, 1994), Levin and Lin (1992, 1993), Maddala and Wu (1999), Hadri (2000), Levin, Lin and Chu (2002), and Im, Pesaran and Shin (1997, 2003). This panel unit root test is a continuation of the univariate unit root test identified earlier but which has low power like the augmented Dickey-Fuller test (Said and Dickey, 1984). The panel unit root test as above has the specification for a null hypothesis and an alternative and methodology to identify problems such as heterokedasticity and different correlations. Each panel unit root test data has its own benefits and limitations and for this study we have chosen the Levin, Lin and Chu version (LLC) and Im, Pesaran and Shin (1997; IPS hereafter), which are based on the well-known Dickey-Fuller procedure. This LLC test is not only considered simple when estimation is carried out, but has also been widely used in empirical studies and the strength of this test has been tested in various Monte Carlo[3] tests.

4.3.2 Levin, Lin and Chu (LLC; 2002)

In LLC it is found that the main hypothesis of panel unit root is as follows:

$$\Delta y_{it} = \Phi_i \, y_{i,t-1} + \sum_{L=1}^{p_i} \rho_{i,l} \Delta y_{i,t-L} + \varepsilon_{i,t} \qquad m = 1, 2, \ldots \tag{4.8}$$

[3] see O"Connell (1998) and Maddala and Wu (1999)

where $y_{i,t}$ refers to variable lnY_{ijt}, $lnGDP_{it}$, $lnGDP_{jt}$, $lnPOP_{it}$, $\ln POP_{jt}$ $lnDINS_{ij}$, $lnFCR_{ij,}$ $lnRER_{ij}$ and $lnOPENNESS_{ij}$ and Δ refers to the first difference. The hypothesis test is $H_0 : \Phi_i = 0$ for existence of unit root whereas $H_a : \Phi_i < 0$ for all *i* for non-existence of unit root. As p_i is unknown, Levin, Lin and Chu (LLC) suggest a three-step procedure in the test. In the first step, obtain the ADF regression which has been separated for each individual in the panel, generate two orthogonalized residuals. The second step requires an estimation of the ratio of long run to short run innovation standard deviation for each individual. The last step requires us to compute the pooled *t*-statistics.

In the first step, we generate ADF regression for each individual *i*:

$$\Delta y_{it} = \Phi_i \, y_{i,t-1} + \sum_{L=1}^{p_i} \rho_{i,L} \, \Delta y_{i,t-L} + \varepsilon_{i,t} \tag{4.9}$$

The lag order for p_i is allowed to be distinguished for each individual. Campbell and Perron (1991) suggest a methodology used by Hall (1990) in choosing the appropriate lag order; that is providing a sample span of *T*, choose a lag order which maximizes P_{MAX}, and then use *t*-statistics for $\hat{\rho}_L$ to determine if the order of a smaller lag order is preferred. [*T-statistics* have a standard normal distribution in a null hypothesis ($\hat{\rho}_{iL} = 0$), when $\Phi_i = 0$ or $\Phi_i < 0$]. When the order of autogression has been determined for p_i in equation (4.11), generate two auxiliary regressions to obtain a orthogalized residuals.

Carry out a regression $\Delta y_{i,t}$ and $y_{i,t}$ on $\Delta y_{i,t-L}$ (L=1,…p_i), then get residuals $\hat{e}_{i,t}$ and $\hat{v}_{i,t-1}$ from these regression. Specifically, this model is shown as below:

$$\hat{e}_{i,t} = \Delta y_{i,t} - \sum_{L=1}^{pi} \hat{\pi}_{i,L} - \Delta y_{i,t-L} \tag{4.10}$$

$$\hat{v}_{i,t} = \Delta y_{i,t} - \sum_{L=1}^{pi} \tilde{\pi}_{i,L} - \Delta y_{i,t-L} \tag{4.11}$$

To control heterogenity among individuals, LLC has normalised $\hat{e}_{i,t}$ and $\hat{v}_{i,t-1}$ through standard error regression which is obtained from equation (4.9):

$$\tilde{e}_{i,t} = \frac{\hat{e}_{i,t}}{\hat{\sigma}_{\varepsilon,i}} \qquad , \qquad \tilde{v}_{i,t-1} = \frac{\hat{v}_{i,t-1}}{\hat{\sigma}_{\varepsilon,i}} \tag{4.12}$$

where $\hat{\sigma}_{\varepsilon,i}$ is standardized error from estimation of equation (4.9). This value can also be calculated from regression $\hat{e}_{i,t}$ on $\hat{v}_{i,t-1}$.

$$\hat{\sigma}^2_{\varepsilon,i} = \frac{1}{T - p_i - 1} \sum_{t=p_i+2}^{T} (\hat{e}_{i,t} - \hat{\Phi}_i \hat{v}_{i,t-1})^2 \tag{4.13}$$

The second step is to estimate the ratio of long run to short run standard deviation. In this null hypothesis for unit root, long term variance for the model can be estimated as below:

$$\hat{\sigma}_{y,t} = \frac{1}{T-1} \sum_{t=2}^{T} \Delta y_{i,t}^2 + 2 \sum_{L=1}^{\bar{K}} W_{K,L} \left[\frac{1}{T-1} \sum_{t=2+L}^{T} \Delta y_{i,t} \Delta_{i,t-L} \right] \tag{4.14}$$

where *w* refers to weights. The truncation lag parameter $\overline{K}$ depends on data. For each individual *i*, LLC define the ratio of the long run standard deviation to innovation standard deviation as:

$$s_i = \frac{\sigma_{y,i}}{\sigma_{\varepsilon,i}} \tag{4.15}$$

and mark this estimation with $\hat{s}_i = \hat{\sigma} y_i / \hat{\sigma}_{\varepsilon,i}$. The average standard deviation ratio is $S_N = (1/N)\sum_{i=1}^{N} S_i$, and the estimation is $\hat{S}_N = (1/N)\sum_{i=1}^{N} \hat{S}_i$. Before we proceed to the third stage, LLC reminds us that there are two items that should be noted. Firstly, the estimation for $\hat{\sigma}_{y,i}$ under a null hypothesis is $\hat{\sigma}_{\varepsilon,i}^2 / (1 - \sum_{i=1}^{pi} \hat{\rho}_{i,L})^2$, and as a result of $\hat{\sigma}_{\varepsilon,i}^2$ is a constant estimation for $\hat{\sigma}_{\varepsilon,i}^2$ under the null hypothesis, thus, $\hat{s}_i$ can be estimated with $\left|1 - \sum_{i=1}^{pi} \hat{\rho}_{i,L}\right|$. Secondly, the feature of size and power for panel unit root test is increased via first difference to estimate long term variance. In the null hypothesis for unit root, Schwert (1989) found long term estimation based on first difference has a smaller bias in a limited sample compared to long term variance based on residuals in level.

The third step in the LLC version of the panel unit root test is to estimate coefficient Φ and to calculate the value of statistic-*t* for panel. For this, combine all cross-section and time series observations to estimate,

$$\tilde{e}_{i,t} = \Phi \tilde{v}_{i,t-1} + \tilde{\varepsilon}_{i,t} \tag{4.16}$$

Based on the total of observations $N\tilde{T}$, where $\tilde{T} = T - \bar{g} - 1$ is the average of the number of observations per individual in the panel, and $\bar{p} = \frac{1}{N}\sum_{i=1}^{N} p_i$ is the average interval for individual ADF regression. The conventional statistic-*t* regression to test $\Phi = 0$ is:

$$t_{\Phi} = \frac{\hat{\Phi}}{STD(\hat{\Phi})} \tag{4.17}$$

where

$$\hat{\Phi} = \frac{\sum_{i=1}^{N}\sum_{i=2+pi}^{T} \tilde{v}_{i,t-1}\tilde{e}_{i,t}}{\sum_{i=1}^{N}\sum_{t=2+pi}^{T} \tilde{v}_{i,t-1}} \tag{4.18}$$

$$STD(\hat{\Phi}) = \Phi_{\tilde{\varepsilon}}^{2}\left[\sum_{i=1}^{N}\sum_{t=2+pi}^{T}\tilde{v}_{i,t-1}\right] \tag{4.19}$$

$$\Phi_{\tilde{e}}^{2} = \left[\frac{1}{N\tilde{T}}\sum_{i=1}^{N}\sum_{t=2+pi}^{T}(\tilde{e}_{i,t} - \hat{\Phi}\tilde{v}_{i,t-1})^{2}\right] \tag{4.20}$$

In the hypothesis H_0: Φ=0, LLC states that *t*-statistic regression (t_{Φ}) has a normal distribution for the ADF model without intercept and trend, but diverges to a negative for the ADF model with intercept and trend. Subsequently, the calculation of coordinated *t*-statistic is as below:

$$t_{\Phi}^{*} = \frac{t_{\Phi} N\tilde{T}\hat{S}_{N}\hat{\sigma}_{\tilde{\varepsilon}}^{-2} STD(\hat{\Phi})\mu_{m\tilde{T}}^{*}}{\sigma_{m\tilde{T}}^{*}} \tag{4.21}$$

where tabulated mean value is adjustment for $\mu_{m\tilde{T}}^{*}$ and standard deviation is adjustment $\mu_{M\tilde{T}}^{*}$ has been given by LLC with a deterministic specification (m=1,2,…) and time series dimension $\tilde{T}$.

Levin *et al*. (2002) state that limited tabulation for corrected statistics if normal where $N \to \infty$ and $T \to \infty$ with $\sqrt{N/T} \to 0$ or $N/T \to 0,$ depends on the model specification. Furthermore, the Monte Carlo simulation shows that this test is still suitable for a moderate-sized panel (value of *N* is between 10 and 250 individuals and *T* between a span of 20 and 250) whereby they are almost similar with panel data for this study. Generally, the LLC test has been accepted as one of the panel unit root test. However, it should be mentioned that this LLC test has a homogenity limitation, where a null hypothesis is $\Phi_i = \Phi = 0$ versus alternative hypothesis $\Phi_i < 0$ for all individual units *i*.

4.3.3 Im, Pesaran and Shin (IPS; 1997)

Im, Pesaran and Shin (1997) denoted IPS proposed a test for the presence of unit roots in panels that combines information from the time series dimension with that from the cross section dimension, such that fewer time observations are required for the test to have power. Since the IPS test has been found to have superior test power by researchers

in economics to analyze long-run relationships in panel data, we will also employ this procedure in this study.

The advantage of the IPS method over previous panel unit root tests is that it allows the data generating processes to vary across countries with respect to ADF coefficients and error structures. This can be particularly important with respect to the number of lagged difference terms in the ADF equation. As with univariate tests, where setting the lag length can be a critical step in appropriate implementation, our experimentation suggests that it is important for the IPS test to allow the lag length to vary across countries rather than imposing a uniform lag length (McCoskey and Selden, 1998).

Another advantage of the IPS test is to allow for heterogeneity in the value of ρ_i under the alternative hypothesis. The IPS tests allow for individual unit root processes so that ρ_i may vary across cross-sections. All the tests are characterized by combining individual unit root tests to derive a panel-specific result.

IPS begins by specifying a separate ADF regression for each cross-section with individual effects and no time trend:

$$\Delta y_{it} = \alpha_i + \rho_i y_{i,t-1} + \sum_{j=1}^{p_i} \beta_{ij} \Delta y_{i,t-j} + \varepsilon_{it} \tag{4.22}$$

The null hypothesis may be written as, $H_0 : \rho_i = 0, \text{for all } i = 1,\ldots N$, While the alternative hypothesis is given by:

$$H_1 : \begin{cases} \rho_i = 0 & for \quad i = 1, 2, ..., N_1 \\ \rho_i < 0 & for \quad i = N+1, N+2, ..., N, with\ 0 < N_1 \leq N. \end{cases} \tag{4.23}$$

IPS use separate unit root tests for the *N* cross-section units. Their test is based on the Augmented Dickey-fuller (ADF) statistics averaged across groups. After estimating the separate ADF regressions, the average of the *t*-statistics for p_1 from the individual ADF regressions, $t_{iT_i}(p_i)$:

$$\bar{t}_{NT} = \frac{1}{N}\sum_{i=1}^{N} t_{iT}(p_i \beta_i) \tag{4.24}$$

is then adjusted to arrive at the desired test statistics. Under the crucial assumption of cross-sectional independence, this statistic is shown to sequentially converge to a normal distribution when *T* tends to infinity, followed by *N*. A similar result is conjectured when *N* and *T* tend to infinity while the ration *N/T* tends to a finite non-negative constant (Hurlin, 2004).

In order to propose a standardization of the $\bar{t}$ statistic, IPS has to compute the value of $E(\bar{t}_{iT}(p_i, \beta_i))$ and $Var\ (\bar{t}_{iT}(p_i, \beta_i))$.The standardization of the $\bar{t}_{iT}$ statistic using the means and variances of $t_{iT}(p_i, 0)$ evaluated by simulation under the null $\rho_i = 0$. IPS shows that a properly standardized $\bar{t}_{NT}$ statistic, denoted $W_{\bar{t}_{NT}}$, has an asymptotic standard

normal distribution under the null of non stationarity along the diagonal $N/T \to k$, with $k > 0$:

$$W_{\bar{t}_{NT}} = \frac{\sqrt{N}\left(\bar{t}_{NT} - N^{-1}\sum_{i=1}^{N} E(\bar{t}_{iT}(p_i,0)|\rho_i = 0)\right)}{\sqrt{N^{-1}\sum_{i=1}^{N} Var\,(\bar{t}_{iT}(p_i,0)|\rho_i = 0)}} \underset{T,N\to\infty}{\overset{d}{\to}} N(0,1) \qquad (4.25)$$

The expressions for the expected mean and variance of the ADF regression *t*-statistics, $E(\bar{t}_{iT}(p_i,\beta_i))$ and $Var\,(\bar{t}_{iT}(p_i,\beta_i))$, are provided by IPS for various values of T and p and differing test equation assumptions. The IPS test statistic requires specification of the number of lags and the specification of the deterministic component for each cross-section ADF equation.

4.4 Cointegration Tests

Conventional cointegration tests tend to suffer from unacceptably low power especially when applied to a series of moderate length. Therefore, we used panel data methodology to address this issue by making available more information by pooling data across individual countries. Panel cointegration test allows for selective pooling of information regarding common long-run relationships from across the panel while allowing the associated short run dynamics and fixed effects to be heterogenous across different members of the panel (Kumari, 2004).

4.4.1 Panel Cointegration Tests

The next step is to test for the existence of a long-run relationship among real per capita GDP growth rates and the independent variables. For panel cointegration, the tests suggested by Pedroni (1999, 2004) are employed. We will make use of seven panel cointegrations by Pedroni (1999, 2004), since he determines the appropriateness of the tests to be applied to estimated residuals from a cointegration regression after normalizing the panel statistics with correction terms.

Pedroni (1999, 2004) extends the Engle and Granger (1987) two step strategies to panels and rely on ADF and PP principles. First, the cointegration equation is estimated separately for each panel member. Second, the residuals are examined with respect to the unit root feature. If the null hypothesis is rejected, the long-run equilibrium exists, but the cointegration vector may be different for each cross section. In addition, deterministic components are allowed to be individual specific. The residuals are pooled either along the within or the between dimension of the panel, giving rise to the panel and group mean statistics (Pedroni, 1999). In the case of the panel statistics the first order autoregressive parameter is restricted to be the same for all cross sections. If the null is rejected, the parameter is smaller than 1 in absolute value, and the variables in question are cointegrated for all panel members. In the group statistics, the autoregressive parameter is allowed to vary over the cross section, as the statistics amount to the average of individual statistics. If the null is rejected, cointegration holds at least for one individual. Hence, group tests offer an additional source of heterogeneity among the panel members (Dreger and Reimers, 2005). To a certain limit, the statistics

are distributed as standard normal with a left hand side rejection area, except for the variance ratio test, which is right sided. Standardization factors arise from the moments of Brownian motion functionals. The factors depend on the number of regressors and whether or not constants or trends are included in the cointegration relationships.

The procedures proposed by Pedroni make use of estimated residual from the hypothesized long-run regression of the following form (Pedroni, 1999):

$$y_{i,t} = \alpha_i + \delta_i t + \beta_{1i} x_{1i,t} + \beta_{2i} x_{2i,t} + \ldots + \beta_{Mi} x_{Mi,t} + e_{i,t} \tag{4.26}$$

for $t = 1,.....,T;\ i = 1,....,N;\ m = 1,\ ...., M,$

where T is the number of observations over time, N number of cross-sectional units in the panel, and M number of regressors. In this set up, α_i is the member specific intercept or fixed effects parameter which varies across individual cross-sectional units. The same is true of the slope coefficients and member specific time effects, $\delta_i t$.

The tests for the null of no cointegration are based on testing whether the error process e_{it} is stationary. This is achieved by testing whether $\rho_i = 1$ in:

$$\hat{e}_{it} = \rho_i \hat{e}_{it-1} + v_{it} \tag{4.27}$$

Pedroni (1999) has proposed seven tests which can be divided into two groups of panel cointegration statistics designed to test the null hypothesis of cointegration between the

variables in Equation (4.27) against the alternative hypothesis of cointegration. Gutierrez (2003) states that the first category of four statistics we consider is what Pedroni labels as within-dimension statistic or Panel *t*-statistic which includes a variance ratio statistic, a non-parametric Philips and perron type ρ-statistic, a non-parametric Phillips and Perron type *t*-statistic and a Dickey-Fuller type *t*-statistic. The second category of three panel cointegration statistics is defined as a between-dimension statistic or Group *t*-statistic including a Phillips and Perron type ρ-statistic, a non-parametric Phillips and Perron type *t*-statistic and finally an Augmented Dickey-Fuller type *t*-statistic.

The first category of test uses the following specification of null and alternative hypothesis,

$$H_0 : \rho = 1, \qquad H_1 : \rho < 1. \tag{4.28}$$

While the second category of tests uses

$$H_0 : \rho_i = 1, \qquad H_1 : \rho_i < 1 \text{ for all } i. \tag{4.29}$$

Pedroni (1999) proposes the heterogeneous panel and heterogeneous group mean panel test statistics to test for panel cointegration as follows:

1. Panel *v*-statistic:

$$T^2 N^{3/2} Z_{\hat{v},N,T} = T^2 N^{3/2} \left(\sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{11i}^{-2} \hat{e}_{i,t-1}^2 \right)^{-1} \tag{4.30}$$

2. Panel ρ-Statistic:

$$T\sqrt{N}Z_{\hat{\rho}N,T-1} = T\sqrt{N}\left(\sum_{i=1}^{N}\sum_{t=1}^{T}\hat{L}_{11i}^{-2}\hat{e}_{i,t-1}^{2}\right)^{-1}\sum_{i=1}^{N}\sum_{t=1}^{T}\hat{L}_{11i}^{-2}\left(\hat{e}_{i,t-1}\Delta\hat{e}_{i,t}-\hat{\lambda}_i\right) \tag{4.31}$$

3. Panel *t*-Statistic (non-parametric):

$$Z_{tN,T} = \left(\tilde{\sigma}_{N,T}^{2}\sum_{I=1}^{N}\sum_{T=1}^{T}\hat{L}_{11i}^{-2}\hat{e}_{i,t-1}^{2}\right)^{-1/2}\sum_{i=1}^{N}\sum_{t=1}^{T}\hat{L}_{11i}^{-2}\hat{e}_{i,t-1}^{2}\left(\hat{e}_{i,t-1}\Delta\hat{e}_{i,t}-\hat{\lambda}_i\right) \tag{4.32}$$

4. Panel t-Statistic (parametric):

$$Z_{tN,T}^{*} = \left(\tilde{s}_{N,T}^{2}\sum_{i=1}^{N}\sum_{t=1}^{T}\hat{L}_{11i}^{-2}\hat{e}_{i,t-1}^{*2}\right)^{-1/2}\sum_{i=1}^{N}\sum_{t=1}^{T}\hat{L}_{11i}^{-2}\hat{e}_{i,t-1}^{*}\Delta\hat{e}_{i,t}^{*} \tag{4.33}$$

5. Group ρ-Statistic:

$$TN^{-1/2}\tilde{Z}_{\hat{\rho}N,T^{-1}} = TN^{-1/2}\sum_{i=1}^{N}\left(\sum_{t=1}^{T}\hat{e}_{i,t-1}^{2}\right)^{-1}\sum_{t=1}^{T}\left(\hat{e}_{i,t-1}\Delta\hat{e}_{i,t}-\hat{\lambda}_i\right) \tag{4.34}$$

6. Group *t*-Statistic (non-parametric);

$$N^{-1/2}\tilde{Z}_{tN,T^{-1}} = N^{-1/2}\sum_{i=1}^{N}\left(\sum_{t=1}^{T}\hat{e}_{i,t-1}^{2}\right)^{-1/2}\sum_{t=1}^{T}\left(\hat{e}_{i,t-1}\Delta\hat{e}_{i,t}-\hat{\lambda}_i\right) \tag{4.35}$$

7. Group t-Statistic (parametric):

$$N^{-1/2}\tilde{Z}_{tN,T}^{*} = N^{-1/2}\sum_{i=1}^{N}\left(\sum_{t=1}^{T}\hat{s}_i^{*2}\hat{e}_{i,t-1}^{*2}\right)^{-1/2}\sum_{t=1}^{T}\hat{e}_{i,t-1}^{*}\Delta\hat{e}_{i,t}^{*} \tag{4.36}$$

where

$$\hat{\lambda}_i = \frac{1}{T}\sum_{s=1}^{k_i}\left(1-\frac{s}{k_i+1}\right)\sum_{t=s+1}^{T}\hat{\mu}_{i,t}\hat{\mu}_{i,t-s}, \tag{4.37}$$

$$\hat{s}_i^2 = \frac{1}{T}\sum_{t=1}^{T}\hat{\mu}_{i,t}^2, \quad \hat{\sigma}_i^2 = \hat{s}_i^2 + 2\hat{\lambda}_i, \tag{4.38}$$

$$\tilde{\sigma}_{NT}^2 = \frac{1}{T}\sum_{t=1}^{T}\hat{L}_{11i}^2\hat{\sigma}_i^2, \quad \hat{s}_i^{*2} = \frac{1}{T}\sum_{t=1}^{T}\hat{\mu}_{i,t}^{*2} \tag{4.39}$$

$$\tilde{s}_{N,T}^{*2} = \frac{1}{N}\sum_{i=1}^{N}\hat{s}_i^{*2} \tag{4.40}$$

and

$$\hat{L}_{11i}^2 = \frac{1}{T}\sum_{t=1}^{k_i}\hat{\eta}_{i,t}^2 + \frac{2}{T}\sum_{T=1}^{T}\left(1-\frac{s}{k_i+1}\right)\sum_{t=s+1}^{T}\hat{\eta}_{i,t}\hat{\eta}_{i,t-s} \tag{4.41}$$

and where the residuals $\hat{\mu}_{i,t}$, $\hat{\mu}_{i,t}^{*}$, and $\hat{\eta}_{i,t}$ are obtained from the following regressions:

$$\hat{e}_{i,t} = \hat{\gamma}_i\hat{e}_{i,t-1} + \hat{\mu}_{i,t} \tag{4.42}$$

$$\hat{e}_{i,t} = \hat{\gamma}_i\hat{e}_{i,t-1} + \sum_{k=1}^{K_i}\hat{\gamma}_{i,k}\Delta\hat{e}_{i,t-k} + \hat{\mu}_{i,t}^{*} \tag{4.43}$$

and

$$\Delta y_{i,t} = \sum_{m=1}^{M}\hat{b}_{mi}\Delta x_{mi,t} + \hat{\eta}_{i,t} \tag{4.44}$$

Δ is the first difference operator. Pedroni suggests some adjustments for each of all test statistics (both for panel unit root tests and panel cointegration tests) described above that produces standard normal distributions (Hatemi and Irandoust, 2005).

According to Pedroni, those seven test statistics can be rescaled so that they are distributed as standard normal. The standardization of the cointegration statistics can be expressed as

$$\frac{K_{NT} - \mu\sqrt{N}}{\sqrt{\nu}} \Rightarrow N(0,1) \tag{4.45}$$

Where K_{NT} is the standardized form of the test statistic with respect to N and T. The value of the mean (μ) and the variance (ν) are tabulated in Pedroni (1999). The values of the normalized statistics are to be compared to the critical values implied by a one-tailed standard normal distribution. Consequently for the panel variance test the right tail of the standard normal distribution (large positive value) is used to reject the null of no cointegration and for the other six tests the left tail is used (large negative value imply rejection of the null).

Harris and Sollis (2003) argue that in practice it is possible for different tests to give contradicting conclusions. Choosing which test is more appropriate is not easy. The groups mean tests particular strength is that they are less restrictive. Regarding the best way to correct for autocorrelation, non parametric tests are likely to be more robust to outliers but have poor size properties and tend to over-reject the null when it is true. The ADF-type tests have better power if the errors follow an autoregressive process. Therefore, we followed from the other researcher that we report the adjusted values so that in all cases the reported test values can be compared to the standard normal distribution. This is the case for both the cointegration and unit root tests.

4.4.2 Fully Modified Ordinary Least Squares (FMOLS) Estimation

The analysis up to now has ignored potential unit-root non-stationarity features of the variables in Equation (4.3). This is the standard approach in the gravity literature. Because lnY_{ijt} is the trade variable between country ***i*** (AMU, EU and ME) and country *j* at time *t*; $lnGDP_{it}$ is a measure of income of country ***i*** at time *t*; $lnGDP_{jt}$ is a measure of income of country *j* at time *t*; $lnPOP_{it}$ and $lnPOP_{jt}$ are local and target populations, are presumably nonstationary, we have thus essentially implicitly approximated the distribution of the estimator by the asymptotic distribution for an infinite cross-section dimension N but a finite time dimension T.

For instance, if the three variables are non-stationary and cointegrated, which seems quite plausible from an economic point of view, the limiting variance of the least squares estimator of the cointegrating vector depends on the long run covariance between changes in the regressors ΔlnY_{ijt}, $\Delta\ lnGDP_{ijt}$ and $\Delta lnPOP_{ijt}$ and the error term ε_{ijt}, which invalidates standard inference (Mark and Sul, 2003). Even though we are ultimately interested in the euro estimate and not in cointegrating vector estimation, problems regarding the latter may carry over to the trade estimate. Therefore, this section investigates the non-stationarity and whether it affects the estimated trade effect.

To solve the resulting least squares inference problems mentioned earlier, one can use fully modified OLS (FMOLS) techniques for panel data (Kao and Chiang, 2000). In this section we adopt FMOLS procedure from Christopoulos and Tsionas (2003, 2004). In

order to obtain a symptotically efficient consistent estimates in panel series, non-exogeneity and serial correlation problems are tackled by employing fully modified OLS (FMOLS) introduced by Pedroni (1996). Since the explanatory variables are cointegrated with a time trend, and thus a long-run equilibrium relationship exists among these variables through the panel unit root test and panel cointegration test, we proceed to estimate the Equation (4.7) by the method or fully modified OLS (FMOLS) for heterogenous cointegrated panels (Pedroni, 1996, 2000). This methodology allows consistent and efficient estimation of cointegration vector and also addresses the problem of non-stationary regressors, as well as the problem of simultaneity biases. It is well known that OLS estimation yields biased results because the regressors are endogenously determined in the *I*(1) case. The starting point OLS as in the following cointegrated system for panel data:

$$y_{it} = \alpha_i + x'_{it}\beta + e_{it} \tag{4.46}$$

$$x_{it} = x_{i,t-1} + \varepsilon_{it}$$

where $\xi_{it} = [e_{it}, \varepsilon'_{it}]$ is the stationary with covariance matrix Ω_i. The estimator β will be consistent when the error process $\omega_{it} + [e_{it}, \varepsilon'_{it}]'$ satisfies the assumption of cointegration between y_{it} and x_{it}. The limiting distribution of OLS estimator depends upon nuisance parameters. Following Phillips and Hansen (1990) a semi-parametric correction can be made to the OLS estimator that eliminates the second order bias caused by the fact that the regressors are endogenous. Pedroni (1996, 2000) follows the same principle in the

panel data context, and allows for the heterogeneity in the short run dynamics and the fixed effects. FMOLS Pedroni's estimator is constructed as follow:

$$\hat{\beta}_{FM} - \beta = \left(\sum_{i=1}^{N} \hat{\Omega}_{22i}^{-2} \sum_{t=1}^{T} (x_{it} - \hat{x}_t)^2 \right)^{-1} \sum_{i=1}^{N} \hat{\Omega}_{11i}^{-1} \hat{\Omega}_{22i}^{-1} \left(\sum_{t=1}^{T} \left(x_{it} - \bar{x}_t \right) e_{it}^* - T\hat{\gamma}_i \right)$$

(4.47)

$$\hat{e}_{it}^* = e_{it} - \hat{\Omega}_{22i}^{-1} \hat{\Omega}_{21i}, \qquad \hat{\gamma}_i = \hat{\Gamma}_{21i} + \hat{\Omega}_{21i}^0 - \hat{\Omega}_{22i}^{-1} \hat{\Omega}_{21i} \left(\hat{\Gamma}_{22i} + \hat{\Omega}_{22i}^0 \right)$$

where the covariance matrix can be decomposed as $\Omega_i = \Omega_i^0 + \Gamma_i + \Gamma_i$ where Ω_i^0 is the contemporaneous covariance matrix, and Γ_i is a weighted sum of autocovariances. Also, $\hat{\Omega}_i^0$ denotes an appropriate estimator of Ω_i^0.

In this study, we employed both the within-dimension and between-dimension panel FMOLS test from Pedroni (1996, 2000). An important advantage of the between-dimension estimators is that the form in which the data is pooled allows for greater flexibility in the presence of heterogeneity of the cointegrating vectors. Specifically, whereas test statistics constructed from the within-dimension estimators are designed to test the null hypothesis $H_0 : \beta_i = \beta_0$ for all I against the alternative hypothesis $H_A : \beta_i = \beta_A \neq \beta_0$ where the value β_A is the same for all *i*, test statistics constructed from the between-dimension estimators are designed to test the null hypothesis $H_0 : \beta_i = \beta_0$ for all *i* against the alternative hypothesis $H_A : \beta_i \neq \beta_0$, so that the values for β_i are not constrained to be the same under the alternative hypothesis. Clearly, this is

an important advantage for applications such as the present one, because there is no reason to believe that, if the co-integrating slopes are not equal to one, which they necessarily take on some other arbitrary common value. Another advantage of the between-dimension estimators is that the point estimates have a more useful interpretation in the event that the true co-integrating vectors are heterogeneous. Specifically, point estimates for the between-dimension estimator can be interpreted as the mean value for the cointegrating vectors. This is not true for the within-dimension estimators (Pedroni, 2001).

4.5 Data and Choice of Variables

The data set consists of a panel of observations for five Arab Maghreb Union (AMU) countries, namely Algeria, Libya, Mauritania, Morocco and Tunisia for the period 1989-2009. The data set also consist of a panel of observation for selected European Union (EU) namely Italy, Spain and France and selected Middle East (ME) namely Egypt, Lebanon and Syria for the years 1989-2009.

For the empirical application, we follow the broad specification and data sets of Egger and Pfaffermayr (2003). The variables used are:

- Dependent variable:

  Trade (export plus import) flow from country i to j in period *t* ; source: *IMF Direction of Trade Yearbook, World Bank World Tables.*

- Explanatory variables (i.e. those variables chosen to enter X_{it} in the basic specification):

- Real Gross Domestic Products of exporter and importer (GDP_{ij} and GDP_{jt} respectively); source: World Bank World Development Indicators.
- Local and target populations (POP_{ij} and POP_{jt}); source: World Bank World Development Indicators.
- Target country's foreign currency reserves (FCR_{ijt}); source: IMF International Financial Statistics.
- The real exchange rate between the two countries (RER_{ijt}), defined as units of foreign currency per unit of domestic currency; source: World Bank World Development Indicators.
- Distance between the two countries in nautical miles (DIS_{ij}); the average length of the shipping routes (source: http://www.ports.com)
- The most basic measure of trade intensity is the so-called ''trade openness'' ($OPENNESS_{ij}$); that is the ratio of exports plus imports to GDP
- Dummy variables for trading partners sharing a common language. The ability to communicate in a common language is predicted to reduce the costs of trade. We use measure for English as a common language (LAN_{ij}). The Language dummy variable takes the value of one if the English language is used, otherwise zero.
- Dummy variables which evaluate the effects of preferential trading agreements ($AGMT_{ij}$) - Pan-Arab Free Trade Agreement (PAFTA), following numerous attempts to foster intra-regional integration in the recent decades. The AGMT dummy variable takes the value one if the PAFTA take place, otherwise zero. In addition, how to interpret this dummy and to

estimate the variables are crucial where the estimated coefficient for this variable measures the degree to which AMU trade with each other. For example, if the coefficient on the AGMT dummy is positive and significant, then the PAFTA is judged to expand mutual two-way trade between both countries.

4.6 Conclusion

This chapter laid out the details pertaining to the research approach. Basically, the study deployed mixed methods of quantitative and qualitative approaches in data collection, thus forming a triangulation, minimizing errors which are likely to occur in individual approaches. The Gravity model which is the research model is also extensively discussed in this chapter. Techniques for analysis of data and other measures were clearly outlined. In the next chapter, analysis of data and research findings are discussed.

CHAPTER 5

RESULTS OF GRAVITY MODEL

5.1 Introduction

This chapter discusses the major findings for all various regression models used in the study. Possible explanations for the findings are discussed in each section, along with their implications. This chapter concludes discussion of the relationship of the findings to the theoretical model proposed in Chapter 4.

5.2 Analysis of Intra-Trade among AMU Countries

The estimation results for Equation 4.3 are presented in Table 5.1 to Table 5.5 including the five Arab Maghreb Union (AMU) countries namely Algeria, Libya, Mauritania, Morocco and Tunisia. These tables present the intra-trade among the AMU countries. Each Tables show the results of the pooled model are in the second column, while those of fixed effects and random effects models are in the third and fourth columns. The main problem of the pooled model is that it does not allow heterogeneity of countries. It does not estimate country specific effects and assumes that all countries are homogenous. It is a restricted model (Eita, 2008).

Fixed effects model introduces heterogeneity by estimating country specific effects. It is an unrestricted model as it allows the intercept and other parameters to vary across

trading partners. The F-test statistic was performed to test whether countries are able to pool and the results indicate that the null hypothesis of equality of individual effects is rejected. This means that a model with individual effects must be selected.

Like the fixed effects, the random effects model also acknowledges heterogeneity in the cross-section. However, it differs from the fixed effects model in the sense that the effects are generated by a specific distribution. Although it assumes that there is heterogeneity in the cross-section, it does not model each effect explicitly. This prevents the loss of degrees of freedom which happens in fixed effects model. The LM test was performed and the null hypothesis of equality of the individual effects is rejected in favour of random effect specification.

The Hausman statistic is used to test the null hypothesis that the regressors and individual effects are not correlated in order to distinguish between fixed effects model and random effects model. Failure to reject the null hypothesis implies that the random effects model will be preferred. If the null hypothesis is rejected, the fixed effects model will be appropriate. The Hausman test statistic shows that the null hypothesis is rejected and this indicates that country specific effects are correlated with regressors. This suggests that the fixed effects model is appropriate, and the random effects estimates are not consistent. Since the fixed effects model is the appropriate one, interpretation of the results will focus on the fixed effects model (Eita, 2008).

Table 5.1 shows the intra-trade between Algeria and the others AMU countries namely Libya, Mauritania, Morocco, and Tunisia. The Hausman specification test statistic shows that the null hypothesis is fail to reject and indicated that there was no systematic

difference between fixed and random models, whereby confirmed that the random effects estimator was efficient in our empirical framework for intra-trade between Algeria and among others AMU countries.

Table 5.1
Algeria – Dependent variable: lnY_{ijt} (Trade)

Variables	Pooled Model	Fixed Effects Model	Random Effects Model
$Constant$	-882.277***(-4.89)	-222.782**(-2.07)	-581.277***(-4.21)
$lnGDP_{it}$	2.049*** (3.58)	0.514***(2.94)	1.049***(4.80)
$lnGDP_{jt}$	-0.557(0.36)	-0.009(-0.11)	-0.054 (-0.36)
$lnPOP_{it}$	2.561***(3.86)	69.341**(2.19)	1.551**(2.86)
$lnPOP_{jt}$	44.845***(4.52)	76.799** (2.30)	34.245***(4.02)
$lnDINS_{ij}$	-2.955***(-7.67)		-1.715***(-7.44)
$lnFCR_{ij}$	0.661***(3.91)	0.085(0.69)	0.601**(2.93)
$lnRER_{ij}$	0.986 (0.55)	0.393(0.88)	0.186(0.25)
$lnOPENNESS_{ij}$	0.233*** (7.33)	0.026***(4.71)	0.0438*** (11.03)
$AGMT_{ij}$	-2.453***(7.54)	-0.633 (-1.40)	-2.083***(-8.76)
LAN_{ij}	0.124*(1.90)	0.165 (0.37)	0.124(0.25)
F Test		10.46***[0.000]	
LM Test			1.47[0.226]
Hausman Test		5.34[0.253]	
Time Fixed Effect		1.04[0.236]	
R-squared	0.852	0.732	0.932
Number of Observation	84	84	84

Notes: *** indicates significant at 1%, ** indicates significant at 5%, and * indicates significant at 10%; t-statistics are in parentheses ( ) and p-value are in [ ].

The results show that an increase in the foreign GDP ($lnGDP_{it}$) causes an increase in Algeria's trade. The coefficient for this variable is positive by 1.049 in random effects model and statistically significant at 1 per cent level as expected and in line with the previous literature on trade (see, for example, Cheng and Wall, 2002, and Serlenga and Shin, 2004). It suggests that the demand-side "pull" effects of foreign output dominate the supply-side effects of domestic output. On the overall this indicates that an increase in foreign GDP causes Algeria trade to increase. On the other hand, domestic GDP is not statistically significant, that means we found the domestic GDP not causes Algeria trade to increase.

The population coefficients of foreign country ($lnPOP_{it}$) and domestic population ($lnPOP_{jt}$) are positive sign coefficient by 1.511 and 34.245 in random effects model, and strongly significant at 1 per cent level. These positive sign indicates that the country size is directly related to trade. These results are consistent with Martines-zarzoso (2003) who was studied on Gravity Model: An Application to Trade between Regional Blocs found that from the year 1991 onwards, the sign is positive which point towards the growing importance of the role played by scale economies and market-size effects in international trade models.

The distance variable ($lnDINS_{ij}$) is intended as a proxy for transportation cost. The distance variable in the random effects model and pooled model has the right sign in the sense that increased trade is negatively correlated with distance. The coefficient is -1.715 and statistically significant at 1 per cent level. It indicates that this variable may

hide the fact that the transaction costs of trading in Algeria in respect of distance are far higher than the others AMU countries. Even though we found a statistically significant negative affect here, the magnitude of both the economic and statistically effect is drastically reduced from what we found in the literature (Rose, 2005).

The real exchange rate($lnRER_{ij}$) has positive coefficient but an insignificant coefficient, implying that it does not have an impact on trades. The foreign currency reserves ($lnFCR_{ij}$) is typically positive coefficient; 0.601 in random effects model and statistically significant at 1 per cent. This result is consistent with previous evidence (Harris and Matyas, 2001, Egger and Pfaffermayr, 2003, and Serlenga and Shin, 2004).

The study takes a particular interest in how both exporters and importer respond to trade openness. As expected, trade and Openness ($lnOPENNESS_{ij}$) are correlated significantly and positively with each other. The coefficient is 0.0438 in random effects model and statistically significant at 1 per cent level. Given the strong and positive relationship between trade intensity ratios and growth, the existence of a significant correlation between trade and Openness indicates that Openness is fairly effective for increasing trade.

The interpretation of the coefficients on the integration dummy variables is also relevant for our analysis. The regression results in Table 5.1 are consistent with the predictions of theoretical studies, rather than the conventional view on the issue. The random effects model column shows report that a significant and negative relationship between

trade and agreement($AGMT_{ij}$) among Algeria and the others AMU countries. The coefficient of the agreement($AGMT_{ij}$) are -2.083 in random effects model. Since the model is log-linear, the impact of AGMT on bilateral trade can be computed in percentage terms as 100 x [exp(β_{AGMT}) – 1.00] or 100 x [0.12455 – 1.00] = -87.54%. This indicates that with the AGMT agreement, the percentage reduction of trade between Algeria and other four AMU countries is 87.54%. On the other hand, Libya, Mauritania and Tunisia demonstrate trade expansion by signing the PAFTA.

Table 5.1 also show that the fixed effects model doesn't have any significant effect between trade and agreement. The estimated coefficient of lagged English language (LAN_{ij}), is not significant in random effects model.

The Goodness of fit reflected by the R-square, as well as the total number of observations are given in the final rows. The overall goodness of fit of four estimation of the gravity model can be concluded that the specified models explain the variety in trade flows to a sufficient extends. Time fixed effects are needed if the independent variables for all are equal to 0, if they are, then no time fixed effects are needed. In Table 5.1, we fail to reject the null that all years coefficients are jointly equal to zero which is 3.17. Therefore time fixed effects are not needed in this model.

Table 5.2 shows the intra-trade between Algeria and the others AMU countries namely Algeria, Mauritania, Morocco, and Tunisia. The Hausman specification test statistic shows that the null hypothesis fail to reject and indicate that there was no systematic

difference between fixed and random models, thereby confirmed that the random effects estimator was efficient in our empirical framework for intra-trade between Libya and among others AMU countries.

Table 5.2
Libya – Dependent variable: Trade

Variables	Pooled Model	Fixed Effects Model	Random Effects Model
$Constant$	-32.753 (-1.46)	94.9611 (0.72)	-35.953 (-1.06)
$lnGDP_{it}$	0.823** (2.64)	-0.203(-0.87)	0.8553*** (2.96)
$lnGDP_{jt}$	0.2911* (1.86)	0.115 (0.67)	0.3903* (1.64)
$lnPOP_{it}$	1.389*** (5.34)	8.010 (0.92)	1.659*** (4.49)
$lnPOP_{jt}$	4.441*** (2.96)	1.700 (0.98)	5.341** (2.41)
$lnDINS_{ij}$	-1.132*** (-6.25)		-1.892*** (-7.38)
$lnFCR_{ij}$	0.437 *** (5.00)	0.3487* (1.70)	0.338*** (5.25)
$lnRER_{ij}$	2.100*** (3.61)	1.509** (2.24)	2.430*** (3.31)
$lnOPENNESS_{ij}$	9.226*** (20.06)	9.585*** (37.67)	9.616*** (39.49)
$AGMT_{ij}$	0.233*** (5.32)	0.370** (2.72)	0.313** (2.58)
LAN_{ij}	-0.139 (-1.12)	-0.168 (-0.80)	-0.249 (-1.46)
F Test		1.82 [0.1512]	
LM Test			2.10 [0.1474]
Hausman Test		5.46 [0.7924]	
Time Fixed Effect		1.43 [0.2433]	
R-squared	0.9938	0.8737	0.9634
Number of Observation	84	84	84

Notes: *** indicates significant at 1%, ** indicates significant at 5%, and * indicates significant at 10%; t-statistics are in parentheses ( ) and p-value are in [ ].

The results show that an increase in the foreign GDP ($lnGDP_{it}$) and domestic GDP ($lnGDP_{jt}$) causes an increase in Libya's trade. The coefficient for both variables are positive by 0.8553 and 0.3903 in random effects model and statistically significant at 1 per cent and 10 per cent level, as expected and in line with the previous literature on trade. Overall, this indicates that an increase in foreign GDP and domestic GDP causes Libya trade to increase. The results also show that foreign GDP and domestic GDP are

an insignificant in the fixed effect. The results are in line with those found in other gravity model studies suggesting that the results are consistent. These results also show that foreign GDP in Libya have the same impact in Algeria to the trades through the intra-trade between Algeria and others AMU countries as well as Libya and others AMU countries.

The population coefficients of foreign country ($lnPOP_{it}$) and domestic population ($lnPOP_{jt}$) are positive sign coefficient by 1.659 and 5.341 in random effects model and strongly significant at 1 per cent level. Population as gravitational variables are expected to have a positive sign. This reflects that countries with large GDP have more goods to trade and greater demand for good to import and export. These results also show that population of foreign country and domestic population in Libya have the same impact in Algeria to the trades through the intra-trade between Algeria as well as Libya and others AMU countries.

The distance variable ($lnDINS_{ij}$) in the random effects model has the right sign in the sense that increased trade is negatively correlated with distance. The coefficient is -1.892 and statistically significant at 1 per cent level. It is indicate that this variable may hide the fact that the transaction costs of trading in Libya in respect of distance are far higher than other AMU countries. This result consistent with Alam et al. (2009) stated that geographical distance has significant impact on imports of Bangladesh which means transport costs and other transaction costs, such as, the probability of surviving intact of perishable goods etc. still have significant impacts on its import. The result of the

distance in Libya also had the same impact in Algeria in term of a resistance factor and has a negative impact on volume of intra-trade.

Libya's real exchange rate ($lnRER_{ij}$) has positive coefficient by 2.430 and statistically significant at 1 per cent level, implying that it have an impact on trades. The foreign currency reserves ($lnFCR_{ij}$) are typically positive coefficient by 0.338 in and statistically significant at 1 per cent level. This result is consistent with previous evidence. The results show that the real exchange rate and the foreign currency reserves are akin to a price variable in the trade demand schedule.

As expected, trade and Openness ($lnOPENNESS_{ij}$) are correlated significantly and positively with each other. The coefficient of the openness is 9.616 and statistically significant at 1 per cent level. Given the strong and positive relationship between trade intensity ratios and growth, the existence of a significant correlation between trade and Openness indicates that Openness is fairly effective for increasing trade.

The interpretation of the coefficients on the integration dummy variables is also relevant for our analysis. The regression results in Table 5.2 are consistent with the predictions of theoretical studies, rather than the conventional view on the issue. Reports on the random effects model column show a significant and positive relationship between trade and agreement ($AGMT_{ij}$) among Libya and the others AMU countries. The coefficient is 0.313 and statistically significant at 1 per cent level. Since the model is log-linear, the impact of AGMT on bilateral trade can be computed in percentage terms as 100 x

[exp(β_{AGMT}) − 1.00] or 100 x [1.36752 − 1.00] = 36.75%. This indicates that with the AGMT agreement, the percentage expansion of trade between Algeria and other four AMU countries is 36.75%. On the other hand, Libya, Mauritania and Tunisia demonstrate trade reduction by signing the PAFTA. The estimated coefficient of lagged English language (LAN_{ij}) is not significant. The Goodness of fit reflected by the R-square, as well as the total number of observations is given in the final rows. The overall goodness of fit of four estimation of the gravity model can be concluded that the specified models explain the variety in trade flows to a sufficient extends. Time fixed effects are needed if the independent variables for all are equal to 0, if they are then no time fixed effects are needed. In Table 5.2 we fail to reject the null that all years coefficients are jointly equal to zero which is 1.43. Therefore time fixed effects are not needed in this model.

Table 5.3
Mauritania – Dependent variable: Trade

Variables	Pooled Model	Fixed Effects Model	Random Effects Model
$Constant$	-690.563** (-2.12)	-551.172* (-2.01)	-690.563** (-2.36)
$lnGDP_{it}$	3.538* (1.76)	3.554** (6.90)	3.432*** (7.42)
$lnGDP_{jt}$	9.971*** (6.58)	9.962*** (9.68)	9.715*** (11.10)
$lnPOP_{it}$	1.036** (2.35)	2.479* (1.93)	1.067** (2.63)
$lnPOP_{jt}$	37.607* (1.93)	37.587* (1.93)	38.034** (2.08)
$lnDINS_{ij}$	-61.125** (-2.22)		-59.551*** (-3.21)
$lnFCR_{ij}$	1.199** (2.16)	1.162** (2.45)	1.210** (2.69)
$lnRER_{ij}$	1.425 (1.27)	1.567 (0.99)	1.644 (1.18)
$lnOPENNESS_{ij}$	11.169*** (28.73)	11.172*** (66.30)	11.143*** (71.49)
$AGMT_{ij}$	2.846*** (3.48)	2.806* (1.84)	3.465*** (5.16)

LAN_{ij}	0.794 (0.62)	0.392 (0.19)	0.794 (0.66)
F Test		0.05 [0.9861]	
LM Test			2.10 [0.1477]
Hausman Test		0.14 [0.9325]	
Time Fixed Effect		0.56 [0.6462]	
R-squared	0.9229	0.9815	0.9939
Number of Observation	84	84	84

Notes: *** indicates significant at 1%, ** indicates significant at 5%, and * indicates significant at 10%; t-statistics are in parentheses ( ) and p-value are in [ ].

Table 5.3 shows the intra-trade between Mauritania and the others AMU countries namely Algeria, Libya, Morocco, and Tunisia. The Hausman test statistic shows that the null hypothesis is rejected and this indicates that the country specific effects are correlated with regressors. This suggests that the random effects model is appropriate, and the fixed effects estimates are not consistent. That means the random effects model is the appropriate one for trade of exports between countries.

The results show that an increase in the foreign GDP ($lnGDP_{it}$) and domestic GDP ($lnGDP_{jt}$) causes an increase in Mauritania's trade. The coefficient for both variables are positive by 3.432 and 9.715 and statistically significant at 1 per cent level, as expected and in line with the previous literature on trade and also the results in Algeria and Libya. Overall this indicates that an increase in foreign GDP causes Mauritania trade to increase. The results are in line with those found in other gravity model studies suggesting that the results are consistent.

The results also show that the domestic population ($lnPOP_{jt}$) is positive sign coefficient by 38.034 and strongly significant at 5 per cent level. Population as gravitational variables are expected to have a positive sign. This reflects that countries with large GDP have more goods to trade and greater demand for good to import and export. On the other hand, the population coefficients of foreign country ($lnPOP_{it}$) have positive coefficient but not significant at any level (1.067). This means no impact on trades. In relation to the foreign and domestic population variables, we should point out that their role in the Gravity setting is generally considered to be ambiguous (Oguledo and MacPhee, 1994).

The distance variable ($lnDINS_{ij}$) in the random effects model has the right sign in the sense that increased trade is negatively correlated with distance. The coefficients are -59.551 and statistically significant at 1 per cent level. It indicates that this variable may hide the fact that the transaction costs of trading in Mauritania in respect of distance are far higher than the others AMU countries.

Mauritania's real exchange rate ($lnRER_{ij}$) have positive coefficient (1.644) but statistically an insignificant, implying that it have no impact on trades. The foreign currency reserves ($lnFCR_{ij}$) is typically positive coefficient by 1.210 and statistically significant at 5 per cent level. This result is consistent with previous evidence (Harris and Matyas, 2001, Egger and Pfaffermayr, 2003, and Serlenga and Shin, 2004). We can conclude that the reason could well be that these simply represent the accumulation of

trade flows combined with past exchange rate and the foreign currency reserves policies, rendering their effect on contemporaneous trade flows somewhat ambiguous.

In Table 5.3, trade and Openness ($lnOPENNESS_{ij}$) are correlated significantly and positively with each other. The coefficients are 11.143 and statistically significant at 1 per cent level. Given the strong and positive relationship between trade intensity ratios and growth, the existence of a significant correlation between trade and Openness indicates that Openness is fairly effective for increasing trade.

Table 5.3 also show that the random effects model column report show a negative relationship between trade and agreement ($AGMT_{ij}$) among Mauritania and other AMU countries. The coefficient is 3.465 and statistically significant at 1 per cent level. Since the model is log-linear, the impact of AGMT on bilateral trade can be computed in percentage terms as 100 x [exp(β_{AGMT}) – 1.00] or 100 x [31.974 – 1.00] = 3,097.64%. This indicates that with the AGMT agreement, the percentage expansion of trade between Algeria and other four AMU countries is 3,097.64%. On the other hand, Libya, Mauritania and Tunisia demonstrate trade reduction by signing the PAFTA. The estimated coefficient of lagged English language (LAN_{ij}) is not significant.

The Goodness of fit reflected by the R-square, as well as the total number of observations is given in the final rows. The overall goodness of fit of four estimation of the gravity model concluded the specified models explain the variety in trade flows to a sufficient extends. Time fixed effects are needed if the independent variables for all are

equal to 0, if they are then no time fixed effects are needed. In Table 5.3, we fail to reject the null that all years coefficients are jointly equal to zero which is 0.56. Therefore time fixed effects are not needed in this model.

Table 5.4
Morocco – Dependent variable: Trade

Variables	Pooled Model	Fixed Effects Model	Random Effects Model
$Constant$	-188.875 (1.56)	-154.840 (-1.23)	-168.875 (-1.26)
$lnGDP_{it}$	0.334** (2.21)	0.221 (1.39)	0.309** (2.01)
$lnGDP_{jt}$	2.152*** (3.80)	3.354*** (3.87)	3.041*** (3.41)
$lnPOP_{it}$	0.786* (1.78)	-1.292 (-0.71)	0.988 (1.63)
$lnPOP_{jt}$	4.112 (0.89)	7.781 (1.01)	5.492 (0.70)
$lnDINS_{ij}$	-1.885** (-2.06)		-2.985* (-1.96)
$lnFCR_{ij}$	0.482** (2.67)	0.420** (2.47)	0.402** (2.31)
$lnRER_{ij}$	2.837*** (4.93)	3.078*** (5.42)	2.837*** (4.93)
$lnOPENNESS_{ij}$	11.169*** (28.73)	11.172*** (66.30)	6.162*** (22.58)
$AGMT_{ij}$	-2.846*** (-3.48)	-2.806* (-1.84)	-0.055 (-0.80)
LAN_{ij}	-0.794 (-0.62)	-0.392 (-0.19)	2.10 (0.1477)
F Test		0.05 [0.9861]	
LM Test			2.10 [0.1477]
Hausman Test		0.23 [0.9735]	
Time Fixed Effect		0.59 [0.6352]	
R-squared	0.9229	0.9845	0.9613
Number of Observation	84	84	84

Notes: *** indicates significant at 1%, ** indicates significant at 5%, and * indicates significant at 10%; t-statistics are in parentheses ( ) and p-value are in [ ].

Table 5.4 shows the intra-trade between Morocco and the others AMU countries namely Algeria, Libya, Mauritania, and Tunisia. The Hausman specification test statistic shows that the null hypothesis fail to reject and indicated that there was no systematic difference between fixed and random models, thereby confirmed that the random effects estimator was efficient in our empirical framework for intra-trade between Morocco and among others AMU countries.

The results show that an increase in the foreign GDP ($lnGDP_{it}$) and domestic GDP ($lnGDP_{jt}$) causes an increase in Morocco's trade. The coefficient for both variables are positive by 0.309 and 3.041 and statistically significant at 1 per cent and 5 per cent level, as expected and in line with the previous literature on trade. Overall this indicates that an increase in foreign GDP causes Morocco trade to increase. The results are in line with those found in other gravity model studies suggesting that the results are consistent.

The population coefficients of foreign country ($lnPOP_{it}$) and domestic population ($lnPOP_{jt}$) are positive sign coefficient by 0.988 and 5.492 but strongly an insignificant at any level. This reflects that there is no impact on trade. The distance variable ($lnDINS_{ij}$) in the random effects model has the right sign in the sense that increased trade is negatively correlated with distance. The coefficients are -2.985 and statistically significant at 10 per cent level. It indicates that this variable may hide the fact that the transaction costs of trading in Morocco in respect of distance are far higher than the others AMU countries

Morocco's real exchange rate ($lnRER_{ij}$) have positive coefficient by 2.837 and statistically significant at 1 per cent level, implying that it have an impact on trades. The foreign currency reserves ($lnFCR_{ij}$) is typically positive coefficient (0.402), and statistically significant at 5 per cent level. This result is consistent with previous evidence and the intra-trade between Libya and other AMU countries. The results show

that the real exchange rate and the foreign currency reserves are akin to the price variable in the trade demand schedule.

In Table 5.4, trade and Openness ($lnOPENNESS_{ij}$) are correlated significantly and positively with each other. The coefficients are 6.162 and statistically significant at 1 per cent level. Given the strong and positive relationship between trade intensity ratios and growth, the existence of a significant correlation between trade and Openness indicates that Openness is fairly effective for increasing trade. We also found that agreement ($AGMT_{ij}$) and English language (LAN_{ij}) are not significant.

The Goodness of fit reflected by the R-square, as well as the total number of observations is given in the final rows. The overall goodness of fit of four estimation of the gravity model concluded the specified models explain the variety in trade flows to a sufficient extends. Time fixed effects are needed if the independent variables for all are equal to 0, if they are, then no time fixed effects are needed. In Table 5.4, we fail to reject the null that all years coefficients are jointly equal to zero which is 0.59. Therefore time fixed effects are not needed in this model.

Table 5.5
Tunisia – Dependent variable: Trade

Variables	Pooled Model	Fixed Effects Model	Random Effects Model
$Constant$	87.082*** (3.10)	-10.883 (-0.38)	87.621*** (4.50)
$lnGDP_{it}$	0.707*** (11.55)	0.808*** (12.57)	0.700*** (9.41)
$lnGDP_{jt}$	0.414*** (4.79)	1.056*** (4.43)	0.365*** (8.28)
$lnPOP_{it}$	7.551*** (32.42)	2.843** (2.77)	7.545*** (45.49)
$lnPOP_{jt}$	6.796*** (3.30)	5.076*** (4.31)	6.756*** (5.19)
$lnDINS_{ij}$	-0.482** (-2.32)		-0.475*** (-3.35)
$lnFCR_{ij}$	0.197*** (3.89)	1.383** (2.47)	0.197*** (6.15)
$lnRER_{ij}$	0.420** (1.79)	-0.028 (-0.11)	0.303 (1.16)
$lnOPENNESS_{ij}$	7.874*** (102.97)	7.880*** (116.38)	7.866*** (96.99)
$AGMT_{ij}$	1.307** (2.05)	0.031 (0.11)	1.320*** (5.16)
LAN_{ij}	0.380* (1.89)	-0.002 (-0.10)	0.380 (1.02)
F Test		11.75*** [0.0000]	
LM Test			1.99 [0.1585]
Hausman Test		35.32***[0.0001]	
Time Fixed Effect		15.58*** [0.0000]	
R-squared	0.9736	0.6565	0.9956
Number of Observation	84	84	84

Notes: *** indicates significant at 1%, ** indicates significant at 5%, and * indicates significant at 10%; t-statistics are in parentheses ( ) and p-value are in [ ].

Table 5.5 shows the intra-trade between Tunisia and the others AMU countries namely Algeria, Libya, Mauritania, and Morocco. The Hausman specification test statistic shows that the null hypothesis fail to reject and indicate that there are no systematic difference between fixed and random models, thereby confirmed that the fixed effects estimator was efficient in our empirical framework for intra-trade between Tunisia and among others AMU countries.

The results show an increase in the foreign GDP ($lnGDP_{it}$) and the domestic GDP ($lnGDP_{jt}$) causes an increase in Tunisia's trade. The coefficients for these variables are positive by 0.808 and 1.056 and statistically significant at 1 per cent level, respectively, as expected and in line with the previous literature on trade. Overall this indicates that an increase in foreign GDP causes Tunisia trade to increase.

The population coefficients of foreign country ($lnPOP_{it}$) and domestic population ($lnPOP_{jt}$) are positive and have a positive sign coefficient by 2.843 and 5.076 and strongly significant at 1 per cent level, respectively. Population as gravitational variables are expected to have a positive sign. This reflects that countries with large GDP have more goods to trade and greater demand for good to import and export.

Tunisia's real exchange rate ($lnRER_{ij}$) have negative coefficient by -0.028 in but statistically not significant, implying that it have not an impact on trades. The foreign currency reserves ($lnFCR_{ij}$) are typically positive coefficient (1.383) and statistically significant at 1 per cent level. This result is consistent with previous evidence and the intra-trade between Tunisia and the others of AMU countries. The results show that the foreign currency reserves are akin to a price variable in the trade demand schedule.

In Table 5.5, trade and Openness ($lnOPENNESS_{ij}$) are correlated significantly and positively with each other. The coefficients are 7.880 and statistically significant at 1 per cent level. Given the strong and positive relationship between trade intensity ratios and

growth, the existence of a significant correlation between trade and Openness indicates that Openness is fairly effective for increasing trade. Table 6.5 also show that the estimated coefficient of agreement ($AGMT_{ij}$) and English language (LAN_{ij}) are not significant in fixed effects model.

The Goodness of fit reflected by the R-square, as well as the total number of observations is given in the final rows. The overall goodness of fit of four estimation of the gravity model concluded the specified models explain the variety in trade flows to a sufficient extends. Time fixed effects are needed if the independent variables for all are equal to 0, if they are, then no time fixed effects are needed. In Table 6.5, we reject the null that all years coefficients are jointly equal to zero which is 15.58. Therefore time fixed effects is needed in this model.

5.3 Analysis of Inter-Trade among Arab Maghreb Union with Selected European Union and Selected Middle East Countries

This section discusses the major findings for relationships between trade and independent variables regression models used in the study. Possible explanations for the findings are discussed in each section, along with their implications. This chapter concludes a discussion of the relationship of the findings to the theoretical model proposed in Chapter 4. This study analyses the inter-trade between countries of Arab Maghreb Union (AMU) namely Algeria, Libya, Mauritania, Morocco and Tunisia, selected European Union (EU) namely Italy, Spain and France and selected Middle East (ME) namely Egypt, Lebanon and Syria.

The estimation results for Equation 4.4 and Equation 4.5 are presented in Table 5.6 and Table 5.7 for the Arab Maghreb Union (AMU) countries namely Algeria, Libya, Mauritania, Morocco and Tunisia and selected European Union (EU) namely Italy, Spain and France and selected Middle East (ME) namely Egypt, Lebanon and Syria. These tables present the inter-trade among the AMU countries. Each Tables show the results of the pooled model are in the second column, while those of fixed effects and random effects models are in third and fourth columns. The main problem of the pooled model is that it does not allow for heterogeneity of countries. It does not estimate country specific effects and assumes that all countries are homogenous. It is a restricted model (Eita, 2008). The analysis explained by Table 5.6 and Table 5.7 and the Hausman test statistic is applied to check further whether the fixed effects model is better than the random effects model. If the null hypothesis of no correlation between the individual or fixed effects and regressors is rejected, then fixed effects model is better than the random effects model.

Table 5.6
AMU to EU– Dependent variable: Trade

Variables	Pooled Model	Fixed Effects Model	Random Effects Model
$Constant$	-4.943 (-0.40)	-85.471** (-2.65)	-4.943 (-0.40)
$lnGDP_{it}$	0.194*** (10.16)	0.299*** (13.47)	0.294*** (13.18)
$lnGDP_{jt}$	0.053*** (5.27)	0.194*** (4.55)	0.255*** (7.17)
$lnPOP_{it}$	0.124 (0.76)	26.182** (2.66)	0.038 (0.06)
$lnPOP_{jt}$	0.124 (1.07)	27.007** (2.69)	0.044 (0.97)
$lnDINS_{ij}$	0.122 (0.72)		0.042 (0.33)
$lnFCR_{ij}$	0.013 (1.12)	0.078** (2.05)	0.034 (1.35)
$lnRER_{ij}$	0.444*** (3.94)	0.491*** (3.96)	0.341** (2.86)
$lnOPENNESS_{ij}$	16.161 *** (38.32)	17.847 *** (34.11)	18.360 *** (45.31)
$AGMT_{ij}$	0.116 (0.74)	0.053 (0.35)	0.128 (0.93)
LAN_{ij}	-0.024 (-0.24)	-0.040 (-0.56)	-0.012 (-0.18)
F Test		192.90*** [0.0000]	
LM Test			2.24 [0.1342]
Hausman Test		41.18** [0.0039]	
Time Fixed Effect		2.73** [0.0354]	
R-squared	0.7515	0.9502	0.7851
Number of Observation	105	105	105

Notes: *** indicates significant at 1%, ** indicates significant at 5%, and * indicates significant at 10%; t-statistics are in parentheses ( ) and p-value are in [ ].

Table 5.6 shows the inter-trade between members of the AMU and the EU countries. The Hausman test statistic shows that the null hypothesis is rejected and this indicates that country specific effects are correlated with regressors. This suggests that the fixed effects model is appropriate, and the random effects estimates are not consistent. That means the fixed effects model is the appropriate one for trade of exports between countries.

The results show that an increase in the foreign GDP ($lnGDP_{it}$) and domestic GDP ($lnGDP_{jt}$) causes an increase in the AMU's trade. The coefficient for these variables are positive by 0.299 and 0.194 and statistically significant at 1 per cent level, respectively, as expected and in line with the previous literature on trade (see, for example, Cheng and Wall, 2002, and Serlenga and Shin, 2004).

The population coefficients of foreign country ($lnPOP_{it}$) and domestic population ($lnPOP_{jt}$) are positive sign coefficient by 26.182 and 27.007, respectively, and strongly significant at 5 per cent level. These positive sign indicates that country size is directly related to trade. These results are consistent with Martines-zarzoso (2003) who was studied on Gravity Model: An Application to Trade between Regional Blocs, found that from 1991 onwards, the sign is positive which point towards the growing importance of the role played by scale economies and market-size effects in international trade models. But the population coefficients of foreign country ($lnPOP_{it}$) and domestic population ($lnPOP_{jt}$) in random effects model and pooled model are not significant.

AMU's real exchange rate ($lnRER_{ij}$) have positive coefficient by 0.491 and statistically significant at 1 per cent level, implying that it have an impact on trades. The foreign currency reserves ($lnFCR_{ij}$) is typically positive coefficient (0.078) and statistically significant at 5 per cent level. This result is consistent with previous evidence (Harris and Matyas, 2001, Egger and Pfaffermayr, 2003, and Serlenga and Shin, 2004).

As expected, trade and Openness are correlated significantly and positively with each other. The coefficient is 17.847 and statistically significant at 1 per cent level. Given the strong and positive relationship between trade intensity ratios and growth, the existence of a significant correlation between trade and Openness ($lnOPENNESS_{ij}$) indicates that Openness is fairly effective for increasing trade. The estimated coefficient of agreement ($AGMT_{ij}$) and English language (LAN_{ij}) are not significant.

The Goodness of fit reflected by the R-square, as well as the total number of observations is given in the final rows. The overall goodness of fit of four estimation of the gravity model concludes the specified models explain the variety in trade flows to a sufficient extends. Time fixed effects are needed if the independent variables for all are equal to 0, if they are then, no time fixed effects are needed. In Table 5.6, we rejected the null that all years coefficients are jointly equal to zero which is 2.73, therefore time fixed effects are needed in this model.

Table 5.7
AMU to ME– Dependent variable: Trade

Variables	Pooled Model	Fixed Effects Model	Random Effects Model
$Constant$	-1.341 (-1.44)	-24.968 (-0.73)	-0.642 (-0.04)
$lnGDP_{it}$	0.472 *** (15.13)	0.271*** (10.75)	0.272 *** (13.18)
$lnGDP_{jt}$	0.120 ** (2.55)	0.118 ** (2.47)	0.090 * (1.95)
$lnPOP_{it}$	-0.444 (-0.75)	18.850** (2.55)	-0.044 (-0.05)
$lnPOP_{jt}$	0.631*** (4.96)	19.799** (2.66)	0.441*** (4.60)
$lnDINS_{ij}$	0.742*** (3.97)		0.646*** (3.59)
$lnFCR_{ij}$	0.176** (2.89)	0.073** (2.31)	0.086** (2.66)
$lnRER_{ij}$	0.760 *** (4.23)	0.726 *** (4.91)	0.550 *** (3.80)
$lnOPENNESS_{ij}$	16.895*** (45.35)	16.046 *** (43.02)	16.525*** (44.37)
$AGMT_{ij}$	0.578*** (3.67)	0.623** (2.32)	0.504*** (3.26)
LAN_{ij}	0.396 (1.75)	0.135 (0.59)	0.176 (1.24)
F Test		4.28 ** [0.0032]	
LM Test			1.49 [0.2229]
Hausman Test		17.35** [0.0436]	
Time Fixed Effect		3.50 ** [0.0114]	
R-squared	0.9769	0.9639	0.9589
Number of Observation	105	105	105

Notes: *** indicates significant at 1%, ** indicates significant at 5%, and * indicates significant at 10%; t-statistics are in parentheses ( ) and p-value are in [ ].

Table 5.7 shows the inter-trade between AMU and ME. The Hausman specification test statistic shows that the null hypothesis are failed to reject and indicated that there was no systematic difference between fixed and random models, thereby confirmed that the fixed effects estimator was efficient in our empirical framework for inter-trade between the AMU and the ME countries.

The results showed that an increase in the foreign GDP ($lnGDP_{it}$) and domestic GDP ($lnGDP_{jt}$) causes an increase in the AMU's trade. The coefficient for these variables are positive by 0.271 and 0.118 and statistically significant at 1 per cent level, respectively, as expected and in line with the previous literature on trade (see, for example, Cheng and Wall, 2002, and Serlenga and Shin, 2004). The results are in line with those found in other gravity model studies suggesting that the results are consistent

The population coefficients of foreign country ($lnPOP_{it}$) and domestic population ($lnPOP_{jt}$) are positive sign coefficient by 18.850 and 19.799 and statistically significant at 5 per cent level, respectively. This reflects that countries with large population have more goods to trade and greater demand for good to import and export.

AMU's real exchange rate ($lnRER_{ij}$) have positive coefficient by 0.726 and statistically significant at 1 per cent level, implying that it have an impact on trades. The foreign currency reserves ($lnFCR_{ij}$) is typically positive coefficient by 0.073 and statistically significant at 5 per cent level. This result is consistent with previous evidence and the inter-trade between the AMU and the ME countries. The results showed that the real exchange rate and the foreign currency reserves are akin to the price variable in the trade demand schedule.

In Table 6.7, trade and Openness ($lnOPENNESS_{ij}$) are correlated significantly and positively with each other. The coefficient is 16.046 and statistically significant at 1 per

cent level. Given the strong and positive relationship between trade intensity ratios and growth, the existence of a significant correlation between trade and Openness indicates that Openness is fairly effective for increasing trade.

Table 6.7 also show that the Fixed Effects column showed a positive relationship report between trade and agreement ($AGMT_{ij}$) among the AMU and the ME countries. The coefficient is 0.623 and 1 per cent level.

Since the model is log-linear, the impact of AGMT on bilateral trade can be computed in percentage terms as 100 x [exp(β_{AGMT}) – 1.00] or 100 x [1.8645 – 1.00] = 86.45%. This indicates that with the AGMT agreement, the percentage expansion of trade between AMU and ME countries is 86.45%. On the other hand, ME demonstrate trade reduction by signing the PAFTA. The estimated coefficient of lagged English language is not significant.

The Goodness of fit reflected by the R-square, as well as the total number of observations is given in the final rows. The overall goodness of fit of four estimation of the gravity model be concluded that the specified models explained the variety in trade flows to a sufficient extends. Time fixed effects are needed if the independent variables for all are equal to 0, if they are, then no time fixed effects are needed. In Table 5.7, we rejected the null that all years coefficients are jointly equal to zero which is 3.50. Therefore time fixed effects are needed in this model.

5.4 Conclusion

Although the relationships between openness measures within each group are generally statistically significant with the correct signs, the relationships between the indicators across the groups tend to be strong. For example, while almost all of the trade barriers are positively and significantly correlated with Openness, their relationships with the other AMU trade intensity ratios showed strong correlation. Given the strong and positive relationship between trade intensity ratios and trade, the existence of a significant correlation between trade barriers and Openness indicates that trade barriers are fairly effective for increasing trade.

We begin the discussion with Openness and we fine that our results are consistent with a number of empirical studies, as reviewed in Harrison (1996), our results support the hypothesis that countries with higher trade shares are likely to grow faster than other countries.

The trade volume of the AMU are increasing with its border countries such as European Union and Middle East countries, Therefore, to find out the impacts of gravity model on the trade patterns of AMU, its trade is tested on home GDP, partner countries' GDP, home population, and partner countries' population.

Overall, the results are in line with those found in other gravity model studies that the results are consistent. In all cases, parameters for these variables are found to be correctly signed and highly significant.

CHAPTER 6

ANALYSIS OF LONG RUN RELATIONSHIP BETWEEN THE TRADE AND ITS DETERMINANTS FOR A GROUP OF SELECTED AMU, EU AND ME COUNTRIES.

6.1 Introduction

This chapter discusses the major findings for all various regression models used in the study. This chapter begins with a discussion on stationarity of the panel data using Levin Lin and Chin (LLC, 2002) and Im, Pesaran and Shin (1997; IPS hereafter) tests and follow by panel cointegration and fully modified OLS (FMOLS), the tests suggested by Pedroni (1999, 2004, 1996). Possible explanations for the findings are discussed in each section, along with their implications. This chapter concludes with a discussion of the relationship of the findings to the theoretical model proposed in Chapter 4.

6.2 Results of the Panel Unit Root Tests

As with standard cointegration tests it is important to know the stationarity properties of the data to ensure that incorrect inferences are not made. Testing for stationarity in panel data differs somewhat from conducting unit root tests in standard individual time series; these differences will be discussed as follows.

Conventional unit root tests like the ADF test have been found to have low testing powers (Coakley *et al*., 1996; Coakley and Kulasi, 1997; Oh *et al*., 1999). The failure to reject the null of a unit root in the data by the conventional ADF unit root test may be due to low testing power of the test. Panel unit root test have been found to have higher power than the individual unit root ADF tests. The panel unit root tests take into account both the cross-section and time series variations in the data and these increase the power of the tests due to the increased number of observations that are available in the panel setting.

In order to determine the presence of a unit root in a panel data setting and to confirm the results from the individual unit root of the ADF tests, we used the panel unit test based on the Levin *et al.* (2002) and Im *et al*. (1997) procedure (LLC and IPS respectively) on the panel data. The LLC and the IPS tests are constructed such that the null hypothesis tested including all the series in the panel, containing a unit root against the alternative that none of the series contain a unit root. Therefore although the test allows for heterogeneity in the panel, for example in lag order or the exact value for the autoregressive parameter, all the series must share the same stationarity properties.

When applying the LLC and the IPS test one has to be particularly careful in selecting the lag length for the ADF tests, since underestimating the true number of lags may lead to lack of power. We also employed the Akaike's Information Criterion (AIC) in choosing the appropriate number of lagged differences term for the five tests statistics to compute our results.The AIC is known for selecting the maximum relevant lag length

(Shrestha and Chowdhury, 2005). McKinnon's tables provide the cumulative distribution of the LLC and the IPS test statistics.

Table 6.1 to Table 6.7 report the results of the LLC and the IPS panel unit root tests for the data on trade (lnY_{ijt}) variable between country ***i*** and country j, income ($lnGDP_{it}$) of country ***i,*** income ($lnGDP_{jt}$) of income *j*. the local and target population ($lnPOP_{it}$ and $lnPOP_{jt}$), the target country's foreign currency reserves ($lnFCR_{ij}$), the real exchange rate ($lnRER_{ij}$) between the two countries, trade openness ($lnOPENNESS_{ij}$) for both the scenarios of constant and constant plus time trend term. The tests are run for the full sample of the five Arab Maghreb Union (AMU) countries, namely Algeria, Libya, Mauritania, Morocco and Tunisia for the period 1989-2009. The tests are also run for the full sample for the selected European Union (EU) namely Italy, Spain and France and selected Middle East (ME) namely Egypt, Lebanon and Syria with AMU countries for the years 1989-2009.

Table 6.1 to Table 6.7 presents the results of the LLC and the IPS panel unit root tests at the level indicating that all variables are *I*(0) in the constant of the panel unit root regression. These results clearly showed that the null hypothesis of a panel unit root in the level of the series cannot be rejected at various lag lengths. We assumed that there was no time trend. Therefore, we tested for stationarity allowing for a constant plus time trend. In the absence of a constant plus time trend, again we found that the null hypothesis of having panel unit root was generally rejected in all series at level form.

As discussed above, we concluded that most of the variables are non-stationary in with and without time trend specifications at level by applying the LLC and the IPS tests which are also applied for heterogeneous panel to test the series for the presence of a unit root. The results of the panel unit root tests confirmed that the variables are non-stationary at level.

Table 6.1
Algeria: Panel Unit Root Tests

	LEVEL				FIRST DIFFERENCE			
	Constant		Constant + Trend		Constant		Constant + Trend	
	LLC	IPS	LLC	IPS	LLC	IPS	LLC	IPS
lnY_{ijt}	2.849 (0.998)	0.456 (0.676)	2.894 (0.998)	1.425 (0.923)	-8.144*** (0.000)	-7.472*** (0.000)	-7.117*** (0.000)	-7.326*** (0.000)
$lnGDP_{it}$	1.297 (0.902)	2.165 (0.984)	0.558 (0.712)	0.940 (0.826)	-6.024*** (0.000)	-4.912*** (0.000)	-7.039*** (0.000)	-5.254*** (0.000)
$lnGDP_{jt}$	-1.527 (0.803)	-1.249 (0.932)	-1.270 (0.984)	-1.272 (0.988)	-5.17*** (0.000)	-2.506*** (0.000)	6.270*** (0.000)	-7.233*** (0.000)
$lnPOP_{it}$	-1.084 (0.139)	0.537 (0.705)	-0.357 (0.361)	0.651 (0.743)	-15.296*** (0.000)	-3.052*** (0.001)	10.760*** (0.000)	-2.686*** (0.003)
$lnPOP_{jt}$	-1.083 (0.139)	-1.174 (0.120)	2.624 (0.995)	3.857 (0.999)	-14.19*** (0.000)	-9.415*** (0.000)	-6.888*** (0.000)	-7.065*** (0.000)
$lnFCR_{ij}$	-0.513 (0.304)	2.212 (0.986)	-1.849 (0.832)	-1.208 (0.114)	-6.784*** (0.000)	-5.980*** (0.000)	-5.978*** (0.000)	-4.821*** (0.000)
$lnRER_{ij}$	-0.575 (0.283)	0.269 (0.606)	0.440 (0.670)	-0.380 (0.352)	-15.037*** (0.000)	-11.183*** (0.000)	-15.677*** (0.000)	-15.449*** (0.000)
$lnOPENNESS_{ij}$	1.989 (0.990)	1.815 (0.903)	1.250 (0.693)	1.793 (0.890)	-3.251*** (0.000)	-4.265*** (0.000)	-6.564*** (0.000)	-2.449*** (0.007)

Notes: The number in ( ) denote Probability value. The lag length is chosen on the basis of the Akaike's Information Criteria (AIC) where we specify maximum lag order (k) in autoregression and then we select appropriate lag order according to the AIC. For LLC *t*-stat all reported values are distributed N(0,1) under null of unit root or no cointegration.

Table 6.1 to Table 6.7 also presents the results of the tests at first difference for the LLC and the IPS tests in constant and constant plus time trend. We can see that for all series the null hypothesis of unit root test are rejected at 95 per cent critical value (1 percent level). Hence, based on the LLC and the IPS test, there strong evidence that all the series are in fact integrated of orders one.

Table 6.2
Libya: Panel Unit Root Tests

	LEVEL				FIRST DIFFERENCE			
	Constant		Constant + Trend		Constant		Constant + Trend	
	LLC	IPS	LLC	IPS	LLC	IPS	LLC	IPS
lnY_{ijt}	-1.196 (0.115)	-1.911 (0.128)	1.344 (0.915)	-0.900 (0.184)	-7.545*** (0.000)	-8.905*** (0.000)	-2.824*** (0.002)	-6.623*** (0.000)
$lnGDP_{it}$	-1.151 (0.124)	-1.410 (0.903)	-1.376 (0.837)	-1.200 (0.828)	-6.00*** (0.000)	-7.941*** (0.000)	-4.548*** (0.000)	-4.412*** (0.000)
$lnGDP_{jt}$	-1.860 (0.314)	1.431 (0.923)	-0.1797 (0.428)	-1.018 (0.621)	-5.826*** (0.000)	-2.400*** (0.008)	-5.203*** (0.000)	-4.368*** (0.000)
$lnPOP_{it}$	-0.296 (0.383)	0.619 (0.732)	0.893 (0.814)	1.210 (0.886)	-7.000*** (0.000)	-8.522*** (0.000)	-6.044*** (0.000)	-7.243*** (0.000)
$lnPOP_{jt}$	-2.864 (0.193)	-2.877 (0.897)	0.479 (0.684)	-2.512 (0.806)	-7.712*** (0.000)	-8.333*** (0.000)	-6.979*** (0.000)	-7.147*** (0.000)
$lnFCR_{ij}$	-0.513 (0.303)	2.212 (0.986)	-1.849 (0.832)	-1.208 (0.113)	-6.784*** (0.000)	-5.980*** (0.000)	-5.978*** (0.000)	-4.821*** (0.000)
$lnRER_{ij}$	1.102 (0.864)	-0.241 (0.404)	0.422 (0.101)	-1.145 (0.125)	-17.48*** (0.000)	-13.358*** (0.000)	-16.382*** (0.000)	-2.761*** (0.002)
$lnOPENNESS_{ij}$	1.177 (0.880)	0.0563 (0.522)	1.647 (0.950)	-0.442 (0.329)	-13.46*** (0.000)	-10.994*** (0.000)	-11.966*** (0.000)	-9.556*** (0.000)

Notes: The number in ( ) denote Probability value. The lag length is chosen on the basis of the Akaike's Information Criteria (AIC) where we specify maximum lag order (k) in autoregression and then we select appropriate lag order according to the AIC. For LLC *t*-stat all reported values are distributed N(0,1) under null of unit root or no cointegration.

Table 6.3
Mauritania: Panel Unit Root Tests

	LEVEL				FIRST DIFFERENCE			
	Constant		Constant + Trend		Constant		Constant + Trend	
	LLC	IPS	LLC	IPS	LLC	IPS	LLC	IPS
lnY_{ijt}	1.649 (0.705)	1.913 (0.924)	1.347 (0.999)	1.749 (0.959)	-3.794*** (0.000)	-4.647*** (0.000)	-2.706*** (0.003)	-4.892*** (0.000)
$lnGDP_{it}$	-1.423 (0.177)	-1.837 (0.847)	-1.972 (0.924)	-1.076 (0.118)	-4.377*** (0.000)	-8.891*** (0.000)	-4.947*** (0.000)	-3.775*** (0.000)
$lnGDP_{jt}$	-1.860 (0.831)	1.430 (0.923)	-0.179 (0.428)	-2.018 (0.921)	-5.826*** (0.000)	-2.400*** (0.008)	-5.203*** (0.000)	-4.368*** (0.000)
$lnPOP_{it}$	-1.758 (0.790)	-2.104 (0.923)	-1.908 (0.997)	-2.212 (0.989)	-7.000*** (0.000)	-8.522*** (0.000)	-6.044*** (0.000)	-7.243*** (0.000)
$lnPOP_{jt}$	-1.558 (0.559)	-1.877 (0.745)	-0.089 (0.464)	-1.512 (0.806)	-8.320*** (0.000)	-8.333*** (0.000)	-7.735*** (0.000)	-7.147*** (0.000)
$lnFCR_{ij}$	-0.513 (0.303)	2.212 (0.986)	-1.849 (0.332)	-1.208 (0.113)	-6.784*** (0.000)	-5.980*** (0.000)	-5.978*** (0.000)	-4.821*** (0.000)
$lnRER_{ij}$	-1.984 (0.383)	-1.766 (0.732)	0.442 (0.130)	-1.145 (0.125)	-7.483*** (0.000)	-3.35*** (0.000)	-6.385*** (0.0000)	-2.761*** (0.002)
$lnOPENNESS_{ij}$	-1.462 (0.814)	1.681 (0.886)	1.047 (0.116)	1.261 (0.283)	-13.466*** (0.000)	-2.771*** (0.002)	-2.448*** (0.007)	-4.658*** (0.000)

Notes: The number in ( ) denote Probability value. The lag length is chosen on the basis of the Akaike's Information Criteria (AIC) where we specify maximum lag order (k) in autoregression and then we select appropriate lag order according to the AIC. For LLC *t*-stat all reported values are distributed N(0,1) under null of unit root or no cointegration.

Table 6.4
Morocco: Panel Unit Root Tests

	LEVEL				FIRST DIFFERENCE			
	Constant		Constant + Trend		Constant		Constant + Trend	
	LLC	IPS	LLC	IPS	LLC	IPS	LLC	IPS
lnY_{ijt}	3.546 (0.999)	2.252 (0.987)	0.078 (0.531)	0.539 (0.705)	-10.06*** (0.000)	-8.785*** (0.000)	-7.722*** (0.000)	-7.524*** (0.000)
$lnGDP_{it}$	-0.284 (0.388)	-1.699 (0.244)	-1.174 (0.145)	-2.691 (0.233)	-2.406*** (0.008)	-1.699*** (0.000)	-8.354*** (0.000)	-6.614*** (0.000)
$lnGDP_{jt}$	-1.159 (0.158)	-1.578 (0.394)	-2.136 (0.983)	-1.799 (0.236)	-10.581*** (0.000)	-10.772*** (0.000)	-8.394*** (0.000)	-2.980*** (0.001)
$lnPOP_{it}$	-1.150 (0.133)	-1.725 (0.825)	-1.020 (0.153)	-2.905 (0.991)	-6.492*** (0.000)	-7.825*** (0.000)	-5.686*** (0.000)	-6.580*** (0.000)
$lnPOP_{jt}$	-2.605 (0.966)	-2.057 (0.937)	-2.024 (0.924)	-2.634 (0.996)	-10.353*** (0.000)	-10.966*** (0.000)	-8.323*** (0.000)	-9.372*** (0.000)
$lnFCR_{ij}$	-0.513 (0.303)	2.212 (0.986)	-1.849 (0.832)	-1.208 (0.113)	-6.784*** (0.000)	-5.980*** (0.000)	-5.978*** (0.000)	-4.821*** (0.000)
$lnRER_{ij}$	-1.984 (0.982)	-1.766 (0.890)	0.424 (0.358)	-1.684 (0.446)	-5.984*** (0.000)	-3.358*** (0.000)	-6.382*** (0.000)	-2.400*** (0.008)
$lnOPENNESS_{ij}$	2.680 (0.996)	2.579 (0.998)	-2.255 (0.399)	0.685 (0.753)	-5.611*** (0.000)	-4.904*** (0.000)	-5.305*** (0.000)	-5.912*** (0.000)

Notes: The number in ( ) denote Probability value. The lag length is chosen on the basis of the Akaike's Information Criteria (AIC) where we specify maximum lag order (k) in autoregression and then we select appropriate lag order according to the AIC. For LLC *t*-stat all reported values are distributed N(0,1) under null of unit root or no cointegration.

Table 6.5
Tunisia: Panel Unit Root Tests

	LEVEL				FIRST DIFFERENCE			
	Constant		Constant + Trend		Constant		Constant + Trend	
	LLC	IPS	LLC	IPS	LLC	IPS	LLC	IPS
lnY_{ijt}	3.771 (0.999)	3.369 (0.999)	1.491 (0.932)	2.245 (0.987)	-8.169*** (0.000)	-5.779*** (0.000)	-8.851*** (0.000)	-6.838*** (0.000)
$lnGDP_{it}$	-1.592 (0.625)	-1.466 (0.368)	-2.121 (0.906)	-2.271 (0.911)	-10.725*** (0.000)	-9.851*** (0.000)	-3.379*** (0.000)	-3.368*** (0.000)
$lnGDP_{jt}$	-0.282 (0.388)	-2.730 (0.003)	0.214 (0.585)	-1.700 (0.644)	-8.081*** (0.000)	-8.234*** (0.000)	-2.443*** (0.007)	-3.479*** (0.000)
$lnPOP_{it}$	-1.139 (0.182)	-1.271 (0.159)	-1.696 (0.443)	-1.860 (0.868)	-8.482*** (0.000)	-9.159*** (0.000)	-7.446*** (0.000)	-7.868*** (0.000)
$lnPOP_{jt}$	-1.742 (0.502)	-1.870 (0.812)	-1.955 (0.850)	-2.761 (0.991)	-8.502*** (0.000)	-5.912*** (0.000)	-7.086*** (0.000)	-4.860*** (0.000)
$lnFCR_{ij}$	-0.513 (0.303)	2.212 (0.986)	-1.849 (0.832)	-1.208 (0.113)	-6.784*** (0.000)	-5.980*** (0.000)	-5.978*** (0.000)	-4.821*** (0.000)
$lnRER_{ij}$	-1.984 (0.986)	-1.766 (0.832)	0.425 (0.486)	-1.684 (0.746)	-7.486*** (0.000)	-3.351*** (0.000)	-6.382*** (0.000)	-2.400*** (0.008)
$lnOPENNESS_{ij}$	-1.473 (0.470)	-1.167 (0.382)	-1.384 (0.421)	-2.775 (0.937)	-4.958*** (0.000)	-7.114*** (0.000)	-6.421*** (0.000)	-5.760*** (0.000)

Notes: The number in ( ) denote Probability value. The lag length is chosen on the basis of the Akaike's Information Criteria (AIC) where we specify maximum lag order (k) in autoregression and then we select appropriate lag order according to the AIC. For LLC *t*-stat all reported values are distributed N(0,1) under null of unit root or no cointegration.

Table 6.6
EU: Panel Unit Root Tests

	LEVEL				FIRST DIFFERENCE			
	Constant		Constant + Trend		Constant		Constant + Trend	
	LLC	IPS	LLC	IPS	LLC	IPS	LLC	IPS
lnY_{ijt}	-0.642 (0.260)	-1.036 (0.150)	-1.372 (0.284)	-1.448 (0.373)	-7.039*** (0.000)	-7.289*** (0.000)	-7.894*** (0.000)	-8.013*** (0.000)
$lnGDP_{it}$	-1.970 (0.825)	-1.631 (0.672)	0.481 (0.688)	-1.917 (0.927)	-8.285*** (0.000)	-8.574*** (0.000)	-6.722*** (0.000)	-7.555*** (0.000)
$lnGDP_{jt}$	0.781 (0.782)	0.515 (0.697)	-0.443 (0.328)	-0.250 (0.401)	-8.576*** (0.000)	-6.939*** (0.000)	-7.573*** (0.000)	-5.836*** (0.000)
$lnPOP_{it}$	-0.960 (0.168)	-1.085 (0.138)	0.032 (0.513)	-0.523 (0.300)	-4.264*** (0.000)	-4.360*** (0.000)	-5.293*** (0.000)	-4.557*** (0.000)
$lnPOP_{jt}$	-1.171 (0.145)	-1.825 (0.735)	-1.874 (0.721)	-1.307 (0.251)	-4.445*** (0.000)	-7.358*** (0.000)	-2.512*** (0.000)	-2.246*** (0.000)
$lnFCR_{ij}$	0.981 (0.836)	1.070 (0.857)	-1.797 (0.636)	-0.345 (0.365)	-9.009*** (0.000)	-7.213*** (0.000)	-6.352*** (0.000)	-7.012*** (0.000)
$lnRER_{ij}$	-0.122 (0.451)	-1.811 (0.735)	-2.434 (0.992)	-2.179 (0.914)	-5.637*** (0.000)	-8.421*** (0.000)	-6.495*** (0.000)	-8.333*** (0.000)
$lnOPENNESS_{ij}$	-1.733 (0.768)	-1.156 (0.223)	2.228 (0.968)	-2.010 (0.900)	-7.968*** (0.000)	-3.223*** (0.000)	-6.777*** (0.000)	-2.739*** (0.003)

Notes: The number in ( ) denote Probability value. The lag length is chosen on the basis of the Akaike's Information Criteria (AIC) where we specify maximum lag order (k) in autoregression and then we select appropriate lag order according to the AIC. For LLC *t*-stat all reported values are distributed N(0,1) under null of unit root or no cointegration.

Table 6.7
ME: Panel Unit Root Tests

	LEVEL				FIRST DIFFERENCE			
	Constant		Constant + Trend		Constant		Constant + Trend	
	LLC	IPS	LLC	IPS	LLC	IPS	LLC	IPS
lnY_{ijt}	-1.273 (0.101)	-1.565 (0.158)	-1.210 (0.113)	-0.8671 (0.192)	-8.687*** (0.000)	-5.849*** (0.000)	-3.615*** (0.000)	-3.960*** (0.000)
$lnGDP_{it}$	-3.338 (0.000)	-2.295 (0.210)	-1.969 (0.224)	-1.316 (0.094)	-10.618*** (0.000)	-8.440*** (0.000)	-7.390*** (0.000)	-5.661*** (0.000)
$lnGDP_{jt}$	0.781 (0.782)	0.515 (0.697)	-0.443 (0.328)	-0.250 (0.401)	-8.576*** (0.000)	-6.903*** (0.000)	-7.573*** (0.000)	-5.836*** (0.000)
$lnPOP_{it}$	-0.960 (0168)	-1.085 (0.138)	0.032 (0.513)	-0.523 (0.300)	-4.264*** (0.000)	-4.360*** (0.000)	-5.293*** (0.000)	-4.557*** (0.000)
$lnPOP_{jt}$	2.577 (0.999)	-0.210 (0.416)	2.282 (0.970)	1.677 (0.953)	-2.019*** (0.000)	-2.300*** (0.000)	-7.687*** (0.000)	-9.274*** (0.000)
$lnFCR_{ij}$	-1.585 (0.351)	-1.262 (0.192)	-2.687 (0.245)	-1.520 (0.189)	-12.963*** (0.000)	-14.085*** (0.000)	-10.956*** (0.000)	-12.147*** (0.000)
$lnRER_{ij}$	-0.122 (0.451)	-1.811 (0.235)	-2.434 (0.992)	-2.179 (0.314)	-5.637*** (0.000)	-8.421*** (0.000)	-6.495*** (0.000)	-8.333*** (0.000)
$lnOPENNESS_{ij}$	-1.733 (0.803)	-1.156 (0.932)	1.221 (0.984)	-1.368 (0.988)	-7.968*** (0.000)	-3.223*** (0.000)	-6.777*** (0.000)	-3.065*** (0.001)

Notes: The number in ( ) denote Probability value. The lag length is chosen on the basis of the Akaike's Information Criteria (AIC) where we specify maximum lag order (k) in autoregression and then we select appropriate lag order according to the AIC. For LLC *t*-stat all reported values are distributed N(0,1) under null of unit root or no cointegration.

6.3 Cointegration Test

The non-stationarity of the variables as shown by the unit root tests raises the problem of spurious regressions. The spurious regression problem can be addressed by employing cointegration methodology. However before the cointegration regression model can be estimated, it has to be first ascertained if the non-stationary variables are cointegrated with one another. The cointegration analysis is able to identify whether it there is of a non spurious equilibrium relationship between then variables. Therefore, cointegration analysis is carried out on both individual and panel data to determine if the variables are cointegrated.

6.3.1 Panel Cointegration Tests

The next step is to test whether the variables are cointegrated using Pedroni's (1999, 2001, and 2004) methodology as described previously for Equation 4.8. This is to investigate whether on the long-run steady state or cointegration exist among the variables and to confirm what Oh *et al*. (1999) and Coiteux and Olivier (2000) stated that the panel cointegration tests have much higher testing power than conventional cointegration test. Since the variables are found to be integrated in the same order $I(1)$, we continued with the panel cointegration tests proposed by Pedroni (1999, 2001, and 2004). Cointegrations are carried out for constant and constant plus time trend and the summary of the results of cointegrations analyses are presented in Table 6.8a and Table 6.8b.

At constant level, we found that the Algeria and the EU indicates that 4 out of 7 statistics reject null by hypothesis of no cointegration at the 1 per cent and 5 per cent level of significance except for the panel-*p*, group-*t* and group-*adf* which are not significant. Libya indicated that 6 out of 7 statistics reject the null hypothesis of no cointegration at the 1 per cent and 5 per cent level of significance except for the group-*adf* which is not significant. In Morocco and Tunisia, the results are indicated that the null hypothesis was rejected by 3 out of 7 statistics at the 1 per cent level of significance. In Mauritania and ME as well as Libya, the results indicated that 6 out of 7 statistics reject the null hypothesis of non cointegration at the 1 per cent and 5 per cent level of significance.

Overall, results on the panel cointegration tests among the AMU countries and between the AMU and the selected EU and ME countries with constant level, however, the independent variables do hold cointegration in the long run for a group of the AMU countries and between the AMU and the selected EU and the ME countries with respect to trade. As indicated by the panel non-parametric (*t*-statistic) and parametric (*adf*-statistic) statistics as well as group statistics that are analogous to the IPS-test statistics, the null hypothesis of non cointegration are rejected at 1 per cent and 5 per cent level of significance.

Table 6.8a
Panel cointegration tests for heterogeneous panel - Constant

	Algeria	Libya	Morocco	Mauritania	Tunisia	EU	ME
Panel-*v*	3.061***	2.617***	3.127***	3.345***	2.242**	2.405**	2.442**
Panel-*ρ*	-1.368	-3.528***	-0.744	-4.082***	-0.508	-0.973	-4.124***
Panel-*t*	-3.267***	-2.622**	-4.032***	-2.657**	-3.147***	-3.341***	-2.509**
Panel-*adf*	-2.501**	-1.965**	0.905	-2.681**	-0.725	-1.247	-0.824
Group-*ρ*	-4.334***	-4.509***	-5.171***	-5.147***	-4.409***	-4.799***	-4.909***
Group-*t*	-1.050	-2.329**	-0.525	-2.433**	-0.558	-1.833*	-2.956**
Group-*adf*	-1.136	0.086	0.902	0.935	-1.622	-2.108**	-1.692*

***Notes*.** All statistics are from Pedroni's procedure (1999) which is the adjusted values can be compared to the N(0,1) distribution. Panel v is a nonparametric variance ratio statistic. Panel-*p* and panel-*t* are analogous to the nonparametric. Phillips-Perron *p* and *t* statistics respectively. Panel-*adf* is a parametric statistic based on the augmented Dickey-Fuller ADF statistic. Group-*p* is analogous to the Phillips-Perron p statistic. Group-*t* and group-*adf* are analogous to the Phillips-Perron *t* statistic and the augmented Dickey- Fuller ADF statistic respectively. The Pedroni (2004) statistics are one-sided tests with a critical value of 1.64 ($k < -1.64$ implies rejection of the null), except the u-statistic that has a critical value of 1.64 ($k > 1.64$ suggests rejection of the null). Note that the means and variances used to calculate the Pedroni statistics are reported in Pedroni (1999). ***, **, * indicates rejection of the null hypothesis of no-cointegration at 1%, 5%, and 10% level of significance. EU - European Union; ME - Middle East

In constant plus trend level, we found that Algeria, Libya, and Mauritania indicates that 4 out of 7 statistics reject null by hypothesis of no cointegration at the 1 per cent and 5 per cent level of significance. Morocco and ME indicates that all 7 statistics reject the null hypothesis of no cointegration at the 1 per cent and 5 per cent level of significance except for the panel-*adf* in ME which is significant at 10 per cent level. In Tunisia, the result is indicating that the null hypothesis is rejected by 5 out of 7 statistics at the 1 per cent and 5 per cent level of significance. In EU, the results indicate that 6 out of 7 statistics reject the null hypothesis of non cointegration at the 1 per cent and 5 per cent

level of significance except for panel-*t* which is significant at 10 per cent level. It is shown that independent variables do hold cointegration in the long run for a group of the AMU countries and between the AMU and the selected EU and the ME countries with respect to trade. However, since most the statistics are in favour of cointegration, and thus, combined with the fact that according to Pedroni (1999) the panel non-parametric (*t*-statistic) and parametric (*adf*-statistic) statistics are more reliable in constant plus time trend, we conclude that there is a long run cointegration among our variables among the AMU countries and between the AMU and the selected EU and ME countries.

Table 6.8b
Panel cointegration tests for heterogeneous panel - Constant + Trend

	Algeria	Libya	Morocco	Mauritania	Tunisia	EU	ME
Panel-*v*	1.606	-0.269	1.985**	0.974	3.501***	2.945**	3.501***
Panel-*ρ*	-1.529	-4.453***	-4.877***	-5.134***	-3.719***	-4.123***	-4.119***
Panel-*t*	-4.080***	-3.125***	-2.533**	-3.843***	-2.216**	-1.642*	-2.416**
Panel-*adf*	-1.966**	-3.110***	-3.235***	-3.834***	-1.132	-1.381	-1.931*
Group-*ρ*	-1.447	-4.284***	-5.059***	-5.059***	-4.457***	-4.683***	-4.557***
Group-*t*	-4.563***	-0.562	-1.978**	-1.333	-2.628**	-2.627**	-2.122**
Group-*adf*	-2.122**	-0.664	-2.104**	-0.085	-1.122	-2.345**	-1.821*

Notes. All statistics are from Pedroni's procedure (1999) which is the adjusted values can be compared to the N(0,1) distribution. Panel v is a nonparametric variance ratio statistic. Panel-*p* and panel-*t* are analogous to the nonparametric. Phillips-Perron *p* and *t* statistics respectively. Panel-*adf* is a parametric statistic based on the augmented Dickey-Fuller ADF statistic. Group-*p* is analogous to the Phillips-Perron p statistic. Group-*t* and group-*adf* are analogous to the Phillips-Perron *t* statistic and the augmented Dickey- Fuller ADF statistic respectively. The Pedroni (2004) statistics are one-sided tests with a critical value of 1.64 ($k < -1.64$ implies rejection of the null), except the u-statistic that has a critical value of 1.64 ($k > 1.64$ suggests rejection of the null). Note that the means and variances used to calculate the Pedroni statistics are reported in Pedroni (1999). ***, **, * indicates rejection of the null hypothesis of no-cointegration at 1%, 5%, and 10% level of significance. EU - European Union; ME - Middle East

According to Table 6.8, we found that most of the panel statistics are more reliable in constant plus time trend compared to the panel statistic in constant. As indicated by the panel non-parametric (*t*-statistic) and parametric (*adf*-statistic) statistics as well as group statistics that are analogous to the IPS-test statistics, the null hypothesis of non cointegration is rejected at the 1 per cent level of significance. These results also imply that taken as a group, the cointegration among the AMU countries and between the AMU and the selected EU and the ME countries does hold over the estimation period.

6.4 Cointegration Estimation Results - FMOLS

The previous section already confirmed that all variables among the AMU countries and between the AMU and the selected EU and the ME countries are cointegrated. In other words, there long run equilibrium exists among the variables. This section discusses the estimated long-run equation. Following Pedroni (2000 and 2001), cointegrating explanatory variables for the data is estimated using the Fully Modified OLS (FMOLS) technique.

Dreger and Reimers (2005) pointed out that it is important to take note that the panel cointegration tests do not provide an estimate of the long run relationship. More or less, the cointegration vector should be common for the panel members, as fundamental economic principles are involved. Moreover, hypothesis testing is a critical issue. In fact, the asymptotic distribution of the OLS estimator depends on nuisance parameters.

In a panel environment, this problem seems to be more serious, as the bias can accumulate with the size of the cross section. As Pedroni (2000) showed, the problem is amplified in a panel setting by the potential dynamic heterogeneity over the cross-sectional dimension. Specifically, as this dimension increases, second order biases could be expected to occur by the poor performance of the estimators designed for large samples as they are averaged over the panel's members. For this reason, the modified FMOLS methodology make inferences in cointegrated panels with heterogeneous dynamics as the cross-sectional dimension becomes large even with relatively short time series (Al-Aswad and Harb, 2005).

Libya in Table 6.9a, the estimate of coefficient for real gross domestic products of exporter ($lnGDP_{it}$) is positive (25.59) and statistically significant at the 10 per cent level. The estimate coefficient for local ($lnPOP_{it}$) and target population ($lnPOP_{jt}$) are positive (36.59 and 0.03, respectively) and statistically significant at 1 per cent level. The estimate of target country's foreign currency reserves (FCR_{ij}) is positive (0.09) and statistically significant at 5 per cent level. These results show that real gross domestic products of exporter, local and target population, and target country's foreign currency reserves increase trade flow, which means that there is a long run cointegration between that variables and trade from among the AMU to the Algeria. As for Libya from Table 6.9 a also showed that real gross domestic products of importer (GDP_{jt}), the real exchange rate between the two countries (RER_{ijt}), and trade openness ($OPENNESS_{ij}$) are statistically not significant.

Morocco in Table 6.9a, the estimate coefficient for real gross domestic products of exporter ($lnGDP_{it}$) is positive (9.62) and statistically significant a 5 per cent level. The estimate of coefficient for local ($lnPOP_{it}$) and target population ($lnPOP_{jt}$) are positive (6.65 and 0.01) and statistically significant at 5 per cent and 1 per cent level, respectively. The estimate target country's foreign currency reserves (FCR_{ij}) is positive (1.04) and statistically significant at 1 per cent level. The estimate of the real exchange rate between the two countries (RER_{ijt}) are positive (0.24) and statistically significant at 1 per cent level. The estimate of trade openness ($OPENNESS_{ij}$) is positive (0.07) and statistically significant at 1 per cent level. These results show that all independent variables except real gross domestic products of importer (GDP_{jt}) have a long run cointegration to trade from among AMU to Algeria.

Mauritania and Tunisia in Table 6.9a, the estimate of coefficient for real gross domestic products of importer (GDP_{jt}) are positive (14.40 and 2.55, respectively) and statistically significant at the 5 per cent level. The estimate coefficient for local ($lnPOP_{it}$) is positive (2.55) and statistically significant at 10 per cent level only in Tunisia. The estimate of coefficient target population ($lnPOP_{jt}$) in Mauritania and Tunisia are positive (0.03) and statistically significant at 1 per cent level. The estimate of target country's foreign currency reserves (FCR_{ij}) are positive (0.01 and 0.09, respectively) and statistically significant at 1 per cent level. The estimate of the real exchange rate between the two countries (RER_{ijt}) are positive (0.14 and 0.50, respectively) and statistically significant at 1 per cent level. The estimate of trade openness ($OPENNESS_{ij}$) are positive (0.20 and 0.25, respectively) and statistically significant at 1 per cent level. These results show

that all independent variables except real gross domestic products of exporter ($lnGDP_{it}$) and local ($lnPOP_{it}$) only for Mauritania have a long run cointegration to trade from among the AMU to the Algeria.

Table 6.9a
Algeria - FMOLS (Individual) Results, With Time Dummies
Dependent variable: Trade (lnY_{ijt})

	$lnGDP_{it}$	$lnGDP_{jt}$	$lnPOP_{it}$	$lnPOP_{jt}$	$lnFCR_{ij}$	$lnRER_{ij}$	$lnOPENNESS_{ij}$
Libya	25.59* (1.70)	21.53 (1.37)	36.59*** (6.73)	0.03*** (9.82)	0.09** (2.39)	1.74 (1.30)	0.23 (11.91)
Morocco	9.62** (2.18)	7.16 (1.59)	6.65** (2.70)	0.01*** (5.88)	1.04*** (8.49)	0.24*** (8.45)	0.07*** (4.87)
Mauritania	4.31 (1.01)	14.40** (2.34)	10.61 (1.32)	0.03*** (5.49)	0.01*** (5.35)	0.14*** (9.60)	0.20*** (7.83)
Tunisia	1.17 (0.30)	2.55** (2.11)	2.38* (1.80)	0.03*** (3.67)	0.09*** (6.87)	0.50*** (3.68)	0.25*** (5.99)

In relationship between the Algeria and among other AMU countries in Table 6.9a, most of the variables reported that tests reject the null hypotheses of non cointegration at 1 per cent and 5 per cent level. While in Table 6.9b, real gross domestic products of exporter and importer (GDP_{ij} and GDP_{jt} respectively) are statistically not significant but

other variables reported that tests reject the null hypotheses of non cointegration at 1 per cent level.

Table 6.9b
Algeria - FMOLS (Group) Results, With Time Dummies
Dependent variable: Trade (lnY_{ijt})

$lnGDP_{it}$	$lnGDP_{jt}$	$lnPOP_{it}$	$lnPOP_{jt}$	$lnFCR_{ij}$	$lnRER_{ij}$	$lnOPENNESS_{ij}$
1.99	0.42	6.85***	0.02***	0.08***	0.29***	0.14***
(1.18)	(1.25)	(5.41)	(6.08)	(3.12)	(3.78)	(6.41)

From table 6.10a, Algeria estimate coefficient for real gross domestic products of exporter and importer [($lnGDP_{it}$) and (GDP_{jt})] are positive (8.07 and 0.18, respectively) and statistically significant at 1 per cent and 5 per cent level. The estimate coefficient for local ($lnPOP_{it}$) is positive (0.12) and statistically significant at the 1 per cent level. The estimation of the real exchange rate between the two countries (RER_{ijt}), and trade openness ($OPENNESS_{ij}$) are positive; 0.55 and 0.20, respectively and statistically significant at the 1 per cent and 5 per cent level. These results show that real gross domestic products of exporter and importer, local population, and real exchange rate increase trade flow, which means that there is a long run cointegration between that variables and trade from among AMU to Libya.

Table 6.10a, showed that Morocco n Tunisia the estimated the coefficient for real gross domestic products of exporter and importer [($lnGDP_{it}$) and (GDP_{jt})] are positive (2.26 and 0.05 for Morocco and 2.31 and 0.01 for Tunisia, respectively) and statistically significant at the 5 per cent and 1 per cent level. The estimate of coefficient for local population ($lnPOP_{it}$) and target population ($lnPOP_{jt}$) are positive (0.01 and 0.52 for Morocco, 0.05 and 0.19 for Tunisia, respectively) and statistically significant at 1 per

cent level. The estimate of target country's foreign currency reserves (FCR_{ij}) is positive (0.12 for Morocco and 0.58 for Tunisia) and statistically significant at 1 per cent level. The estimate of the real exchange rate between the two countries (RER_{ijt}) is positive (0.02) and statistically significant at 1 per cent level for Morocco but not statistically significant for Tunisia. The estimate of trade openness ($OPENNESS_{ij}$) is positive (0.17 for Morocco and 0.37 for Tunisia, respectively) and statistically significant at 1 per cent level. These results show that all independent variables have a long run cointegration to trade from among AMU to Libya.

Table 6.10a, showed that Mauritania estimated the coefficient for real gross domestic products of exporter (GDP_{jt}) is positive (0.57) and statistically significant at the 1 per cent level. The estimate of coefficient for local ($lnPOP_{it}$) and target population ($lnPOP_{jt}$) are positive (0.05 and 0.33, respectively) and statistically significant at 1 per cent level. The estimate target for the country's foreign currency reserves (FCR_{ij}) is positive (0.37) and statistically significant at the 1 per cent level. The estimate of the real exchange rate between the two countries (RER_{ijt}) is positive (0.21) and statistically significant at 1 per cent level. The estimate of trade openness ($OPENNESS_{ij}$) is positive (0.05) and statistically significant at 1 per cent level. These results showed that all independent variables have a long run cointegration to trade among the AMU and Libya.

The relationship between Libya and other AMU countries in Table 6.9a, most of the variables reported that tests reject the null hypotheses of non cointegration at 1 per cent

and 5 per cent level. While in Table 6.10b, all variables reported that tests reject the null hypotheses of non cointegration at the 1 per cent level.

Table 6.10a
Libya - FMOLS (Individual) Results, With Time Dummies
Dependent variable: Trade (lnY_{ijt})

	$lnGDP_{it}$	$lnGDP_{jt}$	$lnPOP_{it}$	$lnPOP_{jt}$	$lnFCR_{ij}$	$lnRER_{ij}$	$lnOPENNESS_{ij}$
Algeria	8.07** (2.09)	0.18*** (5.66)	0.12*** (9.05)	0.51 (0.63)	1.39 (0.28)	0.55*** (5.03)	0.20** (2.00)
Morocco	2.26** (2.24)	0.05*** (8.03)	0.01*** (10.85)	0.52*** (9.32)	0.12*** (7.03)	0.02*** (8.94)	0.17*** (7.85)
Mauritania	0.24 (0.88)	0.57*** (3.83)	0.05*** (7.18)	0.33*** (10.90)	0.37*** (9.25)	0.21*** (5.16)	0.05*** (12.38)
Tunisia	2.31*** (10.95)	0.01*** (9.52)	0.05*** (8.95)	0.19*** (8.18)	0.58*** (13.73)	0.73 (0.85)	0.37*** (7.84)

Table 6.10b
Libya - FMOLS (Group) Results, With Time Dummies
Dependent variable: Trade (lnY_{ijt})

$lnGDP_{it}$	$lnGDP_{jt}$	$lnPOP_{it}$	$lnPOP_{jt}$	$lnFCR_{ij}$	$lnRER_{ij}$	$lnOPENNESS_{ij}$
2.57*** (8.24)	0.03*** (8.53)	0.04*** (12.62)	0.14*** (9.74)	0.26*** (9.23)	0.12*** (10.20)	0.14*** (6.40)

In Table 6.11a, the estimate of coefficient for real gross domestic products of exporter ($lnGDP_{it}$) are positive (6.00 and 2.09, respectively) and statistically significant at 1 per cent and 5 per cent level for Algeria and Mauritania. But both countries have no statistically significant for real domestic product of importer (GDP_{jt}) and local population ($lnPOP_{it}$). The estimate of coefficient for target population ($lnPOP_{it}$) are positive (0.01 and 0.11, respectively) and statistically significant at the 1 per cent level for both countries. The estimate of target country's foreign currency reserves (FCR_{ij}) are positive (0.07 for Algeria and 0.11 for Mauritania) and statistically significant at the 1 per cent and 5 per cent level. The estimate of the real exchange rate between the two countries (RER_{ijt}) is positive (0.07 for Algeria and 0.46 for Mauritania) and statistically significant at 1 per cent level. The estimate of trade openness ($OPENNESS_{ij}$) is positive (0.04 for Algeria and 0.22 for Mauritania) and statistically significant at 1 per cent level. These results show that all independent variables have a long run cointegration to trade between AMU and Morocco.

Libya in Table 6.10a, indicate that Libya estimate of coefficient for real gross domestic products of exporter and importer [($lnGDP_{it}$) and (GDP_{jt})] are positive (9.60 and 5.37) and statistically significant at 1 per cent and 5 per cent level, respectively. The estimate of coefficient for local ($lnPOP_{it}$) and target population ($lnPOP_{jt}$) are positive (0.5.64 and 0.01) and statistically significant at 5 per cent and 1 per cent level, respectively. The target country's foreign currency reserves (FCR_{ij}) is statistically not significant but the estimate of the real exchange rate (RER_{ijt}) is positive (0.18) and statistically significant

at 1 per cent level. The estimate of trade openness ($OPENNESS_{ij}$) is positive (0.36) and statistically significant at 1 per cent level. These results show that most of independent variables have a long run cointegration to trade among the AMU and the Morocco.

Tunisia in Table 6.11a, indicate Tunisia estimate of coefficient for real gross domestic products of exporter and importer [($lnGDP_{it}$) and (GDP_{jt})] are positive (9.54 and 0.57) and statistically significant at 5 per cent level. The estimate coefficient for target population ($lnPOP_{jt}$) is positive (0.02) and statistically significant at the 1 per cent level, but we found that the local population ($lnPOP_{it}$) is statistically not significant. The estimate of target country's foreign currency reserves (FCR_{ij}) is positive (0.22) and statistically significant at 1 per cent level. The estimate of the real exchange rate between the two countries (RER_{ijt}) is positive (0.31) and statistically significant at 1 per cent level. The trade openness ($OPENNESS_{ij}$) is statistically not significant. These results show that most independent variables have a long run cointegration to trade from among the AMU and Libya.

In relationship between Morocco and other AMU countries in Table 6.11a, most of the variables reported that tests reject the null hypotheses of non cointegration at 1 per cent and 5 per cent level. While in Table 6.11b, most variables reported that tests reject the null hypotheses of non cointegration at 1 per cent level.

Table 6.11a
Morocco - FMOLS (Individual) Results, With Time Dummies
Dependent variable: Trade (lnY_{ijt})

	$lnGDP_{it}$	$lnGDP_{jt}$	$lnPOP_{it}$	$lnPOP_{jt}$	$lnFCR_{ij}$	$lnRER_{ij}$	$lnOPENNESS_{ij}$
Algeria	6.00*** (4.16)	0.39 (0.46)	1.39 (0.47)	0.01*** (6.29)	0.07*** (3.13)	0.07*** (3.03)	0.04*** (5.58)
Libya	9.60*** (3.44)	5.37** (2.26)	5.64** (2.74)	0.01*** (10.84)	1.26 (1.26)	0.18*** (10.14)	0.36*** (7.06)
Mauritania	2.09** (2.63)	0.85 (0.24)	0.04 (0.82)	0.11*** (5.49)	0.11** (2.51)	0.46*** (5.37)	0.22*** (6.43)
Tunisia	9.54** (2.39)	0.53** (2.91)	0.75 (0.42)	0.02*** (3.94)	0.22*** (8.14)	0.31*** (6.01)	1.32 (0.30)

Table 6.11b
Morocco - FMOLS (Group) Results, With Time Dummies
Dependent variable: Trade (lnY_{ijt})

$lnGDP_{it}$	$lnGDP_{jt}$	$lnPOP_{it}$	$lnPOP_{jt}$	$lnFCR_{ij}$	$lnRER_{ij}$	$lnOPENNESS_{ij}$
3.34* (1.96)	0.08 (1.51)	3.99*** (3.50)	0.02*** (6.49)	0.12** (2.80)	0.20*** (3.21)	0.34*** (4.33)

Libya and Tunisia in Table 6.12a, the estimate of coefficient for real gross domestic products of exporter and importer [($lnGDP_{it}$) and (GDP_{jt})] are positive (2.23 and 2.29

for Libya and 0.05 and 0.01 for Tunisia, respectively) and statistically significant at the 1 per cent and 5 per cent level. The estimate of coefficient for local ($lnPOP_{it}$) and target population ($lnPOP_{jt}$) are positive (0.01 and 0.54 for Libya and, 0.20 and 0.61 for Tunisia, respectively) and statistically significant at 1 per cent level. The estimate target country's foreign currency reserves (FCR_{ij}) are positive; 0.12 for Libya and 0.61 for Tunisia and statistically significant at 1 per cent level for both countries. The estimate of the real exchange rate between the two countries (RER_{ijt}) are positive; 0.03 for Libya and 0.08 for Tunisia and statistically significant at 1 per cent level for that both countries. The estimate of trade openness ($OPENNESS_{ij}$) are positive for Libya and Tunisia (0.03 and 0.58, respectively) and statistically significant at 1 per cent level. These results show that all independent variables have a long run cointegration to trade among the AMU and Mauritania.

Table 6.10a, showed that Algeria and Morocco estimate of coefficient for real gross domestic products of exporter and importer [($lnGDP_{it}$) and (GDP_{jt})] are positive (4.37 and 0.08, respectively) and statistically significant at 5 per cent and 1 per cent level for Algeria. But we found that only the real gross domestic product of importer (GDP_{jt}) has impact on trade in Morocco, means that the estimate of coefficient for real gross domestic products of importer (GDP_{jt}) is positive (0.61) and statistically significant at the 1 per cent level. The estimate of coefficient for local ($lnPOP_{it}$) and target population ($lnPOP_{jt}$) are positive (0.05 and 0.10 for Algeria and 0.09 and 0.35 for Morocco, respectively) and statistically significant at 1 per cent level. The estimate target country's foreign currency reserves (FCR_{ij}) are positive (0.63 for Algeria and 0.38 for

Morocco, respectively) and statistically significant at 1 per cent level. The estimate of the real exchange rate between the two countries (RER_{ijt}) are positive (4.97 for Algeria and 0.13 for Morocco) and statistically significant at 5 per cent and 1 per cent level. The estimate of trade openness ($OPENNESS_{ij}$) is positive (0.15) and statistically significant at 1 per cent level for Morocco only. These results show that most independent variables have a long run cointegration trade among the AMU and Mauritania.

In relationship between Libya and among other AMU countries in Table 6.9a, most of the variables reported that tests reject the null hypotheses of non cointegration at 1 per cent and 5 per cent level. While in Table 6.12b, all variables reported that tests reject the null hypotheses of non cointegration at 1 per cent level.

Table 6.12a
Mauritania - FMOLS (Individual) Results, With Time Dummies
Dependent variable: Trade (lnY_{ijt})

	$lnGDP_{it}$	$lnGDP_{jt}$	$lnPOP_{it}$	$lnPOP_{jt}$	$lnFCR_{ij}$	$lnRER_{ij}$	$lnOPENNESS_{ij}$
Algeria	4.37***	0.08***	0.05***	0.09***	0.63*	4.97**	0.18
	(5.96)	(3.89)	(6.26)	(8.77)	(1.72)	(2.80)	(1.55)
Libya	2.23**	0.05***	0.01***	0.54***	0.12***	0.03***	0.03***
	(2.21)	(8.05)	(4.85)	(8.61)	(7.14)	(9.19)	(3.96)
Morocco	0.10	0.61***	0.10***	0.35**	0.38**	0.13***	0.15***
	(1.21)	(3.95)	(4.06)	(2.67)	(2.29)	(3.31)	(6.66)
Tunisia	2.29***	0.01***	0.04***	0.20***	0.61***	0.08***	0.58***
	(10.35)	(5.16)	(9.61)	(7.35)	(7.59)	(4.61)	(4.38)

Table 6.12b
Mauritania - FMOLS (Group) Results, With Time Dummies
Dependent variable: Trade (lnY_{ijt})

$lnGDP_{it}$	$lnGDP_{jt}$	$lnPOP_{it}$	$lnPOP_{jt}$	$lnFCR_{ij}$	$lnRER_{ij}$	$lnOPENNESS_{ij}$
2.25***	0.02***	0.04***	0.18***	0.21***	0.27***	0.03***
(9.78)	(9.71)	(4.67)	(3.69)	(3.05)	(4.12)	(4.12)

Table 6.13a and Table 6.13b explained the relationship between Tunisia and others AMU countries. Algeria in Table 6.12a, the estimate of coefficient for real gross domestic products of exporter and importer [($lnGDP_{it}$) and (GDP_{jt})] are positive (4.37 and 0.08, respectively) and statistically significant at the 1 per cent level. The estimate of coefficient for local ($lnPOP_{it}$) and target population ($lnPOP_{jt}$) are positive (0.05 and 0.09, respectively) and statistically significant at the 1 per cent level. The estimate of target country's foreign currency reserves (FCR_{ij}) is positive; 0.63 and statistically significant at the 10 per cent level. The estimate of the real exchange rate between the two countries (RER_{ijt}) is positive; 4.97 and statistically significant at 5 per cent level. The estimate of trade openness ($OPENNESS_{ij}$) is positive (0.18) and statistically significant at 5 per cent level. These results show that all independent variables have a long run cointegration to trade from among AMU to Tunisia.

In Table 6.10a, the estimate of coefficient for real gross domestic products of exporter and importer [($lnGDP_{it}$) and (GDP_{jt})] are positive (2.23 and 0.05 for Libya, 2.29 and 0.01 for Mauritania, and 0.61 for Morocco in real gross product of importer (GDP_{jt})) and statistically significant at the 5 per cent and 1 per cent level. The estimate of coefficient for local ($lnPOP_{it}$) and target population ($lnPOP_{jt}$) are positive (0.01 and 0.54 for Libya, 0.10 and 0.35 for Morocco, and 0.04 and 0.20 for Mauritania) and statistically significant at the 1 per cent and 5 per cent level. The estimate of target country's foreign currency reserves (FCR_{ij}) are positive (0.12 for Libya, 0.38 for Morocco, and 0.61 for Mauritania) and statistically significant at the 1 per cent level. The estimate of the real

exchange rate between the two countries (RER_{ijt}) are positive (0.03 for Libya and 0.13 for Morocco) and statistically significant at 1 per cent level. The estimate of trade openness ($OPENNESS_{ij}$) is positive (0.01 for Morocco and 0.01 for Mauritania) and statistically significant at 1 per cent level for Morocco only. These results show that most of independent variables have a long run cointegration to trade from among AMU to Tunisia.

In relationship between Tunisia and among other AMU countries in Table 6.13a, most of the variables reported that tests reject the null hypotheses of non cointegration at 1 per cent and 5 per cent level. While in Table 6.13b, most of the variables reported that tests reject the null hypotheses of non cointegration at the 5 per cent and 1 per cent level.

Table 6.13a
Tunisia - FMOLS (Individual) Results, With Time Dummies
Dependent variable: Trade (lnY_{ijt})

	$lnGDP_{it}$	$lnGDP_{jt}$	$lnPOP_{it}$	$lnPOP_{jt}$	$lnFCR_{ij}$	$lnRER_{ij}$	$lnOPENNESS_{ij}$
Algeria	4.37*** (5.96)	0.08*** (3.89)	0.05*** (6.26)	0.09*** (8.77)	0.63* (1.72)	4.97** (2.80)	0.18** (11.55)
Libya	2.23** (2.21)	0.05*** (8.05)	0.01*** (4.85)	0.54*** (8.61)	0.12*** (7.14)	0.03*** (9.19)	0.80 (0.42)
Morocco	0.10 (1.21)	0.61*** (3.95)	0.10*** (4.06)	0.35** (2.67)	0.38** (2.29)	0.13*** (3.31)	0.01*** (6.76)
Mauritania	2.29*** (10.35)	0.01*** (4.16)	0.04*** (9.61)	0.20*** (7.35)	0.61*** (7.59)	0.08 (4.61)	0.43*** (6.07)

Table 6.13b
Tunisia - FMOLS (Group) Results, With Time Dummies
Dependent variable: Trade (lnY_{ijt})

$lnGDP_{it}$	$lnGDP_{jt}$	$lnPOP_{it}$	$lnPOP_{jt}$	$lnFCR_{ij}$	$lnRER_{ij}$	$lnOPENNESS_{ij}$
2.25*** (9.78)	0.02*** (8.71)	0.04*** (4.67)	0.18*** (3.69)	0.21*** (3.05)	0.27*** (4.12)	0.01** (2.61)

Table 6.14a and Table 6.14b explained the relationship between selected European Union (EU) namely Italy, Spain and France and AMU countries. Spain in Table 6.14a, the estimate of coefficient for real gross domestic products of exporter and importer [($lnGDP_{it}$) and (GDP_{jt})] are positive (14.64 and 0.02, respectively) and statistically significant at 10 per cent and 1 per cent level. The estimate of coefficient for local ($lnPOP_{it}$) and target population ($lnPOP_{jt}$) are positive (11.62 and 0.26, respectively) and statistically significant at 5 per cent and 1 per cent level. The estimate of target country's foreign currency reserves (FCR_{ij}) is positive; 0.07 and statistically significant at the 1 per cent level. The estimate of the real exchange rate between the two countries (RER_{ijt}) is positive; 4.55 and statistically significant at 10 per cent level. The estimate of trade openness ($OPENNESS_{ij}$) is positive (0.19) and statistically significant at 1 per cent level. These results show that all independent variables have a long run cointegration to trade from the selected EU to the AMU.

In Table 6.10a, the estimate of coefficient for real gross domestic products of importer [(GDP_{jt})] are positive (0.01 for Italy, 0.03 for France)] and statistically significant at 5 per cent and 1 per cent level. But the real gross products of exporter ($lnGDP_{it}$) is statistically not significant. Local ($lnPOP_{it}$) and target population ($lnPOP_{jt}$) are statistically not significant in Italy but only statistically significant in target population ($lnPOP_{jt}$) for France where the estimate of coefficient is positive (0.25) and statistically significant at 1 per cent level. The estimate of target country's foreign currency reserves (FCR_{ij}) are positive (5.23 for Italy and 0.05 for France) and statistically significant at 1 per cent level. The real exchange rate for both countries (RER_{ijt}) are statistically not

significant. The estimate of trade openness ($OPENNESS_{ij}$) is positive (0.12) and statistically significant at 1 per cent level for France but not for Italy. These results show that most of the independent variables have a long run cointegration to trade from the AMU to the selected EU countries.

In relationship between the AMU countries and the selected EU countries in Table 6.14a, most of the variables reported that tests reject the null hypotheses of non cointegration at 1 per cent and 5 per cent level. While in Table 6.14b, most of variables reported that tests reject the null hypotheses of non cointegration at the 1 per cent level.

Table 6.14a
European Union (EU) - FMOLS (Individual) Results, With Time Dummies
Dependent variable: Trade (lnY_{ijt})

	$lnGDP_{it}$	$lnGDP_{jt}$	$lnPOP_{it}$	$lnPOP_{jt}$	$lnFCR_{ij}$	$lnRER_{ij}$	$lnOPENNESS_{ij}$
Italy	3.53 (0.39)	0.01** (2.54)	0.49 (0.39)	0.76 (0.97)	5.23*** (9.25)	0.16 (0.47)	1.92 (1.63)
Spain	14.64* (1.95)	0.02*** (9.87)	11.62** (2.47)	0.26*** (8.33)	0.07*** (9.10)	4.55* (1.68)	0.19*** (9.44)
France	1.15 (0.02)	0.03*** (3.76)	1.55 (0.65)	0.25*** (10.46)	0.05*** (8.39)	0.80 (0.09)	0.12** (2.22)

Table 6.14b
European Union (EU) - FMOLS (Group) Results, With Time Dummies
Dependent variable: Trade (lnY_{ijt})

$lnGDP_{it}$	$lnGDP_{jt}$	$lnPOP_{it}$	$lnPOP_{jt}$	$lnFCR_{ij}$	$lnRER_{ij}$	$lnOPENNESS_{ij}$
1.06	0.02***	0.21***	0.25***	0.29***	0.34	2.72
(1.56)	(3.69)	(3.34)	(3.50)	(5.69)	(1.40)	(1.54)

Table 6.15a and Table 6.15b explained the relationship between the selected Middle East (ME) namely Egypt, Lebanon and Syria and AMU countries. Egypt in Table 6.14a, estimate of coefficient for real gross domestic products of exporter and importer [($lnGDP_{it}$) and (GDP_{jt})] are positive (3.79 and 0.31, respectively) and statistically significant at 1 per cent level. The estimate of coefficient for local ($lnPOP_{it}$) and target population ($lnPOP_{jt}$) are positive (0.66 and 0.40, respectively) and statistically significant at 5 per cent and 1 per cent level. The estimate of target country's foreign currency reserves (FCR_{ij}) is positive; 4.75 and statistically significant at 1 per cent level. The estimate of the real exchange rate between the two countries (RER_{ijt}) is positive; 0.09 and statistically significant at 1 per cent level. The estimate trade openness ($OPENNESS_{ij}$) is positive (0.22) and statistically significant at 1 per cent level. These results show that all independent variables have a long run cointegration to trade from the selected ME to AMU.

In Table 6.10a, the estimate of coefficient for real gross domestic products of exporter and importer [($lnGDP_{it}$) and (GDP_{jt})] are positive (2.56 and 0.22 for Italy and 4.76 and

0.43 for Syria)] and statistically significant at 5 per cent and 1 per cent level. Local population ($lnPOP_{it}$) are statistically not significant for both countries but the estimate of coefficient for target population ($lnPOP_{jt}$) are positive (0.26 for Lebanon and 0.23 for Syria) and statistically significant at 1 per cent level. The estimate of target country's foreign currency reserves (FCR_{ij}) are positive (0.03 for Lebanon and 0.10 for Syria) and statistically significant at the 1 per cent level. The estimate of the real exchange rate for both countries (RER_{ijt}) are positive (0.06 for Lebanon and 0.13 for Syria) statistically significant at 1 per cent level. The estimate of trade openness ($OPENNESS_{ij}$) is positive (0.10 for Lebanon and 0.06 for Syria) and statistically significant at 1 per cent level for France but not for Italy. These results show that most of independent variables have a long run cointegration to trade from the AMU to the selected EU countries.

In relationship between the AMU countries and the selected EU countries in Table 6.15a, most of the variables reported that tests reject the null hypotheses of non cointegration at 1 per cent and 5 per cent level. While in Table 6.15b, most of variables reported that tests reject the null hypotheses of non cointegration at the 1 per cent level.

Table 6.15
Middle East (ME) - FMOLS (Individual) Results, With Time Dummies
Dependent variable: Trade (lnY_{ijt})

	$lnGDP_{it}$	$lnGDP_{jt}$	$lnPOP_{it}$	$lnPOP_{jt}$	$lnFCR_{ij}$	$lnRER_{ij}$	$lnOPENNESS_{ij}$
Egypt							
	3.79***	0.31***	0.66***	0.40**	4.75***	0.09***	0.22***
	(4.69)	(6.52)	(7.29)	(2.38)	(7.65)	(6.35)	(8.74)
Lebanon							
	2.56***	0.22**	0.01	0.26***	0.03***	0.06***	0.10***
	(5.53)	(2.95)	(0.96)	(6.70)	(8.81)	(8.39)	(11.35)
Syria							
	4.76***	0.43***	2.42	0.23***	0.10***	0.13***	0.06***
	(5.23)	(5.83)	(1.06)	(3.23)	(8.47)	(3.23)	(8.03)

Table 6.15b
Middle East (ME) - FMOLS (Group) Results, With Time Dummies
Dependent variable: Trade (lnY_{ijt})

$lnGDP_{it}$	$lnGDP_{jt}$	$lnPOP_{it}$	$lnPOP_{jt}$	$lnFCR_{ij}$	$lnRER_{ij}$	$lnOPENNESS_{ij}$
2.53***	0.48***	1.64***	0.21***	0.37***	0.14***	0.03***
(11.11)	(3.60)	(4.30)	(3.09)	(5.65)	(6.14)	(5.94)

6.5 Conclusion

This chapter is devoted in analyzing the empirical model as discussed in the Chapter Four (equation 4.8) to find out the possible answers for third objectives of this study. Section 6.1 examines the nature of each variable in panel unit root test as well as equation. In general, we could say that the integration order of the series are consistently $I(1)$. For this reason, panel cointegration (Pedroni; 1999 and 2004) approach is applicable.

Section 6.2 provides the panel cointegration test based on Pedroni's procedure (1999 and 2004). Generally, we found that all the variables are cointegrated in the model. Therefore, the long run equation is extracted from the Fully Modified OLS (FMOLS) analysis (Pedroni; 1996, 2000, 2001) and they are presented in Section 6.3.

CHAPTER 7

CONCLUSIONS AND POLICY IMPLICATIONS

7.1 Introduction

This chapter provides the summary, conclusion, policy implications related to the findings (as discussed in Chapter 5 and Chapter 6), limitations of the study, and suggestions for future study.

7.2 Summary

Trade flow are important for the process of growth since in the past, national economy were relatively self-contained entities, isolated from each other by barriers to cross-border trade and investment; by distance, time-zones, and language; and by national differences in government regulations, culture, and business systems. As these barriers are being minimized by taking different initiatives, the contribution of cross-border trade to the development of national economy is becoming significant.

Over the last decade, the Arab Maghreb Union countries have increased their trade integration into the world economy, including in the context of the Association Agreements between the European Union and Arab Maghreb countries. However, there is a debate that, whether the Arab Maghreb countries achieve the goals of this regional cooperation or not. Although empirical research on the trade of the Arab Maghreb Union

countries is limited, there is a room for us to study the important of trade in the Arab Maghreb Union. A useful tool in the determination of the export potential of a country is a gravity model. The model has its foundations in physical science and has become an important tool in the analysis of bilateral trade flows. Tinbergen (1962) and Poyhonen (1963) pioneered the idea of explaining trade flows in analogy to Newtons's law of gravity by the attraction of two countries' masses, weakened by distance between them and enforced by trade agreements they belong to. The masses of countries are measured by GDP or population, and transport costs are proxied by the distance between countries. As in physical science, the bigger and closer the units are to each other, the stronger the attraction. The analogy with gravity derives from GDP being a measure of economic mass and distance as a measure of resistance. The gravity model is used to investigate the relationship between the volume and the direction of international trade and the formation of regional trade blocks. The model is augmented with a number of variables to test whether they are relevant in explaining trade flows between countries. These variables include GDP, distance, infrastructure endowment, differences in per capita income and exchange rate (Eita and Jordaan, 2007).

The appropriate estimation method and related econometric issues have been shown to have a significant impact on the quality of the estimation results. Firstly, results contained in Morgenroth (2002) show that the choice of sample is important for studies which aim to predict potential trade between certain countries since significant parameter differences were found for estimates using alternative samples. We formulated a simple gravity model which is based on the augmented version of the standard gravity model in which the impact of trade between the trade variable and

GDP, population, distance, the foreign currency reserve, the real exchange rate, openness, language, and trading agreements among Arab Maghreb Union (AMU) countries which is intra-trade and inter-trade between AMU and European Union (EU) and Middle East (ME).

We have attempted to investigate the statistical properties of the explanatory variables within panel context using the Levin Lin and Chin (LLL) and Im, Pesaran and Shin (IPS) statistics. The empirical results from the LLC and IPS tests clearly indicate all the series in the model are $I(1)$, which means that they are stationary at first difference, while the results based on the tests for panel cointegration provide empirical support that the variables can be considered as a cointegrated panel system.

Three important findings are extracted from the analysis in accordance to the objectives of this study. Firstly, it determines the determinants of bilateral trade flow between the regional integration among the Arab Maghreb Union countries. Secondly, it determines the determinants of bilateral trade flow between AMU's trade with the selected European Union (EU) and Middle East (ME) countries. These two important findings using gravity model of international trade is empirically tested to investigate the relationship between the volume and direction of international trade and the formation of regional trade blocks where members are in different stages of development. Furthermore, the standard gravity model is augmented with a number of variables to test whether they are relevant in explaining trade. These variables are the trade variable, GDP, population, distance, the foreign currency reserve, the real exchange rate, openness, language, and trading agreements. Finally, we analyse to what extent

potentials for trade between these two economic areas are important (among AMU countries and AMU's countries and EU and ME) used empirical analysis of panel cointegration to investigate the properties of various estimators for such cointegrating vectors in panels with heterogeneous dynamics and to propose feasible statistics that can be used to make reliable inferences about the cointegrating vectors

A summary of the empirical results for all models are presented in Table 7.1 to Table 7.3. Regarding the long run effect of independent variables on trade, we found that by using fixed effect and random effect cointegration test estimators, there is a impact between independent variables and trade even though some variables are not significant effects.

Table 7.1
Summary of the sign of impact effect (Fixed and Random Effects Model)

	Algeria (REM)	Libya (REM)	Mauritania (FEM)	Morocco (REM)	Tunisia (FEM)	EU (FEM)	ME (FEM)
$lnGDP_{it}$	+ (s)	+ (s)	+ (s)	+ (s)	+ (s)	+ (s)	+ (s)
$lnGDP_{jt}$	- (ns)	+ (s)	+ (s)	+ (s)	+ (s)	+ (s)	+ (s)
$lnPOP_{it}$	+ (s)	+ (s)	+ (s)	+ (ns)	+ (s)	+ (s)	+ (s)
$lnPOP_{jt}$	+ (s)	+ (s)	+ (s)	+ (ns)	+ (s)	+ (s)	+ (s)
$lnDINS_{ij}$	- (s)	- (s)	- (s)	- (s)	- (s)*	+ (ns)*	+ (s)*
$lnFCR_{ij}$	+ (s)	+ (s)	+ (s)	+ (s)	+ (s)	+ (s)	+ (s)
$lnRER_{ij}$	+ (ns)	+ (s)	+ (ns)	+ (s)	+(ns)	+ (s)	+ (s)
$lnOPENNES$	+ (s)	+ (s)	+ (s)	+ (s)	+ (s)	+ (s)	+ (s)
$AGMT_{ij}$	- (s)	+ (s)	- (ns)	- (ns)	+ (ns)	+ (ns)	+ (s)
LAN_{ij}	+ (ns)	- (ns)	+ (ns)	+ (ns)	- (ns)	- (ns)	+ (ns)

Note: REM = Random Effects Model; FEM = Fixed Effects Model, s=significant, ns=not significant; * REM

Table 7.2
Summary of the sign of long run effect Fully Modified OLS (FMOLS) Among AMU

	$lnGDP_{it}$	$lnGDP_{jt}$	$lnPOP_{it}$	$lnPOP_{jt}$	$lnFCR_{ij}$	$lnRER_{ij}$	$lnOPENNESS_{ij}$
ALGERIA							
Libya	+(s)	+(ns)	+(s)	+(s)	+(s)	+(ns)	+(ns)
Morocco	+(s)	+(ns)	+(s)	+(s)	+(s)	+(s)	+(s)
Mauritania	+(ns)	+(s)	+(ns)	+(s)	+(s)	+(s)	+(s)
Tunisia	+(ns)	+(s)	+(s)	+(s)	+(s)	+(s)	+(s)
LIBYA							
Algeria	+(s)	+(s)	+(s)	+(ns)	+(ns)	+(s)	+(s)
Morocco	+(s)	+(s)	+(s)	+(s)	+(s)	+(s)	+(s)
Mauritania	+(ns)	+(s)	+(s)	+(s)	+(s)	+(s)	+(s)
Tunisia	+(s)	+(s)	+(s)	+(s)	+(s)	+(ns)	+(s)
MOROCCO							
Algeria	+(s)	+(ns)	+(ns)	+(s)	+(s)	+(s)	+(s)
Libya	+(s)	+(s)	+(s)	+(s)	+(ns)	+(s)	+(s)
Mauritania	+(s)	+(ns)	+(ns)	+(s)	+(s)	+(s)	+(s)
Tunisia	+(s)	+(s)	+(ns)	+(s)	+(s)	+(s)	+(ns)
MAURITANIA							
Algeria	+(s)	+(s)	+(s)	+(s)	+(s)	+(s)	+(ns)
Libya	+(s)	+(s)	+(s)	+(s)	+(s)	+(s)	+(s)
Morocco	+(ns)	+(s)	+(s)	+(s)	+(s)	+(s)	+(s)
Tunisia	+(s)	+(s)	+(s)	+(s)	+(s)	+(s)	+(s)
TUNISIA							
Algeria	+(s)	+(s)	+(s)	+(s)	+(s)	+(s)	+(s)
Libya	+(s)	+(s)	+(s)	+(s)	+(s)	+(s)	+(ns)
Morocco	+(ns)	+(s)	+(s)	+(s)	+(s)	+(s)	+(s)
Mauritania	+(s)	+(s)	+(s)	+(s)	+(s)	+(ns)	+(s)

Table 7.3
Summary of the sign of long run effect Fully Modified OLS (FMOLS): EU & ME

	$lnGDP_{it}$	$lnGDP_{jt}$	$lnPOP_{it}$	$lnPOP_{jt}$	$lnFCR_{ij}$	$lnRER_{ij}$	$lnOPENNESS$
European Union (EU)							
Italy	+(ns)	+(s)	+(ns)	+(ns)	+(s)	+(ns)	+(ns)
Spain	+(s)	+(s)	+(s)	+(s)	+(s)	+(s)	+(s)
France	+(ns)	+(s)	+(ns)	+(s)	+(s)	+(ns)	+(s)
Middle East (ME)							
Egypt	+(s)	+(s)	+(s)	+(s)	+(s)	+(s)	+(s)
Lebanon	+(s)	+(s)	+(ns)	+(s)	+(s)	+(s)	+(s)
Syria	+(s)	+(s)	+(ns)	+(s)	+(s)	+(s)	+(s)

7.3 Conclusion

Using data on bilateral trade between the Arab Maghreb Union (AMU) member countries and several trading partners and blocs over the period 1989-2009, the study reports three important findings. Firstly, our study attempts to identify the important of intra-trade among AMU countries namely Algeria, Libya, Mauritania, Morocco, and Tunisia. The results from the traditional approach which is gravity model, estimates

from the econometric technique indicate that there are strong positive and negative relationship between trade and GDP, population, distance, foreign currency reserves (FOC) and real exchange rate (RER) among AMU countries. These results answered the first objective which is to examine the impact of regional integration on trade among the Maghreb countries. Overall we can conclude that Arab Maghreb Union (AMU) have had mix relationships of intra-regional trade in the Arab Maghreb Union (AMU) countries. This study also shows that AMU's non-traditional trading partners are relatively more openness to AMU's member states trade. On the hand, dummy variables for trading agreement and English language have mix results. As is evident from the study, the existence of a significant correlation between trade flows and openness shows that openness are fairly effective for increasing trade.

Second, this study shows that there is a strong and positive relationship in trade between AMU countries and selected European Union (EU) namely Italy, Spain and France and selected Middle East (ME) namely Egypt, Lebanon and Syria. As is evident from the study, the existence of a significant correlation between trade flow and openness shows that openness is fairly effective for increasing trade. In much the same way, the study findings show that the trade volume of Arab Maghreb Union (AMU) is increasing with its trading partners such as the European Union and Middle East countries. The study uses the gravity model approach to investigate whether AMU activities have trade flows effect. As indicated earlier the empirical results of the study support the view that AMU has trade effect. Accordingly, it is concluded that, other factors constant, AMU has helped to improve trade flows in its member trading. Evidently this study shows that the gravity model is still a useful instrument in analyzing the implications of international

economic integration. In a way, this study established that regional economic integration is plausible and beneficial. These results answered the second objective is to examine the bilateral trade flows between AMU countries with selected European Union (EU) and Middle East (ME) countries..

Third, we estimate our equations using econometric approached. First, in using Levin Lin and Chin (LLC, 2002) and Im, Pesaran and Shin (IPS, 1997) tests, we could say that the integration order of the series are consistently *I*(1). Second, using panel cointgeration proposed by Pedroni (1999 and 2004) and for this reason, panel cointegration approach is applicable. We found that all the variables are cointegrated in the model. Thereafter, the long run equation is extracted from the Fully Modified OLS (FMOLS) analysis (Pedroni; 1996, 2000, 2001). We found a positive and statistically significant impact of trade trade and GDP, population, distance, foreign currency reserves (FOC) and real exchange rate (RER) and openness among AMU countries and also between AMU and European Union (EU) and Middle East (ME).

7.4 Policy Implications

In accordance to the objectives of this study, several policy implications emerged from the analysis. First, identifying that trade direction, this is intra-trade and inter-trade. The intra-trade among AMU is below the expected level, this study clearly identifies that GDP, population, distance, Foreign currency reserve (FOC), and Real Exchange Rate (RER) measures to promote trade relationships and which look like remove barriers to trade is justified. Importantly, there is evidence that the deviation from the expected

level of trade is increasing among AMU especially among Mauritania, Morocco, and Tunisia, further highlighting the need for appropriate policies in population and Real Exchange Rate (RER).

The real exchange rate is best thought of as a facilitating condition as keeping it at competitive levels and can be critical for jump-starting growth. From our study, we found that the real exchange rate gave mix results of significant level. Algeria, Mauritania, and Tunisia have positive and negative impact but not significant into trade among the other AMU countries, while only Libya and Morocco have positive and significant impact into trade. From a policy perspective it is important to consider where resources are most effectively used to promote trade. Furthermore, it is also important to consider the appropriate policy tools as these may well differ between countries. As the global exchange rate system is in a state of flux, it is important for AMU countries to work towards some kind of convergence with respect to exchange rate policies in the immediate term. There has to be a clear understanding among the foreign exchange authorities on the kind of interventions that will have to be made in the near term. This will facilitate increased intra-regional trade transactions.

Greater regional economic integration for the Maghreb countries would yield important benefits by creating a regional market of more than 100 million consumers which is similar in population to many leading trading nations. This would bring efficiency gains and make the region more attractive for foreign investors. And, most importantly, the

complementary economic structures of the Maghreb countries would create opportunities for mutually beneficial trade within the region. .

Our we found that the language is not significant to the Arab Maghreb Union trade more to countries where the official language is English, which suggests that sharing the same language promotes volumes of trade. In economic terms, opening both markets, even in a moderated and progressive way, can be less costly for the EU and more beneficial, from the economic, social and political point of view for the Maghreb countries than paying for not doing so.

Most importantly it is found that geographical distance has significant impact on trade of among AMU and between AMU and EU and ME as well, which means transport costs and other transaction costs. But in recent phenomenon, the trades are more influenced by profitability, easy trade procedures, product delivery time etc., rather than the geographical distance. As a consequence, policy makers need to conduct further serious studies to find out the relationship, if any, between trading pattern, geographical distance and trade of AMU.

7.5 Limitations of the Study

The finding in this study is subject to several limitations. Firstly, the sample size was small, with only 5 countries in Arab Maghreb Union, 3 selected countries in European Union and 3 selected countries in Middle East countries.

Our empirical analysis excludes target countries themselves. The study's only econometric weapons are the gravity equation and panel cointegration equation. Its performance depends on, among other things, the reliability of trade flow data. It is reasonable to suppose that data on trade flows between targets' neighbours and the rest of the world are no less reliable than trade data in general. Neighbours might have an incentive to conceal the origin or final destination of the traded goods but they don't have an incentive to distort the magnitude of trade flows. On the other hand, it is hard to take seriously data on trade flows between targets and anybody else in the world for obvious reasons.

7.6 Suggestion for Further Studies

The empirical work in our study was done on the macroeconomic level, while the analysis of mechanisms through which trade and determinants of trade become effective should involve mostly microeconomic investigation. Also, macroeconomic analysis should be extended to include a more detailed breakdown of trade and determinants of trade by functions and by type. Such a breakdown would allow extension of the analysis and distinguish among various measures to reduce trade distortion and, then, adopted transparency in governance and bureaucracy to improve economic performance. For this purpose some additional variables should be used as control variables. We suggest that further studies on the empirical work should focus also on the implication of the entire mix trade policies and good governance are required in order to improve economic development.

REFERENCES

Abdelkafi, J. (undated), *Le vignoble du Cap Bon (Tunisie)* (The vineyards of Cap Bon (Tunisia)). Available in French http://www.icomos.org/studies/viticoles/viticole23.pdf.

Agostino, M.R., Aiello, F. and Cardamone, P. (2008). Evaluating the impact of non-reciprocal trade preferences using gravity models. *Applied Economics*, ISSN: 0003-6846.

Ahmed A. (2000). *From preferential status to partnership: the Euro-Maghreb relationship* (Hardback)

Al-Awad, M. and Harb, N. (2005). Financial development and economic growth in the Middle East. *Applied Financial Economics*, 15, 1041-1051

Alam, M. M., Uddin, M.G. S. and Taufique, K. M. R. (2009). Import inflows of bangladesh: the gravity model approach, *International Journal of Economics and Finance*, 1(1), 131-140.

Amiot, F. and Salama, O.A. (1996). *Logistical constraints on international trade in the Maghreb, World Bank, Middle East and North Africa*, Country Dept. I, Private Sector Development, Finance and Infrastructure Division (Washington, DC).

Anderson, J. E. & Wincoop, E (2001). Borders, Trade and Welfare, *NBER Working Papers 8515*, National Bureau of Economic Research, Inc. Arab Monetary Fund. http://www.amf.org.ae/.

Arora, V. and Athanasios, V. (2005). How much do trading partners matter for economic growth? *IMF Staff Papers*, 52 (April), 24–40.

Anderson, J.E. and van W.E. (2003). Gravity with gravitas: a solution to the border puzzle. *American Economic Review*, 93(1), 170-192.

Andrés, J. and I. Hernando (1997). Does inflation harm economic growth? Evidence for the OECD. *Paper Presented at the NBER conference on "The Costs and Benefits of Achieving Price Stability*", Federal Reserve Bank of New York (February 20-21, 1997).

Anselin, L. and Griffinh, D. A (1988). Do spatial effects really matter in regression analysis? *Papers of the Regional Science Association*, 25, 11-34.

Asilis, C. M. and Rivera-Batiz, L. (1994). Geography, trade patterns and economic policy, in *The location of economic activity*. Centre for Economic Policy Research.

Bahmani-Oskooee, M. and Hegerty, S.W. (2007). Exchange rate volatility and trade flows: a review article, *Journal of Economic Studies*, 34(3), 211-255.

Bardhan, P. (2006). Globalization and rural poverty. *World Development*, 34: 1393–1404.

Barro, R. and Lee, J.W. (1996). International measures of schooling years and schooling quality. *American Economic Review: Papers and Proceedings*, 86, 218-223.

Bassanini, S., Scarpetta. S. and Hemmings, P. (2001). Economic growth: the role of policies and institutions. Panel data evidence from OECD countries. *OECD Economics Department Working Papers* N0. 283, Paris.

Bernard, A., Bradford, J., Stephen, R. and Peter S. (2007). Firms in international trade. *Journal of Economic Perspectives*, 21(3), 105-130.

Bergstrand, J.H. (1985). The gravity equation in international trade: some microeconomic foundations and empirical evidence. *Review of Economics and Statistics*, 67, 474-80.

Bernard, A.B., Jensen, J. B., Redding, S. and Schott, P. K. (May 2007). Firms in international trade, *CEP Discussion Paper* No 795.

Bleaney, M. and Castilleja-Vargas, L. (2007). Regional growth patterns and growth contagion. *Journal of Economic Studies,* 34(1), 4 – 12.

Bougheas, S., Panicos O.D. and Edgar L.W.M. (1999). Infrastructure, transport cost and trade, *Journal of International Economics*, 47, 169-189.

Brenton, P., Baroncelli, E. and Malouche1, M. (2006). Trade and investment integration of the Maghreb, Middle East and North Africa. *Working Paper Series* No. 44, The World Bank.

Breuss, F. and Egger, P. (1999). How reliable are estimations of East-West trade potentials based on cross-section gravity analyses? *Empirica,* 26 (2), 81-95.

Breus, F. (2004). WTO Dispute settlement: an economic analysis of four EU–US mini trade wars - a survey, *Journal of Industry, Competition and Trade, Bank Papers*, 275–315,

Brulhart, M. and Kelly, M.J. (1999). Ireland's trading potential with Central and Eastern European countries: a gravity study, *The Economic and Social Review*, 30(2), 159-174.

Bruno, M. (1993). Inflation and growth in an integrated approach. *NBER Working Paper* 4422.

Byers, D. A., Darren, A., Talan B. I., Barry L. (2000). New borders and trade flows: a gravity model analysis of the Baltic States, *Open Economies Review*, 11(1), 73-91.

Cammett, M. (1999). Defensive integration and late developers: The Gulf Cooperation Council and the Arab Maghreb Union. *Global Governance*, 5(3), 379-402.

Cardamone, P. (2007), A survey of the assessments of the effectiveness of preferential trade agreements using gravity models, *TRADEAG Working Paper.* http://tradeag.vitamib.com.

Carrington, A. (2003). The mistreated model: A reply, *Open Economies Review*, 14 (1). 15-17.

Central Bank of Tunisia (2004). *Annual Report 2003*. Available in English at: http://www.bct.gov.tn/ english/publication/index.html.

Chemingui, M. A (2003). What macroeconomics factors explain Algeria's poor economic growth performance, background paper for the GDN global research project on explaining growth in developing countries: The Case of Algeria,

Chemnitz, C. and Grethe, H. (2005), *EU trade preferences for Moroccan tomato exports – who benefits?* In: XIth Congress. European Association of Agricultural Economists. The Future of Rural Europe in the Global Agri-Food System. Copenhagen. 24-27 August (CD).

Chen, I-H. and Wall, H. J. (1999). Controlling for heterogeneity in gravity models of trade. *Federal Reserve Bank of St. Louis Working Paper* 99-010A.

Chemingui, M. A. (2002). Labor market and economic growth in Algeria. *Background Paper for the GDN Global Research Project on explaining Growth in Developing Countries: The Case of Algeria*.

Cheng, I-H. and Wall, H. J. (2002). Controlling for Heteogeneity in Gravity Models of Trade, *Federal Reserve Bank of St. Louis Working Paper*, 1999-010C, St. Louis.

Chernat, L. (2001). Assessing regional trade arrangements: are south–south RTAS more trade diverting? International Trade 0109001, EconWPA.

Chikhaoui, L. (2004), *Cadre juridique et institutionnel du secteur des services en Tunisie* (Legal and institutional framework of the Tunisian services sector), November. Available in French at: Countries: Lessons from European globalization, *Humanomics*, 24(2), 130-144.

Christopoulos, D.K. and Tsionas, E.G. (2003). Testing the Buchaman-Wagner hypothesis: European evidence from panel unit root and cointegration tests. *Public Choice*, 115, 439-453.

Christopoulos, D.K. and Tsionas, E.G. (2004). Financial development and economic growth: evidence from panel unit root and cointegration tests. *Journal of Development Economics*, 73, 55-74.

Cioffi, A. and dell' Aquila, C. (2004), The effects of trade policies for fresh fruit and vegetables of the European Union. *Food Policy*, 29: 169-185.

Darku, A. B. (2009), The gravity model and the test for the regional integration effect: the case of Tanzania, *The Journal of Developing Areas*, 43(1), 25-44.

De Gregorio, J. and Lee, J.W. (1999). Economic growth in Latin America: sources and prospects. Paper Prepared for the *Global Development Network.*

Deardoff, A.V. (1998). Determinants of bilateral trade: does gravity work in a neo-classic world? *National Bureau of Economic Research Working Pape*r *No. 5377*, National Bureau of Economic Research, Cambridge, MA.

DeRosa, D.A. (2008). *Gravity model analysis, prospects for greater global and regional integration in the Maghreb*. Peterson Institute for International Economics, Washington, DC.

Dreger, C. and Reimers, H.E. (2005). Health care expenditures in OECD countries: A panel unit root and cointegration analysis. *The Institute for the Study of Labor (IZA) Discussion Paper No. 1469*

Eby Konan, D. and Maskus, K. (1999), *Étude d'impact de la libéralisation du commerce des services sur l'économie tunisienne*, Rapport final, Phase II (Study of the impact of the liberalization of trade in services on the Tunisian economy, Final report, Phase II), Tunisian Ministry of International Cooperation and Foreign Investment, November

Economidou, C.; Lei, V. and Netz, J. S. (2006). International integration and growth: a further investigation on developing countries, *International Advances in Economic Research*, 12, 435-448.

Egger, P. (2000). A note on the proper econometric specification of the gravity Equation. *Economics Letters*, 66, 25-31.

Egger, P., and M. Pfaffermayr (2003). The Proper Econometric Specification of the Gravity Model: A Three-Way Model with Bilateral Interaction Effects. *Empirical Economics*, 28, 571-580.

Eita, J. H. (2008). Determinants of Namibian Exports: A gravity model approach. retrieved from http://www.africametrics.org/documents/conference08/day1/session2/eita.pdf

Elbadawi, A.I., Ndulu, J.B. and Ndung's, N. (1996). *Debt overhang and economic growth in Sub-Saharan Africa*. Paper presented at the IMF/World Bank conference on External Financing for Low Income Countries, December, Washington..

Emlinger, C., Jacquet, F. and Lozza, E. C. (2008). Tariffs and other trade costs: Assessing obstacles to Mediterranean countries' access to EU-15 fruit and vegetable markets, *European Review of Agricultural Economics*, 35 (4), 409–438.

Endoh, M. (1999). Trade creation and trade diversion in the EEC, the LAFTA and the CMEA: 1960-1994, *Applied Economics*, 31, 207-21.

Engle, R.F. and Granger C.W.J. (1987). Cointegration and Error Correction: Representation, Estimation and Testing. *Econometrica*, 55(2), 251-276.

Evenett, S.J. and Keller, W. (1998). On theories explaining the success of the gravity equation. *NBER Working Paper* No. 6529, National Bureau of Economic Research, Cambridge, MA.

Fik, T. J. and Mulligan, G. F. (1998). Functional form and spatial interaction models, *Environment and Planning*, 30, 1497-1507.

Flandreau, M. and Maureen, M. (2005). Monetary union, trade integration, and business cycles in 19th Century Europe. *Open Economies Review*,16, 135–152,

Foroutan, F. and Pritchett, L. (1993). Intra-Sub-Saharan African trade: is it too little? *Journal of African Economies*, 2-1 (May), 74-105.

Frankel, J. A. and Wei, S.J. (1993). Trade blocs and currency blocs. *Working Paper No. W4335.* National Bureau of Economic Research (NBER).

Frankel, J.A (1998). The Regionalization of the World Economy. *NBER Books*, National Bureau of Economic Research, Inc, number fran 98-1.

Garcia-Alvarez-Coque, J. M. and Martì Selva, M.L. (2006). A gravity approach to assess the effects of Association Agreements on Euro Mediterranean Trade of Fruit and Vegetables. *TRADEAG Working Paper* No 2006-15.

García Álvarez-Coque, J. M.; Martinez, V; M. Villanueva (2007). F&V trade model to assess Euro-Med Agreements. An application to the fresh tomato market. Paper presented to the *1st Mediterranean Conference of Agro-Food Social Scientists*, Barcelona, 23-25 April.

Ghali, S. (2004). *The Tunisian Path to Development: 1961-2001,* Scaling Up Poverty Reduction: A Global Learning Process and Conference, Shanghai, 25-27 May. Available at: http://www.worldbank.org/wbi/reducingpoverty/docs/FullCases/MENA%20PDF/Tunisia.pdf.

Ghosh, S., and Yamarik S. (2004). Are regional trading arrangements trade creating? an application of extreme bounds analysis. *Journal of International Economics*, 63, 369-395.

Glick, R. and Rose, A.K. (2002). Does a currency union affect trade? The time series Evidence. *European Economic Review*, 46, 1125-1151.

Goetz, L. and Grethe, H. (2007). *Does the entry price system restrict fresh fruit and vegetable exports from china to the eu?* Contributed paper at the 2007 IATRC Summer Symposium in Beijing, China, July 8-9, 2007.

Greaker, Mads. (2006), Eco-labels, trade and protectionism, environmental & resource economics growth contagion, *Journal of Economic Studies*, 34(1), 4-12.

Grethe, H., Nolte, S. and Tangermann, S. (2005). The development and future of EU agricultural trade preferences for North-African and Near-East Countries", Paper prepared for presentation at the 99 th seminar of the EAAE (European Association of Agricultural Economists), *The Future of Rural Europe in the Global Agro-Food System*, 23-27 August 2005, Copenhagen.

Grossman, G.M., (1998). Imperfect Labour Contracts and International Trade, *Papers 205*, Princeton, Woodrow Wilson School - Public and International Affairs.

Gutierrez L. (2003). One the power of panel cointegration tests: a Monte Carlo comparison. *Economic Letters*, 80, 105-111.

Gundlach, E. (1996). Openness and economic growth in developing countries. *Kiel Institute of World Economics Working Paper* N0. 749.

Hadri, K. (2000). Testing for stationarity in heterogeneous panel data. *Econometrics Journal*, 3, 148– 161.

Hall, R.E. (1990). Invariance *Properties of Solow's Productivity Residual, Growth, Productivity, Unemployment: Essays to Celebrate Bob Solow's Birthday*. Cambridge: MIT Press.

Hamilton, C. B. and Winters, A.L. (1992). Opening up international trade with Eastern Europe, *Economic Policy*, 14, 77-116.

Hannik, D.M & Owusu, J.H. (1998) Has ECOWAS promoted trade among its members? *Journal of African Economics*, 7, 363-383.

Hassan, M. (2001). Is SAARC a viable economic block? Evidence from gravity model. *Journal of Asian Economics*, 12, 263-290.

Hassine, N. B. and Kandil, M. (2009). Trade liberalisation, agricultural productivity and poverty in the Mediterranean region, *European Review of Agricultural Economics*, 36(1), 1–29.

Harris, M. and Matyas, L. (2001). Modelling Export Flows In The APEC Region: Static And Dynamic Gravity Model Approach, *Asia Pacific Journal Of Economics And Business*, 5, 97-118.

Harris, R.I.D and R. Sollis (2003) *Applied Time Series Modelling and Forecasting* Wiley. Chapter 7.

Hatemi, A. Irandoust, M. (2005). Foreign AID and Economic Growth: New Evidence from Panel Cointegration. *Journal of Economic Development*, 30(1), 71-80.

Haufler, A., Schjelderup, G. and Staehler, F. (2005). Barriers to trade and imperfect competition: the choice of commodity tax base, *International Tax and Public Finance*, 12, 281–300,

Head, K. and Thierry, M. (2004). Market potential and the location of Japanese investment in the European union. *Review of Economics and Statistics*.

Helpman, E. and Krugman, P. (1985). *Market structure and foreign trade: increasing returns, imperfect competition and the international economy*. MIT Press, Cambridge, MA.

Helpman, E. (1987). Imperfect competition and international trade: evidence from fourteen industrial countries. *Journal of Japanese and International Economies*, 1(1), 62-81.

Hirsch S. & Hashai N. (2000). Arab Israeli potential trade: the role of distance sensitive products. *The International Trade Journal*, 14 (1), 1-35.

Hossain, Md. Zakir; Bhatt, M. Ishaq; and Hoque, Mohammad Ziaul, (2005), Econometric analysis of marketing potential of OIC countries: Some facts under global economy, *Managerial Auditing Journal*, 20(2), 198-207.
http://www.icomos.org/studies/viticoles/viticole23.pdf.

Im, K.S., Pesaran, M.H. and Shin, Y. (1997). *Testing for unit roots in heterogeneous panels*. *Discussion Paper*, University of Cambridge, December.

Im, K.S., Pesaran, M.H. and Shin**,** Y. (2003). Testing for Unit Roots in Heterogeneous Panels. *Journal of Econometrics*, 115, 53-74.

IMF (2000). Algeria: Recent Economic Developments. *IMF Staff Country Report* No. 00/105, Washington.

IMF (2001). Algeria: Statistical Appendix. *IMF country report* No. 01/163, Washington.

IMF (2004), *Exchange Controls and Exchange Restrictions*, Washington D.C.

International Trade Centre/UNCTAD/WTO (2004), *Évaluation des exportations de services tunisiens et de leur évolution de 1998 à 2003*, Rapport final (Assessment of Tunisian services exports and of their evolution from 1998 to 2003, Final report), January, Geneva.

Irwin, A and Terviö, M. (2002). Does trade raise income? Evidence from the twentieth Century. *Journal of International Economics*, 58, 1 – 18.

Johnston, R., Hepple, L., Hoare, T., Kelvyn and Plummer, P. (2003). The mistreated model: some technical comments on Porojan's paper on 'trade flows and spatial effects. *Open Economies Review*; 14(1), 11-14.

José R. López-Cálix, Peter W. and Ndiamé D. (2010). *Trade Competitiveness of the Middle East and North Africa. Policies for Export Diversification.* The World Bank, Washington DC.

Kao, C., and Chiang, M-H. (2000). On the Estimation and Inference of a Cointegrated Regression in Panel Data. *Advances in Econometrics*, 15, 179-222.

Keller, J. and Nabli, M.K (2002). The macroeconomics of labor market outcomes in MENA over the 1990s: how growth has failed to keep pace with a burgeoning labor market. Paper Presented at the *MDF4*, Amman.

Kien, N. and Hashimoto, Y. (2005). Economic analysis of ASEAN Free Trade Area: By a Country Panel Data. Discussion Papers in Economics and Business, No. 12.

Kirkpatrick, C., and Watanabe, M. (2005). Regional trade in Sub-Saharan Africa: an analysis of East African trade cooperation, 1970-2001. The Manchester School, 2005, 73, 141-164.

Krugman, P. (1991), *Geography and trade*. London: MIT Press

Lawless, M. (2009). Destinations of Irish exports: a gravity model approach, Retrieved from http://www.ssisi.ie/M_Lawless09.pdf.

Lee, J., and Park, I. (2005). Free trade areas in East Asia: discriminatory or non-discriminatory? *The World Economy*, 28, 21-48.

Levin, A. and Lin, C.F. (1992). Unit roots test in panel data: asymptotic and finite sample properties. *Discussion Paper* 92- 93, University of California.

Levin, A. and Lin, C.F. (1993). Unit root tests in panel data: New results. *Discussion Paper 56*, University of California at San Diego

Levin, A., Lin, C.F. and Chu, J. (2002). Unit root test in panel data: asymptotic and finite sample properties. *Journal of Econometrics*, 108, 1-24.

Liabes (1984). Capital and bosses of industry in Algeria 1962-1982. *CREA*, 650p.

Limão, N and Venables, A. (2001). Infrastructure, geographical disadvantage, transport costs and trade. *World Bank Economic Review*, 15 (3), 451-479.

Linnemann, H. (1966). *An econometric study of international trade flows / Hans Linnemann* North-Holland, Amsterdam

Maddala, G.S. and Wu, S. (1999). A comparative study of unit root tests with panel data and a new simple test. *Oxford Bulletin of Economics and Statistics*, 61, 631-652.

Mark, N.C. and Sul, D. (2003). Cointegration vector estimation by panel DOLS and long-run money demand. *Oxford Bulletin of Economics and Statistics*, 65, 655-680.

Martinez-Zarzoso, I. and Nowak-Lehman, F.D. (2003). Augmented gravity model: An empirical application to Mercosur-European Union trade flows. *Journal of Applied Economics*, 6(2), 291-316.

Martinez-Zarzoso, I. and Nowak, F.D. (2004), Economic and geographic distance: explaining MERCOSUR sectoral exports to the EU, *Open Economies Reviews*, 15, 291-314.

Martinez-Zarzoso, I. (2008). Gravity model: an application to trade between regional blocs, *Atlantic Economic Journal*. 31(2), 174-187,

Matyas, L. (1997). Proper econometric specification of the gravity model. *The World Economy*, 20, 364-368.

Matyas, L. (1998). The gravity model: some econometric consideration. *The World Economy*, 21, 397-401.

Mayer, T. & Zignago,S. (2005). *Market Access in Global and Regional Trade Working Papers 2005-02*, CEPII research center.

McCallum J. (1995), National borders matter: Canada-U.S. regional trade patterns, *American Economic Review*, 85(3), 615-623.

McCoskey, S.K. and Selden, T.M. (1998). Health care ecpenditures and GDP: Panel data unit root test results. *Journal of Health Economics*, 17, 369-376.

Micco, A., Stein, E., and Ordoñez, G. (2003). The currency union effect on trade: early evidence from EMU. *Economic Policy*, 37, 316-356.

Mohamed, F. and Bell, E. (1995). Strategy of integration, future changes. *Middle East Executive Reports*, December 1995.

Morgenroth, U. (2002). Southern Iberia and Mediterranean Trade-Routes. *Oxford Journal of Archaeology*, 18(4), 395-401.

Morrisson, C. and Talbi, B. (1996). La Croissance de l'Economie Tunisienne en Longue Période, OECD Development Centre Studies, Paris.

Musila, J. W. (2004). The common market for Eastern and Southern Africa and Kenya's export trade, *International Journal of Social Economics*, 31(1/2), 67 – 77.

Nehru, V. and Dhareshwar, A. (1993). A new database on physical capital stock: Sources, methodology, and results. *Revista de Analisis Economico*, 8(1), 37-59.

Nissanke, M. and Thorbecke, E. (2006). Channels and policy debate in the globalization–inequality–poverty nexus. *World Development*, 34, 1338–1360.

Oguledo, V. I. (1996). Gravity model estimation of trade flows effects of the ECOWAS. *The Negro Educational Review*, 47, 170-189.

Ok, Süleyman Tuluğ. (2010), What Determines Intra-EU Trade? The Gravity Model Revisited. *International Research Journal of Finance and Economics*, 39, 244-250.

Page, J. and Underwood, J. (1996). Growth, the Maghreb and free trade with the European Union. The Egyptian Center for Economic Studies, *Working Paper Series* 7.

Pedroni, P. (1996). Fully Modified OLS for heterogenous cointegrated panels and the case of purchasing power parity. *Working paper*, North American Econometric Society Summer Meeting.

Pedroni, P. (1999). Critical Values for cointegration Tests in Heterogeneous Panels with Multiple Regressors," *Oxford Bulletin of Economics and Stat*istics *Special Issue*, 61, 653-678.

Pedroni, P. (2000). Fully modified ols for heterogeneous cointegration panel in nonstationary panels, panel cointegration and dynamic panels, advances, *Econometrics*, 15, 93-130.

Pedroni, P. (2001). Purchasing power parity tests in cointegrated panels. *The Review of Economics and Statistics*, 83(4), 727-731.

Pedroni, P. (2004). Panel cointegration: asymptotic and finite samples properties of pooled time series tests with an application to the PPP hypothesis. *Econometric Theory*, 20, 597-625.

Perron, P. (1991). A test for changes in a polynomial trend functions for a dynamioc time series. *Papers 363*, Princeton, Department of Economics - Econometric Research Program.

Phillips, P.C.B. and Hansen, B.E. (1990). Statistical inference in instrumental variables regression with I (1) processes. *Review of Economic Studies*, 57, 99-125

Pindyck, R. and Solimano, A. (1993). Economic instability and aggregate investment. *NBER working paper* 4380.

Polak, J. (1996). Is APEC a natural regional trading block? a critique of the gravity model of international trade. *The World Economy*, 19, 533-543.

Pojoran, A. (2001). Trade flows and spatial effects: the gravity model revisited, *Open Economies Review*, 12(3), 265-280.

Poyhonen, P. (1963). A tentative model for the volume of trade between countries. Weltwirtschaftliches Archiv, 90(1), 93-9.

Pusterla, F. (2007). Regional integration agreements: impact, geography and efficiency. *IDB-SOE Working Paper*, 2007, No. 1.

Quah, D. (1992). *International patterns of growth: I. persistence in cross-country disparities*. Mimeo, London School of Economics.

Quah, D. (1994). Exploiting cross-section variations for unit root inference in dynamic panels. *Economics Letters*, 44(1-2), 9–19.

Rahman, M. (2005). The determinants of Bangladesh's trade: evidence from the generalised gravity model. School of Economics and Political Science, University of Sidney, *Working Paper*, No. 3.

Raimi, L. and Mobolaji, H.I. (2008). Imperative of economic integration among Muslim countries : Lessons from European globalization. *Humanomics*, 24(2), 130-144.

Rose, A. (2000). One money, one market: the effect of common currencies on trade. *Economic Policy*, 30, 9-45.

Schwert, G W. (1989). Tests for Unit Roots: A Monte Carlo Investigation. *Journal of Business & Economic Statistics*, 7(2), 147-159.

Serlenga, L. and Shin, Y. (2004). Gravity models of the intra-EU trade: application of the Hausman-Taylor estimation in heterogeneous panels with common time-specific factors. ESE Discussion Papers *105*, Edinburgh School of Economics, University of Edinburgh.

Shrestha, M.B. and Chowdhury K. (2005). A sequential procedure for testing unit roots in the presence of structural break in time series data: an application to Nepalese Quarterly Data 1970-2003. *International Journal of Applied Econometrics and Quantitative Studies 2.*

Siliverstovs, B. and Schumacher, D. (2006). *To log or not to log, or how to estimate a gravity model?* Unpublished, DIW Berlin.

Stephenson, S. (1999), *Obligations du GATS et analyse des engagements de la Tunisie, Étude d'impact de la libéralisation du commerce des services sur l'économie tunisienne, Rapport final, Phase I* (Obligations under the GATS and analysis of Tunisian commitments, Study of the impact of the liberalization of trade in services on the Tunisian economy, Final Report, Phase I, November.

Tinbergen, J. (1962). *Shaping the World Economy*, the Twentieth Century Fund, and New York, NY.

Tunisian Ministry of Agriculture (1995), *Perspectives de l'agriculture tunisienne compte tenu des mutations Internationales* (Prospects for Tunisian agriculture in the light of global changes), November, Tunis.

Tunisian Ministry of Transport (2000), *Évolution du transport maritime en Tunisie, 1992-2000* (Developments in Tunisian maritime transport, 1992-2000) June, Tunis.

Tunisian Ministry of Transport (2004), *Les statistiques du secteur maritime et portuaire, 2002-03* (Shipping and port sector statistics, 2002-03), June, Tunis.

United Nations Development Programme, UNDP-Tunisian Export Promotion Centre, CEPEX (1998), *L'offre tunisienne de biens pour l'exportation* (Tunisian supply of export goods), Tunis. wds.worldbank.org/servlet/WDS_IBank_Servlet?pcont=details&eid=000094946_99051205325829.

Walsh, K. (2006). Trade in services: does gravity hold? a gravity model approach to estimating barriers to services trade, IIIS *Discussion Paper* 183.

Wei, S.-J. (1996), Intra-national versus international trade: how stubborn are nations in global integration? *NBER Working Paper* 5531.

Were, M. (2001). *The Impact of External Debt on Economic Growth and Private Investment in Kenya: an Empirical Assessment*. A paper presented at the wider conference on Debt Relief, August, Helsinki.

Westerlund, J. and Wilhelmsson, F. (2006). *Estimating the Gravity Model without Gravity Using Panel Data*. Unpublished, Departments of Economics, Lund University.

World Bank (1994). *The democratic and popular republic of algeria country economic memorandum: the transition to a market economy*. Volume I (In two volumes), Country Operations Division, Washington.

World Bank (1999), *Project Appraisal Document on a Proposed Loan [...] to the Republic of Tunisia for an Export Development Project*, 30 April.

World Bank (2001). *Algeria in Brief*. World Bank web site.

World Bank (2004a). Good practice in trade facilitation: lessons from Tunisia. *PREM notes Economic Policy*, July, No. 89. Available in English at: http://www1.worldbank.org/prem/ PREMNotes/premnote89.pdf.

World Bank (2004b), *Tunisia - Export Development Project II*, Washington D.C. Available in English at: http://www.wds.worldbank.org/servlet/WDS_IBank_Servlet?pcont=details&eid=000094 946_03060404011320.

World Bank (2004c), *Project Appraisal Document on a Proposed Loan [...] to the Republic of Tunisia for a Second Export Development Project*, 2 June. Available in English at: http://www.wds.worldbank.org/servlet/WDS_IBank_Servlet?pcont=details&eid=000160016_20040615173207.

World Bank (2004d), *Project performance assessment report, Republic of Tunisia*, Report No. 31017, 27 December. Available in English at: http://www-wds.worldbank.org/servlet/WDSContent Server/WDSP/IB/2005/01/11/000160016_20050111151717/Rendered/PDF/31017.pdf.

World Bank. Global Research Project Data base.

World Trade Organization (2004) News: 2004 News Items, Retrieved 10 August, 2010 from www.wto.org/english/news_e/news04_e/libya_stat_27july04_e.htm., 28 July 2004 General Council/Accessions.

World Trade Organization (2005), Press Release: Press/TPRB/252, Trade Policy Review – Tunisia, 5 and 7 October 2005.

World Trade Organization (2002). Trade Policy Reviews**: S**econd Press Release and Chairperson's Conclusions, Press Release, PRESS/TPRB/201, 13 September 2002

World Trade Organization, WT/TPR/S/152**,** 7 September 2005, (05-3817).

World Trade Organization (2002). Trade policy reviews: first press release, secretariat and government summaries, Press Release, PRESS/TPRB/200, 13 September 2002, Mauritania.

World Trade Organization (1996). Members trade policy reviews**:** first press release, Secretariat and Government Summaries, Morocco: January 1996 http://www.wto.org/english/tratop_e/tpr_e/tp23_e.htm. Press Release PRESS/TPRB/23, 1 January 1996.