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The EU Enlargement to 27 and More, Challenge Faces South Mediterranean Member Countries: The Case of Horticultural Exports to EU Markets

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Summary

This study accomplishes two different objectives. Firstly, it investigates and identifies the major determinants of horticultural exports from south Mediterranean countries to the European Union (EU 15) in the recent past and potential trade in the future. Secondly, the research assesses the potential impact of the European Union enlargement upon horticultural exports from south Mediterranean countries to the EU, and thereby recommends appropriate market strategies for companies whose trade are most likely to be influenced by such change, and also draws relevant conclusions for policymakers.

The research has produced a number of findings. The results of using gravity approach to explore determinants of horticultural export flows from south Mediterranean countries to the EU, show that exporter and importer GDP's, as expected, have positive influences in bilateral trade flows between the two blocs. Also, exporter and importer population have large and positive effect on exports, indicating that bigger countries export and import more than smaller countries.

The coefficients obtained from the gravity equations used to forecast bilateral trade flows to calculate potential horticultural exports. The research found that the potential for South Mediterranean countries exports were lower than the actual export value in most of study years for each country except Egypt and Israel. For Jordan, Morocco, Syria and Tunisia, at the lower range, the difference between potential and actual exports to the EU represented respectively a -83%, -72% , 84% and -74% of actual exports in 2003, whereas for Algeria, Egypt and Israel, these percentages amount39%, 15% and 38% respectively. This means that the actual level of exports is above those that normal trade relations would support. However if the previous years were looked, all countries results except Egypt and Israel showed a common picture, for these countries export potentials were lower than actual exports. On the other hand, the trade effects that resulted from the dummy variables; border, EU membership and dummies for French and UK links present positive signs and statistical significance. That is, all dummies variables make a significant contribution to trade development

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The research found that potential horticultural exports from South Mediterranean countries to the EU were different from the actual export value in most years for each country. This means that the actual level of exports is above or under those that normal trade relations would support. Finally, the growth rates of horticultural exports from South Mediterranean countries to the EU 27 were also forecasted in base on our estimates presented in table 19. Results are shown in table 20. With exception of Egypt and Israel, all

South Mediterranean countries export potentials have decreased percentages. The South Mediterranean countries exports to the EU 27 are bigger than our predictions for all countries (except Egypt and Israel increase by 13% and 12%), which likely to decrease exports to EU 27 by 15% (Algeria), 30% (Jordan), 30% (Morocco), 45% (Syria), 5% (Tunisia).

CONTENTS

1. Introduction

Economic integration between south Mediterranean countries[1] and EU is an integral element of the Barcelona process and is perceived as a key mechanism for stimulating trade and investment and raising growth rates in the Mediterranean region. To date, however, integration initiatives have not been effective in delivering these goals.

The south Mediterranean countries are characterized by relatively small markets, which entail that exports must be the key factor behind future growth. The EU is the main trading partner, accounting for almost 45% of exports in 2006 and as much as 73% and 77% for countries such as Tunisia and Morocco. The bilateral relationship between the two groups is one of great significance to both parties. Total bilateral trade increased from $42.4 billion in 1990 to $130.8 billion in 2006. Exports to the EU have increased from $18.9 billion in 1990 to $69.2 billion in 2006 (Commission of the European communities, 2004).[2]

Horticultural exports from south Mediterranean countries play an important role in the economies of the Mediterranean region. They significantly contribute to agricultural production, employment and trade in several of these countries, particularly Egypt, Morocco, Syria and Tunisia. Although total exports of horticultural from these countries are relatively small as compared to other developing countries' exports, they represent a higher share of merchandise trade in these countries as compared to the share of horticultural in world merchandise trade and enjoy a comparative advantage in the agricultural sector.

The economic prospects of the Mediterranean countries are currently constrained by the lack of ambition in their relationships with their major export market, the EU. These economic relationships are limited by a lack of coverage (agriculture and services are effectively excluded), by a lack of depth (substantial technical barriers to trade remain due to differences in regulatory requirements and the need to duplicate testing and conformity assessment when selling in EU markets), and by rules (restrictive rules of origin and lack of cumulation limit effective market access). In addition, the rest of Europe, including Turkey, is integrating at a faster pace to create a Wider European Economic Space. This should help eliminate the difficulties sometimes faced by those trying to sell their products in the EU.

The integration of the 12 Accession Countries into the EU is a continuous process, which commenced in the early 1990s and which will continue for many years. Many of the direct economic benefits of EU membership, in terms of enhanced trade and investment

[1] Algeria, Egypt, Israel, Jordan, Morocco, Syria and Tunisia.
[2] United Nations, COMTRADE Database, Statistics Division, 2008.

relations have already occurred. May 2004 and January 2007 however were the date on which formal accession occurred, and on which key institutional changes implemented. These changes gave rise to some important impacts affecting horticultural export companies operating in south Mediterranean countries. With EU enlargements, this relationship entered a new phase, one which presents challenges as well as opportunities. This has raised understandable concerns among the EU's traditional partners in the developing world, in particular the South Mediterranean countries.

The research project sets out to investigate the consequences of EU enlargement on horticultural exports from south Mediterranean countries to EU after the growing integration of economic activity in a European-wide network of horticultural production and distribution. Horticultural exports to EU Markets are expected to be influenced profoundly by the enlargement. Thus, the approach adopted for the purposes of this research aspires to provide an assessment of the impact of enlargement on the levels of horticultural exports of firms from south Mediterranean countries to EU.

The aim of this research project is to examine the determinants of south Mediterranean countries horticultural exports to the EU markets. The purpose of identify the determinants in the analysis is to provide a complete view regarding which of the variables included is likely to impact on the size of south Mediterranean countries horticultural exports to the EU. Another aim of this research is to examine how the latest EU enlargements would affect the horticultural exports from south Mediterranean countries to EU markets.

The paper organized as follows: The first section is introduction. In this introductory chapter, research questions and key concepts are presented. The second section reviews the literature on the gravity model of bilateral trade flow and presents the most influential works on bilateral trade flow determinants. Section three presents the current situation of horticultural exports from south Mediterranean to EU27. The Fourth section is focusing mainly on research methodology. The fifth one explains the determinants of horticultural exports flows from south Mediterranean countries to European Union (EU15). A gravity model of international trade is empirically tested to investigate the relationship between the volume and direction of horticultural bilateral trade flow of the two regional trade groups 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 volume. The sixth section explain what the positive or negative effects of the EU expansion will be on the horticultural exports from south Mediterranean countries to EU. The seventh section explains development of horticultural exports for the main important items from Egypt and Morocco to the EU. A final section sums up the findings

and conclusion.

2. Literature Review

In recent years, trade has occupied center stage in the international development dialogue. This owes much to the Uruguay Round trade agreements signed in 1994 by most developing countries. Much attention in the area of trade in goods continues to be focused on the reduction of tariffs and quota. This is clearly in the interest of both developed countries and developing countries. In general, potential benefits for developing countries of such market opening measures are expected to be massive (UNIDO, 2002).

As observed by Linder (1961), once the difference in expenditure decisions between rich and poor consumers is acknowledged, the trade pattern between industrialized and less developed regions is determined not only by differentials in technology, factor endowments and income but also by income distribution within each region. Rault et al. (2008) argued that variables such as partner size, economic distance, or agreement membership have the highest (significant) coefficients, and hence explain better the level of bilateral trade as well as the attraction between partners for a deeper integration. Balogun (2008) indicated that the coefficients of the log GDP and the per capita incomes are significant, confirming that similarities in business cycles influence bilateral trade among the countries. However, the positive sign of the real GDP variable coefficient estimate confirms the assertion in the literature that larger countries exert a greater gravitational pull on imports and push to exports. In general, the gravity model considers trade between a pair of countries as an increasing function of their combined economic size and a decreasing function of their geographical distance (Frankel and Rose, 2002).

Recent papers by Feenstra et al. (2001) include a remoteness variable to capture the impact of an additional geographic factor on bilateral trade. Remoteness measures how far an exporting country is from all other countries. The intuition behind this variable is that bilateral distance expressed relative to the distance of each of the pairs from their other partner's matters with there being a positive relationship between the remoteness of the exporting country and bilateral trade. Brun et al. (2005) found that the absolute value of the elasticity of bilateral trade to distance has been significantly increasing. The result is attributed to a relatively larger decline in costs independent of distance (such as handling) than in distance-related costs (e.g. oil price). Mélitz (2007) assumed that distance in the gravity model strictly reflects frictions impeding bilateral trade. However, distances could also reflect differences in factor endowment that provide opportunities for profitable trade. Flam and Jansson (2000) argue that exchange rate volatility can give rise to partial effects on exports that are of the same magnitude as the changes in exports themselves. Wickhamson

(1985) argue that exchange rate fluctuations influence trade balance along with other macroeconomic variables. He views that changes in the country's bilateral exchange rate, determined by the choice of peg and exogenously given exchange rate movements between foreign currencies, are the source of disturbances to equilibrium in both the country's imports and exports. Using a gravity type trade model, Brada and Mendez (1988) reach the conclusion that exchange rate uncertainty does lower the volume of international trade irrespective; of the nature of exchange rate regime.

On the other hand, Hooper and Koqhlhagen (1978) found significant impact of the exchange rate uncertainty on prices but not on the volume of trade. They argue, however, that if traders are averse to risk, an increase in foreign exchange risk will reduce the volume of trade. Warner and Kreinin (1983) split the effect of changes in the real exchange rate on trade flows into nominal exchange rate and price components. The reason for this specification, as they see, is that although developing countries visually peg their currency to a major currency, they still are vulnerable to exchange rate fluctuations as long as major currencies fluctuate against each other. They found that exchange rate is a powerful determinant of a country's exports. Adam and Cobhan (2007) have estimated different versions of a gravity model, from the most basic to one which includes a full menu of exchange rate regimes, using a variety of techniques. They showed that when country pair fixed effects are included they do most of the work and it is not possible to identify the effects which interest us, notably those of exchange rate regimes. On the other hand country fixed effects seem to improve the explanatory power of the equations without having major impacts on the coefficients estimated for the other explanatory variables.

Rault et al. (2007) showed that use of panel econometric method in empirical analysis of trade flows is convenient because it permits for controlling the individual heterogeneity to avoid biased results. As it is now well known, the time-series and cross-section not controlling for heterogeneity run the risk of obtaining biased results. For the deterministic gravity equation suggested by economic theory to be used in empirical studies of the determinants of trade, the inspiration for the formulation comes from Newtonian physics (Zhang and Kristensen, 1995), more specifically from the law of universal gravity, according to which attraction is larger between, larger and closer positioned bodies. Timbergen (1962) and Pöyhönen (1963) were the first authors applying the gravity equation to analyze international trade flows. 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 and more specifically to international trade flows. According to this model, exports from country i to country j are explained by their economic sizes (GDP or GNP), their populations,

direct geographical distances and a set of dummies incorporating some kind of institutional characteristics common to specific flows. Although the gravity model became popular because of its perceived empirical success, it was also criticized because it lacked theoretical foundations.

In the last decade, a lot of effort has been produced in empirical international trade to explain the bilateral volume of trade through the estimation of a gravity equation (Disdier and Head (2004)). Different formulations of the gravity model have been used in empirical research. Key determinants include relative factor endowment differences, overall bilateral country size, similarity in country size and trade costs. Most empirical work using the gravity model has been done using cross-section data (Deardorff (1998)). Hummels & Levinsohn (1995) were among the first to apply panel data techniques that account for country-pair instead of exporter and importer effects, and recent empirical work on the determinants of trade volumes increasingly relies on this approach. Fixed country pair effects control for the impact of any time invariant determinant such as bilateral distance, common language or common borders and guard against possible bias resulting from the omission of any such variable. Baltagi et al. (2003) use three additional explanatory variables: the sum of two countries real GDPs as a measure of bilateral overall country size, a similarity index of two trading partners' GDPs as a measure of relative country size, and the absolute difference in relative factor endowments between two trading partners. Feenstra et al. (2001) found that the national product differentiation model is appropriate to explain the pattern of food and agricultural trade between developed countries in a dynamic gravity framework. However, for the large-scale manufacturing products such as machinery and chemical goods, the product differentiation model is found to explain the pattern of intra-industry trade among sample countries for the both short and long run.

McCallum (1995) estimates that the effect of the log of distance on the log of imports is -1.42, which implies that two countries 500 miles apart will trade more than 2.67 times as much as two countries 1000 miles apart. Considering the effect of price indices usually ignored in gravity model estimation, Anderson and Wincoop (2003) show that the -1.42 estimate is reduced to about -0.8. Other things equal, their estimate implies that a 100% increase in the distance between trading partners will reduce trade by a factor of 1.74. The implicit assumption in the current literature is that the effect of distance on trade cannot be due to transportation costs alone, since those are small and falling. Anderson and Marcouiller (2002) derive a structural model in which trade between countries is subject to predation. They provide evidence that improvements in contract enforcement and institutions have a substantial positive effect on trade, but not on the estimated distance elasticity of imports.

Sohn (2005) indicates that the gravity model is very effective in explaining one country’s bilateral trade flows and that the gravity model is well applicable to a single

country case. He also found that although the gravity model becomes in great fashion in analyzing various trade issue, it still needs much development. In particular, the problems of the gravity model lie on the dependent variable. The total bilateral trade volumes can be decomposed into: (1) sum of export and import, (2) sum of intra-industry and inter-industry trade, (3) sum of primary commodity, intermediate goods and final products trade, and (4) sum of disaggregated industrial sectors. Further theoretical developments are in great need in distinguishing the different determining factors for the decompositions. Carrillo and Li (2002), indicate that the most of the determinant factors for a small country like Iceland are the same as in the general case, i.e. exports can be determined by distance together with GDP and population of the recipient country. Gravity equations are one of the most popular tools in empirical studies addressing issues in international trade. Four categories of applications can be mentioned: estimating the cost of the border, explaining trade patterns, identifying effects related to regionalism and lastly tabulating trade potentials.

If the presence of a common border facilitates bilateral trade between nations i and j, the same border is also a hindrance to trade. Hence, trade between regions of i should be more developed than trade between regions of i and regions j. This is the so called "border effect" (McCallum, 1995). The coefficient of the importer population has also an ambiguous sign, for similar reasons. The distance coefficient is expected to be negative since it is a proxy of all possible sources of trade cost. Traditionally, the gravity model uses distance to model transport costs. However, recently Bougheas et al. (1999) showed that transport costs are a function not only of distance but also of public infrastructure. They augmented the gravity model by introducing additional infrastructure variables (stock of public capital and length of motorway network). Their model predicts a positive relationship between the level of infrastructure and the volume of trade, which is supported using data from European countries.

It is common to expand the basic gravity model by adding other variables, For instance variables are added to control for common language, common border, common colonial history, common currency, land lockedness and insularity. Usually these variables are introduced as dummies in the gravity equation. Hummels (2001) also found that shipping time is an important trade barrier, faster transport over time (air shipping and faster ocean vessels) being equivalent to reducing tariffs from 20% to 5.5% from 1950 to 1998.

3. Horticultural[1] exports from South Mediterranean to EU27

The EU is a major player in world horticulture. Across the EU, there are wide regional variations in the types of produce grown, from the cabbages and turnips of northern Europe to the citrus fruits of Greece. Around 15 % of the value of the EU's agricultural production derives from the fruit and vegetables sector, which provides a range of fresh and processed products remarkable for its variety. In several States, fruit and vegetables account for around one quarter of total agricultural output. The EU is also a major consumer market for the produce of non-EU countries (European Commission, 2003).

The economic weight of the sector of fruit and vegetable products represents an average of 16.4% of total agricultural production of the EU-15 in the period 2001-2003 (for 2003, the share of the sector is 17.2% for the EU-15 and if we include the 10 new member countries it is 16.8%). The economic importance of the sector has increased steadily in the last few years (it has increased from 13.4% in 1995 to 17.2% in 2003), partly due to the decrease in market prices of the other products following the different CAP reforms. The significance of the sector is particularly high in Greece (34.5% in 2001-2003), Spain (32.3%), Portugal (30.8%), Italy (25.0%) and Malta (24.1%). It is also important in Belgium (16.7%), Hungary (15.1%), Poland (13.9%), the Netherlands (13.1%), Slovenia (11.3%) and France (11.1%) (European Commission, 2004).

The European Union is also the world's largest market as well as supplier of fresh and processed fruits and vegetables. In 2006 its 25 member countries accounted for $70.6 billion in imports, or 54.3 percent of world imports, while exports amounted $54.9 billion, or 44.6 percent of world exports. Table 1 presents that Germany is the EU's leading importer with a share of 22.7%, followed by the UK (15.4%), France (12.6%), Netherlands (9.5%), Belgium (8.5%), Italy (6.7%), Spain (5.1%) and Sweden (2.8%).

On the other hand, Spain comes as the EU's leading exporter with a share of 22.6%, followed by the Netherlands (19.9%), Belgium (13.5%), Italy (11.8%), France (9.5%), Germany (8.6%), Poland (4.0%) and Greece (2.7%). In addition, the EU trade in fruits and vegetables is, however, largely intraregional. Intra-EU imports represent 62 percent of EU imports, while 87 percent of EU export trade occurs among its 25 member states in 2006.[2]

[1] Horticulture is the science or art of cultivating fruits, vegetables, flowers, or ornamental plants. Whether it's growing, eating or trading.

[2] United Nations, COMTRADE Database, Statistics Division, 2008.

Table 1: EU 25 Trade* of Horticultural Products, 2006.

	Imports			Exports	
	Value	**%**		**Value**	**%**
Germany	16.0	22.7	Spain	12.4	22.6
United Kingdom	10.9	15.4	Netherlands	10.9	19.9
France	8.9	12.6	Belgium	7.4	13.5
Netherlands	6.7	9.5	Italy	6.5	11.8
Belgium	6.0	8.5	France	5.2	9.5
Italy	4.7	6.7	Germany	4.7	8.6
Spain	3.6	5.1	Poland	2.2	4.0
Sweden	2.0	2.8	Greece	1.5	2.7
Others	11.8	16.7	Others	4.1	7.5
Total	70.6	100.0	**Total**	54.9	100.0
World	130.0		**World**	123.1	

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Source: United Nations, COMTRADE Database, Statistics Division, 2008.

Table 2 shows that with exception of Syria, all south Mediterranean countries horticultural exports concentrate in EU25; Algeria (76.8%), Morocco (74.4%), Israel (72.5%), Tunisia (56.6%), Egypt (48.7%) . On the other hand, Morocco comes as the leader exporter of horticultural products to EU 25 with a share of 42.3% of the total exports value ($1505 millions) of the region followed by the Israel (35.7%), Egypt (12.0%), Tunisia (6.5%), Algeria (1.5%), and Syria (1.2%) as table 3 shows.

Table 2: Direction of horticultural exports from the South Mediterranean countries, 2006.

	Algeria	**Egypt**	**Israel**	**Jordan**	**Morocco**	**Syria**	**Tunisia**
EU 25	76.8	48.7	72.5	7.8	74.4	2.7	56.6
Arab countries	16.3	32.9	0.0	87.5	1.3	89.4	33.5
ROW*	6.9	18.4	27.5	4.7	24.3	7.9	9.8
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

*Rest of the world

Source: United Nations, COMTRADE Database, Statistics Division, 2008

Table 3: Total horticultural exports from South Mediterranean countries to EU25, 2006.

	Value (US$ millions)	%
Algeria	22.2	1.5
Egypt	180.3	12.0
Israel	536.9	35.7
Jordan	13.7	0.9
Morocco	635.9	42.3
Syria	17.7	1.2
Tunisia	98.5	6.5
Total	1505.0	100.0

Source: United Nations, COMTRADE Database, Statistics Division, 2008.

Table 4 presents the main exports of horticultural exports from South Mediterranean countries to EU25 in 2006. Most exports comprise of fresh or chilled vegetables (22.1%), fresh or dried fruit (18.4%), fresh or chilled tomatoes (11.4%), oranges and mandarins (10.5%), potatoes (8.7%), prepared or preserved vegetables (7.3%), vegetable products roots and tubers (3.5%) and fresh or dried grapes (3.3%), which together account for about 85.2% of the total export value.

Table 4: Relative importance of horticultural exports from South Mediterranean countries to EU25, 2006.

Items	**Value** (US$ millions)	**%**
Other fresh or chilled vegetables	333.2	22.1
Fruit, fresh or dried, nes	276.9	18.4
Tomatoes, fresh or chilled	171.0	11.4
Oranges, mandarins, etc, fresh or dried	158.0	10.5
Potatoes, fresh or chilled, excluding sweet potatoes	130.9	8.7
Vegetables, prepared or preserved, nes	109.6	7.3
Vegetable products roots and tubers, nes, fresh, dried	52.0	3.5
Grapes, fresh or dried	49.6	3.3
Vegetables, frozen or in temporary preservative	37.7	2.5
Fruit or vegetable juices	36.4	2.4
Fruit, temporarily preserved	34.7	2.3
Other citrus fruits, fresh or dried	33.7	2.2
Vegetables (excluding leguminous), dried, evaporated, etc	27.5	1.8
Fruit prepared or preserved, nes	27.1	1.8
Nuts edible, fresh or dried	12.7	0.8
Others	13.9	0.9
Total	1505.0	100.0

Source: Calculated from: United Nations, COMTRADE Database, Statistics Division, 2008.

Table 5: Direction of horticultural exports from South Mediterranean countries to EU25, 2006.

country	Value (US$ millions)	%
France	476.1	31.6
United Kingdom	230.3	15.3
Netherlands	209.2	13.9
Spain	153.2	10.2
Germany	124.7	8.3
Italy	123.3	8.2
Belgium	71.9	4.8
Greece	27.5	1.8
Sweden	14.6	1.0
others	74.4	4.9
Total	1505.0	100

Source: Calculated from: United Nations, COMTRADE Database, Statistics Division, 2008.

About one third of horticultural export from South Mediterranean countries was destined to the France, while UK, Netherlands, Spain, Germany, Italy, Belgium, Greece and Sweden received 15.3%, 13.9%, 10.2%, 8.3%, 8.2%, 4.8%, 1.8% and 1.0% of the total export value of horticultural products of South Mediterranean countries in 2006 (Table 5).

4. Methodology

4.1 Building the gravity model

The concept of the gravity model is based on Newton's Law of universal gravitation relating the force of attraction between two objects to their combined mass and the distance between them. Originally applied to international trade by Tinbergen (1962), the gravity model predicts bilateral trade flows between any two countries as a function of their size and the distance between them. Economic size is measured as gross domestic product, population or per capita income. Distance is typically measured as the distance between the countries capital cities, in some studies this is replaced by measures of remoteness that weight distances by GDP or measure bilateral distances relative to the country's average distance from all trading partners.

According to the generalized gravity model of trade (Inmaculada and Felicitas (2003); Anderson J. E. (1979); Mátyás (1997); Tinbergen (1962); Deardorff (1995)), the volume of exports between pairs of countries, Xij, is a function of their incomes (GDPs), their populations, their geographical distance and a set of dummies:

$$X_{ij} = \beta_0 Y_i^{\beta 1} Y_j^{\beta 2} N_i^{\beta 3} N_j^{\beta 4} D_{ij}^{\beta 5} A_{ij}^{\beta 6} u_{ij} \quad (1)$$

Where:

X_{ij} is the total exports from i to j

Yi, Yj are the exporter (importer)' GDP (characteristics of trading partners)

N_i, N_j are the population in country *i* (exporter) and country *j* (importer)

Dij is the geographical distance between i and j (separation characteristic measures the distance between the two countries' capitals or economic centers)

A_{ij} represents any other factors aiding or preventing trade between pairs of countries.

u_{ij} is the normal random error term

For estimation purposes, model (1) in log-linear form for a single year, is expressed as,

$$lX_{ij} = \beta_0 + \beta_1 lY_i + \beta_2 lY_j + \beta_3 lN_i + \beta_4 lN_j + \beta_5 lD_{ij} + \sum_h \delta_h P_{ijh} + u_{ij} \quad (2)$$

where l denotes variables in natural logs. P_{ijh} is a sum of preferential trade dummy variables. P_{ijh} takes the value one when a certain condition is satisfied (e.g. belonging to a trade bloc), zero otherwise. The model includes four dummy variables for trading partners sharing a common border, EU membership and colonial links to France or UK. The coefficients of all dummy variables (δ_h) are expected to be positive.

A high level of income in the exporting country indicates a high level of production, which increases the availability of goods for exports. Therefore, it is expected that $\boldsymbol{\beta_1}$ to be positive (Poyhonen, P.1963). The coefficient of Y_j, $\boldsymbol{\beta_2}$, is also expected to be positive since a high level of income in the importing country suggests higher imports. The coefficient estimate for population of the exporters, $\boldsymbol{\beta_3}$, may be positive or negative signed, depending on whether the country exports less when it is big (absorption effect) or whether a big country exports more than a small country (economies of scale) (Bergstrand, J. H. 1985; 1989). The coefficient of the importer population, $\boldsymbol{\beta_4}$, has also an ambiguous sign, for similar reasons. The distance coefficient is expected to be negative since it is a proxy of all possible trade cost sources. Traditionally, the gravity model uses distance to model transport costs. (Inmaculada M. Z. and Felicitas N. L., 2003; Limao, N. and A. J. Venables, 1999)

However, recently Arnon et al. (1996) augmented the gravity model with differences in incomes between exporters. The differences in incomes variable ($ydif_{ij}$) is constructed as the square of the difference in per capita incomes. Finally, a real exchange rate variable is added to model specification, once the time dimension is incorporated in the analysis. $lRER_{ij}$ denotes the natural log of country i real exchange rate defined as the local

currency value of 1 unit of country j currency, multiplied by country j GDP deflator and divided by country's i GDP deflator, where i is the exporter country and j is the importer.

For a single period, the augmented gravity model is specified as follows,

$$\mathbf{lX_{ij} = \beta_0 + \beta_1 lY_i + \beta_2 lY_j + \beta_3 lN_i + \beta_4 \ lN_j + \beta_5 lD_{ij} + \beta_6 ydif_{ij} + \beta_7 IRER_{ij} + \sum_h \delta_h P_{ijh} + u_{ij}} \quad \mathbf{(3)}$$

In constructing the empirical gravity model to explore the determinants of horticultural exports from South Mediterranean countries to EU and, the estimations base on a sample of 21 countries; 14 EU countries (Belgium and Luxembourg data are added together) and 7 South Mediterranean countries. The time period under study goes from 1995 to 2003. The data consists therefore, of a panel data of 420 trading pairs, with 3780 observations.

The study estimated the gravity model of trade described before, in a panel data framework. The use of panel data methodology has several advantages over cross -section analysis. First, panels make possible to capture the relevant relationships among variables over time. Second, a major advantage of using panel data is the ability to monitor the possible unobservable trading-partner-pairs individual effects. When individual effects are omitted, OLS estimates will be biased if individual effects are correlated with the regressors.

The estimated gravity models with individual effects for each trading pair are given by,

$$\mathbf{lX_{ijt} = \alpha_{ij} + \beta_1 lY_{it} + \beta_2 lY_{jt} + \beta_3 lN_{it} + \beta_4 \ lN_{jt} + \beta_5 lD_{ij} + \sum_h \delta_h P_{ijh} + u_{ijt}} \quad \mathbf{(4a)}$$

$$\mathbf{lX_{ijt} = \alpha_{ij} + \beta_1 lY_{it} + \beta_2 lY_{jt} + \beta_3 lN_{it} + \beta_4 \ lN_{jt} + \beta_5 lD_{ij} + \beta_6 IRER_{ij} + \sum_h \delta_h P_{ijh} + u_{ij}} \quad \mathbf{(4b)}$$

$$\mathbf{lX_{ijt} = \alpha_{ij} + \beta_1 lY_{it} + \beta_2 lY_{jt} + \beta_3 lN_{it} + \beta_4 \ lN_{jt} + \beta_5 lD_{ij} + \beta_6 \ ydif_{ij} + \sum_h \delta_{h\ ijh} + u_{ij}} \quad \mathbf{(4c)}$$

$$\mathbf{lX_{ijt} = \alpha_{ij} + \beta_1 lY_{it} + \beta_2 lY_{jt} + \beta_3 lN_{it} + \beta_4 \ lN_{jt} + \beta_5 lD_{ij} + \beta_6 \ ydif_{ij} + \beta_7 IRER_{ij} + \sum_h \delta_{h\ ijh} + u_{ij}} \quad \mathbf{(4d)}$$

where, α_{ij} stands for the individual effects, with (4a) corresponding to the basic gravity model and (4b, 4c, 4d) to the augmented gravity models.

Since individual effects (α_{ij}) are included in the regressions, the research has to decide whether they are treated as fixed or as random. From an a prior point of view, the random effects model (REM) would be more appropriate when estimating typical trade flows between a randomly drawn sample of trading partners from a larger population. On the other hand, fixed effect model (FEM) would be a better choice than REM when one is interested in estimating typical trade flows between an ex ante predetermined selection of nations (Egger, 2000). Since the model sample includes trade flows among all the country members of the South Mediterranean and the EU countries, intuition leads to think that this view is consistent with a fixed effect specification.

A problem this study faced with FEM is that equation cannot directly estimate variables that do not change over time because the inherent transformation wipes out such variables.

However, these variables can be easily estimated in a second step, running another regression with the individual effects as the dependent variable and distance and dummies as explanatory variables,

$$\mathbf{IE}_{ij} = \alpha_0 + \alpha_1 \mathbf{D}_{ij} + \alpha_2 \mathbf{Border} + \alpha_2 \mathbf{EU\_Mem} + \alpha_3 \mathbf{TIE\_Fra} + \alpha_4 \mathbf{TIE\_UK} + \mathbf{u}_i \quad (5)$$

where IE_{ij} denotes the individual effects, D_{ij} denotes distance, Border is a dummy variables for border, EU membership and colonial links to France and UK.

To examine the expected impacts of EU expansion on horticultural exports from South Mediterranean countries to the EU, the research empirical strategy is based upon the well-known gravity equation. The estimated gravity equation is given as equation 4d above.

Where P_{ijh} takes the value one when a certain condition is satisfied (e.g. belonging to a trade bloc), zero otherwise in addition to a set of time dummies for each year in a period that included to capture the year-specific fixed effects. The mentioned model includes dummy variables for trading partners sharing a common border, EU membership and colonial links to France and UK.

To evaluate the impact of EU eastern enlargement on horticultural exports from South Mediterranean countries to the EU and, in particular, to determine how strong are the relations of South Mediterranean countries with the EU, on one hand, and the relations of South Mediterranean countries with EU-N12 countries, on the other hand, the research used bilateral trade flow simulation between South Mediterranean countries and the five

EU members countries which have been joined the EU in 1986 and 1995.[1]

The specification of the gravity equation is estimated in a panel and cross-section framework for six data sets. The old EU 15 (Belgium and Luxembourg data are added together) members and seven South Mediterranean countries included in the first set of aggregate period of 1980-2006 with a panel data of 420 trading pairs, with 11340 observations (table 8 in appendix). The second data set covers the EU 10 member's countries (Belgium and Luxembourg data are added together) before the third enlargement in 1986 and seven South Mediterranean countries states of period of 1980-1985 with a panel data of 240 trading pairs, with 1440 observations (table 9 in appendix).

For the third and fourth sets, each is a sample of 11 countries; 5 EU countries when the Community was enlarged to include Spain and Portugal (1986), Austria, Finland and Sweden (1995) and 7 South Mediterranean countries. The time period under study goes from 1980 to 1985 (table 10 in appendix) and 1995 to 2006 (table 11 in appendix) respectively. The data set consists therefore, of a panel data of 132 trading pairs, with 792 observations for the third set and 132 trading pairs, with 1584 observations for the fourth set.

The fifth data set covers the new ten EU-N12 countries to EU (in 2004 and 2007) and seven south Mediterranean countries of period of 1995-2006 with a panel data of 342 trading pairs, with 4104 observations (table 12 in appendix). While the EU 27 (Belgium and Luxembourg data are added together) members and seven south Mediterranean countries included in the sixth set of aggregate period of 1995-2006 with a panel data of 1056 trading pairs, with 12672 observations(table 13 in appendix).

4.2 Data sets

The bilateral trade (exports & imports) data, measured in current US dollars terms, come from the United Nation COMTRADE Database. The data was available in Standard International Trade Classification (SITC.Rev.2) and deflated by GDP deflator indices which taken from the United Nation National Accounts Main Aggregates Database. GDP, per Capita GDP (deflated by GDP deflator indices), the nominal effective exchange rate and population data are taken from the National Accounts Main Aggregates Database. To proxy the trading costs, the research followed the common practice of using the great circle distance between capital cities as its proxy. This data was also obtained from the World Ports Distances web page (www.distances.com) and is measured in kilometers.

[1] In 1986, Spain and Portugal became members and in 1995, Austria, Finland and Sweden joined the EU.

The dummy variables are constructed as follows: a set of dummies serve to identify whether two trading partners share a border, whether they belonging to the EU and others two variables whether they linked with France and UK by colonial tie in the past. The border dummy takes the value of one when the countries share a common border that allows them to have border trade and zero otherwise. The EU membership (belonging to a trade bloc) variable takes the value of one when the countries is a EU member and zero otherwise. For colonial links, they include a dummy for the British and a dummy for the French colonial origin which takes the value of one when the countries had colonial links and zero otherwise

5. Determinates of horticultural exports from South Mediterranean countries to EU15

5.1 Empirical evidence

In this section, aggregate trade flow equations (4a, 4b, 4c, 4d) were estimated using several methodologies. Firstly, for comparison purposes, we used OLS ($\alpha ij = \alpha$). The results are shown in table 1 in appendix. Secondly, we applied the regression to cross-section means (between estimation) obtaining similar results which are shown in table 2 in appendix. In both cases, all the coefficients present the expected sign except the real exchange rate and all are statistically significant except the border coefficient.

A F-test was conducted to check for the poolability of the data. The restricted model is the pooled model given by equation (4), with the restrictive assumption of a single intercept ($\alpha ij = \alpha$) and with the same parameters over time and across trading partners, as shown in table 1 in appendix. The unrestricted model, however, is the same behavioral equation but allows the intercept to vary across trading partners. Results from the test, reported in table 1 in appendix, show that the null hypothesis of equality of individual effects cannot be accepted. This indicates that the OLS results are biased and we have to select a model with individual effects. The between estimates exploit the between dimension of the data (differences between individuals), but ignore any information within individuals. It is usually presented as an alternative to estimate long-run coefficients. In table 2 in appendix, the coefficient estimates for the standard gravity model are very similar to those obtained by pooling the data (table 1 in appendix). The same appears to be true looking at the augmented gravity model (table 2 in appendix). All the coefficients variables present the correct sign except the real exchange rate, and all are statistically significant.

Tables 3 and 4 in appendix report respectively estimation results for the basic and augmented versions of the FEM an REM. The estimates of the country-pair individual effects are omitted for space considerations. Table 3 in appendix shows results for the test.

Comparing our results of the pooled and fixed effects models, allowing for country-pair effects, as in FEM, slightly higher the estimated income and population elasticities of trade. For the ydif (squared per capita income differential) variables, the coefficient is statistically significant and has the correct sign. The real exchange rate variable presents a negative signed coefficient, which is also significant. However, there might be a problem of multicollinearity.

Finally, the dummies for common border, EU membership and colonial links with France increase in magnitude whereas the one for colonial links with UK decreases. Both present the expected positive sign.

Since additional interpretations could be convincing, it is certain that these time-dummies will pick up the effects of any variables affecting bilateral exports that vary over time, are constant across trading-pairs and have not been included in the list of explanatory variables. Results are shown in the first column of table 5 in appendix. A Wald test was conducted to check for the significance of time effects and then the null of insignificant time dummies could not accepted.

Since there is suspect that cross-section heteroskedasticity may be present, given the importance of the cross-section dimension of our data (N=420), the same specification was estimated, but each pool equation is now down weighted by an estimate of the cross-section residual standard deviation. The second column of table 5 in appendix reports the estimates of the two ways fixed effects model with cross-section weights and similar results obtained. All coefficient variables which are now positive (negative for real exchange rate) signed and statistically significant, as the theory predicts.

In column 3 the income difference variable (ydif) is added to test for the existence of a Linder effect. The estimated coefficient on the variable ydif has now the expected positive sign and it is statistically significant. According to Linder's trade model, bilateral trade will be greater when the per capita GDPs of the trading countries are more similar. The rest of explanatory variables present very similar estimated coefficients.

Column 4 of table 5 in appendix reports our results when movements in the real exchange rate are considered. The estimated coefficient for real exchange rate is negative and significant, indicating that price competitiveness is not important. A10 % depreciation (devaluation) of the exporter currency decrease exports by 1.2% according to our estimations. The main results concerning the rest of explanatory variables remain unchanged.

The interpretation of the coefficients on the dummy variables is also relevant for our analysis. Since our model is estimated in natural logs, all dummy variables are given a value of one when the correspondent condition is satisfied and a value of zero otherwise.

An alternative specification to the FE model consists in estimating the gravity equation in first differences. This method has the advantage of eliminating the effects of possible auto correlated disturbances, controlling at the same time for heterogeneity. Results for the model in first differences and model 7 are very similar in order of magnitude and sign of the coefficients.

Finally, table 6 in appendix reports the results obtained when the fixed effects from models 4, 5, 6, 7 are regressed on the distance variable and dummies, which are fixed over time. According to our findings, distance and all dummies are statistically significant and all present the correct sign except distance which present wrong sign. A low R^2 coefficient was obtained, which means that there are other determinants of the trading-pair effects, different from the ones traditionally included in the analysis, which should be investigated. The coefficient estimate for the distance variable is lower than the one obtained in the pooled and between regressions (tables 1 and 2 in appendix) and continued lower than the one obtained in the REM (table 4 in appendix).

5.2 Estimates of potential trade

The coefficients obtained from the gravity equations were used to forecast bilateral trade flows to calculate potential horticultural exports. Estimated coefficients from model 7 presented in table 5 in appendix (two ways fixed effects model with cross-section weights) were served as the basis for the forecast. Table 7 in appendix reports our estimates for potential horticultural exports from South Mediterranean countries to the EU 15 along with the actual export values for every year in our sample. The potential for South Mediterranean countries exports lower than the actual export value in most of study years for each single country except Egypt and Israel. For Jordan, Morocco, Syria and Tunisia, at the lower range, the difference between potential and actual exports to the EU represented respectively a -83%, -72% , 84% and -74% of actual exports in 2003, whereas for Algeria, Egypt and Israel, these percentages amount39%, 15% and 38% respectively. This means that the actual level of exports is above those that normal trade relations would support. However if the previous years were looked, all countries results except Egypt and Israel show a common picture, for these countries export potentials are lower than actual exports. Explanations about increasing and decreasing potentials should be based on time specific factors.

6. Potential horticultural exports from South Mediterranean countries to the EU27

6.1 Empirical Evidence

Estimation results of the equation 4d, with real bilateral trade of the six different sets summarized in the tables 8 to 13 in appendix. To obtain the estimated coefficients, country-pair FEM was applied for the six periods of the different data sets. Model was estimated with pooled OLS, computing standard errors that are robust to clustering by country-pairs, with the inclusion of a set of the year-specific fixed effects (set of dummies for each year) and with the restrictive assumption of a single intercept for each trading country-pair (α_{ij}=α).

The estimates of table 8 in appendix give quite good explanation of trade patterns as evidenced by the value of the overall R^2 (0.59). Traditional gravity effects are plausible in magnitude and highly statistically significant. With the exception of dummy variables of the years 1987 and 1999; all the other baseline variables are highly significant and have the expected signs except real exchange rate with negative sign.

Since GDP term is the product of exporter levels of GDP, this implies that a 1% rise in a country's GDP should be associated with a 0.8% rise in its level of export, all else constant. In the same manner, GDP of importer, this implies that a 1% rise in a country's GDP should be associated with a 0.1% rise in its level of imports. Further, if one country becomes an EU member, the level of its export from south Mediterranean countries will increase by 114.5% (= exp (0.763) -1) equal to expected level from the gravity model.

Distance between economic centers of both countries, which is a proxy for transaction costs, affects trade negatively: more distant countries trade less. For what regards bilateral volatility, the coefficient is negative and significant which means that higher transaction costs have a negative impact on trade. Bilateral volatility has thus the same effect as a larger distance between two partners.

The border effect model is quite close to the gravity equation. It is based upon a counterfactual that is: what would be the trade in an economy without border-related barriers, specifically without border barriers.

Table 9 in appendix presents the estimates of the specification (2); the model gives good explanation of trade patterns. The value of R^2 equals to 0.44, which is even lower than the alternative value from table 8 in appendix (0.59). Specification variables are highly

statistically significant. All variables of equation are highly significant and have the expected signs except real exchange rate and borders have unexpected signs.

A 1% rise in an exporter's GDP should be associated with a 1.3% rise in its level of export, all else constant. In the same manner, GDP of importer, this implies that a 1% rise in a country's GDP should be associated with a 0.7% rise in its level of imports. Further, if one country becomes an EU member, the level of its export from south Mediterranean countries will increase by 34% (= exp (0.294) -1) higher than the expected level from the gravity model.

The estimates of table 10 in appendix give good explanation of trade patterns as evidenced by the value of the overall R^2 (0.56). Traditional gravity effects are plausible in magnitude and highly statistically significant. With the exception of except real exchange rate; all the other baseline variables are highly significant and have the expected signs except real exchange rate. A 1% rise in a country's GDP should be associated with a 1.3% rise in its level of export, all else constant.

The value of the overall R^2 (0.60) of specification (4) is presented in table 11 in appendix. Traditional gravity effects are plausible in magnitude and highly statistically significant. With the exception of real exchange rate and dummy variables of the years 1998, 2002 and 2006; all the other baseline variables are highly significant and have the expected signs. A 1% rise in an exporter's GDP should be associated with a 0.2% rise in its level of export, all else constant.

The value of the overall R^2 (0.49) of specification (5) is presented in table 12 in appendix. Traditional gravity effects are plausible in magnitude and highly statistically significant. With the exception of importer population dummy variable of the year 2003; all the other baseline variables are highly significant and have the expected signs except real exchange rate present negative sign. A 1% rise in an exporter's GDP should be associated with a 0.9% rise in its level of export, all else constant.

The value of the overall R^2 (0.70) of specification (6) is presented in table 13 in appendix. Traditional gravity effects are plausible in magnitude and highly statistically significant. With the exception of dummy variables of the years 1998, 2004, 2005 and 2006; all the other baseline variables are highly significant and have the expected signs (real exchange rate present unexpected sign). A 1% rise in an exporter's GDP should be associated with a 1.1% rise in its level of export, all else constant.

6.2 Estimates Growth Rates of Potential Horticultural Exports

The coefficients obtained from the gravity equations for the different data sets were used to forecast bilateral trade flows to calculate potential horticultural exports from south Mediterranean countries to EU. Estimated coefficients presented in tables from 13 to 18 served as the basis for the forecast. Table 6 reports our estimates for potential exports of each of the South Mediterranean countries to the EU for the six different periods as mentioned before along with the actual export values for every year in our samples. The mentioned table shows that potential horticultural exports from South Mediterranean countries to the EU for different periods lower than the actual export value in most years for each single country. This means that the actual level of exports is above or under those that normal trade relations would support.

Finally, the growth rates of horticultural exports from South Mediterranean countries to the EU 27 were also forecasted in base on our estimates presented in table 6. Results are shown in table 7. With exception of Egypt and Israel, all South Mediterranean countries

Table 6: Potential Exports from South Mediterranean countries to the EU the six periods.

Change %	X_ALG _EU	X_EGY _EU	X_JOR _EU	X_ISR _EU	X_MOR _EU	X_SYR _EU	X_TUN _EU	X_TOTAL _EU
set 1	33	-101	-158	-95	-99	-100	-150	-50
set 2	173	-99	-97	-13	-60	-35	-10	-94
set 3	5	-33	-90	-2	-85	-101	-150	-128
set 4	-59	5	-96	-99	-53	-36	-48	-30
set 5	-57	-103	-79	65	-33	-92	-93	-10
set 6	10	85	60	73	-45	-92	-91	-92

Note:

- X_ ALG _EU stands for exports from Algeria to the EU, X_EGY_EU stands for exports from Egypt to the EU, X_ JOR _EU stands for exports from Jordan to the EU, X_ISR_EU stands for exports from Israel to the EU, X_MOR_EU stands for exports from Morocco to the EU, X_SYR_EU stands for exports from Syria to the EU and X_TUN_ EU stands for exports from Tunisia to the EU.
- Set 1 calculated according to table 13 (expected exports –Actual) / Actual *100
- Set 2 calculated according to table 14 (expected exports –Actual) / Actual *100
- Set 3 calculated according to table 15 (expected exports –Actual) / Actual *100
- Set 4 calculated according to table 16 (expected exports –Actual) / Actual *100
- Set 5 calculated according to table 17 (expected exports –Actual) / Actual *100
- Set 6 calculated according to table 18 (expected exports –Actual) / Actual *100

Table 7: The Impact of EU Enlargement on Potential Exports of horticultural products from South Mediterranean countries to the EU.

Change%	X_ALG _EU	X_EGY _EU	X_JOR _EU	X_ISR _EU	X_MOR _EU	X_SYR _EU	X_TUN _EU	X_TOTAL _EU
(A)	-64	65	-6	-82	-49	-28	-23	16
(B)	73	-154	-111	-124	-129	-127	-173	-179
(C)	-8	-123	-28	-30	-101	-111	-133	-111
(D)	-72	-58	-35	-112	-151	-139	-156	-94

(A) = (%) in table set 4 - (%) in table set 3

(B) = [(%) in table set 2 + (%) in table set 3 + (%) in table set 6 -(%) in table set 1]

(C) = [(B) + (%) in table set 5]/2.

(D) = (A) + (C) indicates to the potential change in horticultural exports from South Mediterranean countries to the EU 27.

potentials export have decreased percentages. The South Mediterranean countries exports to the EU 27 are bigger than our predictions for all South Mediterranean countries (except Egypt and Israel increase by 13% and 12%), which likely to decrease exports to EU 27 by 15% (Algeria), 30% (Jordan), 30% (Morocco), 45% (Syria), 5% (Tunisia).

7. Development of horticultural exports for the main products from Egypt and Morocco to the EU

In this section, the research explains the growth rates of horticultural exports for the main important items exported from Egypt and Morocco to EU over different periods from 1976 to 2006. Over the periods covered by this study (1987 to 1993), the growth of Egyptian main horticultural exports to the EU increased in most periods. Table 8 shows that the growth rates of exports of potatoes, fresh or chilled vegetables, dried and evaporated Vegetables and Oranges are estimated by 0.2%, 7.5%, 1.2% and -0.4% for the last period (2004-2006). On the other hand, the growth rates of exports of potatoes, Tomatoes, fresh or chilled vegetables, Oranges, and prepared or preserved are estimated by －11.4%, －1.6%, -0.5%, -8.6% and -2.9%for the last period (2004-2006) (table 9). These mentioned growth rate support the research results obtained in section 6 that Egyptian horticultural exports to EU 27 will increase, while The Moroccan horticultural exports to EU will decrease.

Table 8: Annual Average Rate of Growth of horticultural Exports from Egypt to the EU.

Period	Rate of Growth (quantities)	Members of the EU
	Potatoes, fresh or chilled	
1981- 1985	3.7	10
1986-1994	6.7	12
1995-2003	-4.8	15
2004-2006	0.2	25
	Other fresh or chilled vegetables	
1981- 1985	7.8	10
1986-1994	0.5	12
1995-2003	0.5	15
2004-2006	7.5	25
	Vegetables (excluding leguminous), dried, evaporated	
1981- 1985	-0.9	10
1986-1994	47.0	12
1995-2003	2.0	15
2004-2006	1.2	25
	Oranges, mandarins, etc, fresh or dried	
1981- 1985	14.1	10
1986-1994	291.3	12
1995-2003	11.0	15
2004-2006	-0.4	25

Note: Greece joined in 1981, Portugal, Spain 1 January 1986, Austria, Finland, Sweden 1 January 1995 and Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, the Poland, Slovakia, Slovenia 1 May 2004.

Source: Calculated from: United Nations, COMTRADE Database, Statistics Division, 2008.

Table 9: Annual Average Rate of Growth of horticultural Exports from Morocco to the EU.

Period	Rate of Growth (quantities)	Members of the EU
	Potatoes, fresh or chilled	
1976-1980	-6.8	9
1981- 1985	14.6	10
1986-1994	3.6	12
1995-2003	-7.2	15
2004-2006	-11.4	25
	Tomatoes, fresh or chilled	
1976-1980	-3.8	9
1981- 1985	4.0	10
1986-1994	8.5	12
1995-2003	0.8	15
2004-2006	-1.6	25
	Other fresh or chilled vegetables	
1976-1980	-10.7	9
1981- 1985	-3.8	10
1986-1994	24.9	12
1995-2003	86.3	15
2004-2006	-0.5	25
	Oranges, mandarins, etc, fresh or dried	
1976-1980	16.0	9
1981- 1985	3.6	10
1986-1994	2.4	12
1995-2003	-2.4	15
2004-2006	-8.6	25
	Vegetables, prepared or preserved	
1976-1980	4.0	9
1981- 1985	2.7	10
1986-1994	2.4	12
1995-2003	-3.1	15
2004-2006	-2.9	25

Note: Greece joined in 1981, Portugal, Spain 1 January 1986, Austria, Finland, Sweden 1 January 1995 and Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, the Poland, Slovakia, Slovenia 1 May 2004.

Source: Calculated from: United Nations, COMTRADE Database, Statistics Division, 2008.

8. Conclusions and Recommendation

The purpose of this research is divided to two different goals. Firstly, it investigates and identifies the major determinants of horticultural export from south Mediterranean countries to the European Union (EU 15) in the recent past and potential in the future. Secondly, the research assesses the potential impact of the European Union enlargement upon horticultural export from south Mediterranean countries to the European Union.

The research has produced a number of findings. The preliminary conclusion presented is that the EU is a significant trading partner for south Mediterranean countries. The results of using gravity approach to explore determinants of horticultural export flows from south Mediterranean countries to the EU, show that exporter and importer GDP's, as expected, have positive influences in bilateral trade flows between the two blocs. Also, exporter and importer population have large and positive effect on exports, indicating that bigger countries export and import more than smaller countries. This is consistent with the findings in earlier and recent researches (Porojan, 2000; Baltagi et al., 2003; Helpman and Krugman, 1985; Carlos and Carmen, 2002) which report that exports from country i to country j are explained by their economic sizes (GDP or GNP), their populations, direct geographical distances and a set of dummies incorporating some kind of institutional characteristics common to specific flows.

The coefficients obtained from the gravity equations were used to forecast bilateral trade flows to calculate potential horticultural exports. The research found that the potential for South Mediterranean countries exports were lower than the actual export value in most of study years for each single country except Egypt and Israel. For Jordan, Morocco, Syria and Tunisia, at the lower range, the difference between potential and actual exports to the EU represented respectively a -83%, -72% , 84% and -74% of actual exports in 2003, whereas for Algeria, Egypt and Israel, these percentages amount39%, 15% and 38% respectively. This means that the actual level of exports is above those that normal trade relations would support. However if the previous years were looked, all countries results except Egypt and Israel show a common picture, for these countries export potentials were lower than actual exports.

On the other hand, the trade effects that resulted from the dummy variables; border, EU membership and dummies for French and UK links present positive signs and statistical significance. That is, all dummies variables make a significant contribution to trade development (Frankel, (1997; McCallum, 1995; Fontagné et al., 1999; Hummels, 2001; Linneman, 1966).

The research found that potential horticultural exports from South Mediterranean countries to the EU for different periods were lower than the actual export value in most years for each single country. This means that the actual level of exports is above or under those that normal trade relations would support.

Finally, the growth rates of horticultural exports from South Mediterranean countries to the EU 27 were also forecasted in base on our estimates presented in table 19. Results are shown in table 20. With exception of Egypt and Israel, all South Mediterranean countries potentials export have decreased percentages. The South Mediterranean countries exports to the EU 27 are bigger than our predictions for all South Mediterranean countries (except Egypt and Israel increase by 13% and 12%), which likely to decrease exports to EU 27 by 15% (Algeria), 30% (Jordan), 30% (Morocco), 45% (Syria), 5% (Tunisia).

The negative potential exports for the most of south Mediterranean countries are may be due to the nature of data sets used in analysis (i.e. there are not available data for some years in the data sets and also by the still incomplete details surrounding the mentioned enlargement) and then the results may be better in the future under conditions of availability of long time series data.

The author strongly recommends policy makers and firms in south Mediterranean countries with the following procedures to enhance horticultural exports to EU especially after the new enlargements in 2004 and 2007:

- Additional technical assistance is needed for south Mediterranean countries in terms of technology transfer and vocational training to comply with the technicalities required by the EU. Such training at both local and regional level will improve the efficiency of utilizing the scarce resources such as water for increasing cultivated area and then horticultural trade development;

- Catching up with the new EU members requires south Mediterranean countries to increase both the speed and extent of reforms that promote trade development stability, accelerate institutional reform and deregulation, and achieve more openness. With these reforms, south Mediterranean countries will be better equipped to minimize the cost and maximize the benefits inherent in the EU enlargement; and
- Additional gains for the horticultural and food exports from south Mediterranean countries to EU will be affected by the implementation of the CAP. So, effective market access into the EU market should depend partly on the development of production and marketing infrastructure and partly on the compliance of production with EU standards in a cost efficient manner. This would create in turn substantial additional benefits in the longer term.

As the new EU enlargements is in its initial stages to measure the impacts on horticultural exports from south Mediterranean countries to the EU, there are some limitations of the work. In future analysis, the author expects to extend the research scope in two important ways. Firstly, there is need to carry out further studies on the impacts of EU enlargement on EU- south Mediterranean countries trade flow to inform the appropriate strategies to respond to the new and emerging issues and to equip the firms in south Mediterranean countries to be able to take advantages of the association agreements with EU 27. Secondly, it is tempting to apply the results of this study to the ongoing debate about the trade implications of changing institutional relationships within the association agreements between south Mediterranean countries and EU. However, the results do not necessarily lead to simple policy prescriptions. The gravity model provides a standard of comparison against which the level of particular bilateral trade flows can be evaluated.

Finally, I take two different messages from studied large literature. Firstly, one indication of this is that the newer papers are habitually motivated by exegeses on the methodological shortcomings of prior work. Secondly, I think there is much to be learned from micro-econometric analysis of panel data sets. These data sets constitute a rich source for the ways in which micro-econometric variables influences bilateral trade flow performance.

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Appendix

Table 1: OLS results for the basic and augmented generalized gravity equation.

Right hand side variables	Standard model	Augmented		
		Model1	Model2	Model3
Constant	-12.370 (-50.686)[h]	-12.333 (-52.899)[h]	-12.375 (-52. 994)[h]	-12.337 (-52. 994)[h]
Exporter GDP	0.579 (34.718)[h]	0.520 (31.626)[h]	0.470 (21.908)[h]	0.394 (21.908)[h]
Importer GDP	0.622 (40.817)[h]	0.668 (44.846)[h]	0.644 (43.331)[h]	0.694 (43.331)[h]
Exporter Population	0.939 (42.621)[h]	0.995 (46.522)[h]	1.049 (41.037)[h]	1.122 (41.037)[h]
Importer Population	0.155 (7.342)[h]	0.112 (5.469)[h]	0.137 (6.732)[h]	0.089 (6.732)[h]
Distance	-1.162 (-36.710)[h]	-1.158 (-38.269)[h]	-1.168 (-38.538)[h]	-1.164 (-38.538)[h]
Per capita income differential	-	-	0.057 (7.622)[h]	0.065 (7.622)[h]
Real exchange rate	-	-0.118 (-14.576)[h]		-0.123 (-14.576)[h] -
Border	0.059 (1.915)	0.061 (2.072)[l]	0.060 (2.019)[l]	0.062 (2.019)[l]
EU_ Membership	1.379 (64.614)[h]	1.385 (67.922)[h]	1.367 (66.757)[h]	1.372 (66.757)[h]
TIE_France	1.485 (24.489)[h]	1.488 (25.686)[h]	1.500 (25.834)[h]	1.504 (25.834)[h]
TIE_UK	0.656 (10.824)[h]	0.644 (11.126)[h]	0.644 (11.106)[h]	0.630 (11.106)[h]
Adjusted R^2	0.502	0.504	0.503	0.505
F	4661.9	4619.8	4588.8	4564.6
SSR	8608.76	9346.4	9378.1	10109.3
Number of observations	3780	3780	3780	3780

Notes:

All variables except dummies are expressed in natural logarithms.

Estimation uses White's heteroskedasticity-consistent covariance matrix estimator.

T-statistics are in parentheses.

[h] denotes significance at the 1% level, [m] denotes significance at the 5% level and [l] denotes significance at the 10% level.

F (n-1,nT-n-K) degrees of freedom in brackets. Where K is the number of variables in the regression, n is the number of trading pairs and T is the number of time periods. The number of observations equals (n x T).

Table 2: Between (OLS on means) results for the basic and augmented generalized gravity equation.

Right hand side variables	Standard model	Augmented		
		Model1	Model2	Model3
Exporter GDP	0.901 (14.212)[h]	0.910 (9.600)[h]	0.908 (9.001)[h]	0.912 (6.554)[h]
Importer GDP	0.420 (10.601)[h]	0.510 (10.644)[h]	0.328 (9.150)[h]	0.610 (11.00)[h]
Exporter Population	0.801 (15.201)[h]	0.830 (14.322)[h]	0.910 (12.130)[h]	0.998 (12.660)[h]
Importer Population	0.101 (4.202)[h]	0.188 (3.906)[h]	0.153 (4.010)[h]	0.201 (4909.732)[h]
Distance	-1.206 (-16.001)[h]	-1.108 (-16.130)[h]	-1.110 (-16.001)[h]	-1.115 (-15.912)[h]
Per capita income differential	-	-	0.040 (4.120)[h]	0.098 (4.600)[h]
Real exchange rate	-	-0.023 (-10.160)[h]		-0.111 (-9.001)[h]
Adjusted R^2	0.522	0.524	0.523	0.530
SSR	806.32	836.1	822.9	800.3
Number of observations	420	420	420	420

Notes: see table 1 in the appendix.

Table 3: Regression results for the Fixed Effect model.

Right hand side variables	Standard model	Augmented		
		Model1	Model2	Model3
Exporter GDP	0.595 (33.488)[h]	0.534 (30.624)[h]	0.499 (21940)[h]	0.422 (18.902)[h]
Importer GDP	0.626 (38.542)[h]	0.673 (42.590)[h]	0.645 (40.907)[h]	0.697 (45.133)[h]
Exporter Population	0.965 (41.136)[h]	0.023 (45.090)[h]	1.062 (39.145)[h]	1.136 (43.105)[h]
Importer Population	0.180 (8.006)[h]	0.135 (6.250)[h]	0.164 (7.612)[h]	0.116 (5.538)[h]
Per capita income differential	-	-	0.050 (6.311)[h]	0.058 (7588)[h]
Real exchange rate	-	-0.122 (-14.130)[h]		-0.126 (-15.231)[h]
Border	0.764 (29.557) [h]	0.763 (31.034) [h]	0.767 (31.146) [h]	0.767 (32.592) [h]
EU_ Membership	1.592 (72.757)[h]	1.597 (76.727)[h]	1.583 (75.690) [h]	1.586 (79.447) [h]
TIE_France	1.625 (25.199)[h]	1.627 (26.529)[h]	1.639 (26.646) [h]	1.643 (27.976) [h]
TIE_UK	0.454 (7.053)[h]	0.442 (7.230)[h]	0.442 (7.217) [h]	0.429 (7.328) [h]
Adjusted R^2	0.686	0.688	0.686	0.689
SSR	8079.1	8844.4	8878.2	9636.6
Number of observations	3780	3780	3780	3780

Notes: see table 1 in the appendix.

Table 4: Regression results for the Random Effects model (Generalized Least Squares).

Right hand side variables	Standard model	Augmented		
		Model1	Model2	Model3
Constant	-12.370 (-50.680)[h]	-12.333 (-52.893)[h]	-12.375 (-52.988)[h]	-12.337 (-55.115)[h]
Exporter GDP	0.579 (34.714)[h]	0.520 (31.622)[h]	0.470 (21.905)[h]	0.394 (18.683)[h]
Importer GDP	0.622 (40.812)[h]	0.668 (44.841)[h]	0.644 (43.326)[h]	0.694 (47.559)[h]
Exporter Population	0.938 (42.616)[h]	0.995 (46.516)[h]	1.049 (41.032)[h]	1.122 (44.992)[h]
Importer Population	0.155 (7.341)[h]	0.112 (5.468)[h]	0.137 (6.731)[h]	0.089 (4.532)[h]
Distance	-1.162 (-36.705)[h]	-1.158 (-38.265)[h]	-1.168 (-38.534)[h]	-1.164 (-40.058)[h]
Per capita income differential	-	-	0.057 (6.621)[h]	0.065 (8.958)[h]
Real exchange rate	-	-0.118 (-14.539)[h]		-0.123 (-15.732)[h]
Border	0.059 (1.915)	0.061 (2.072)[i]	0.060 (2.019)[i]	0.062 (2.182) [i]
EU_ Membership	1.379 (64.606)[h]	1.385 (67.913)[h]	1.367 (66.749) [h]	1.371 (69.876) [h]
TIE_France	1.484 (24.486)[h]	1.488 (25.682)[h]	1.500 (25.831) [h]	1.504 (27.040) [h]
TIE_UK	0.656 (10.822)[h]	0.644 (11.124)[h]	0.644 (11.106) [h]	0.630 (11.338) [h]
Adjusted R^2	0.602	0.604	0.603	0.605
SSR	8608.8	8844.8	9378.1	10109.6
Number of observations	3780	3780	3780	3780

Notes: see table 1 in the appendix.

Table 5: Regression results for the two ways Fixed Effects model.

Right hand side variables	Model 4: No weights	Model 5: cross- section weights	Model 6: gravity model with Linder effect	Model 7: gravity model with real exchange rate
Exporter GDP	0.613 (46.048)[h]	0.510 (18.200)[h]	0.620 (43.160)[h]	0.552 (41.406)[h]
Importer GDP	0.650 (52.817)[h]	0.380 (30.331)[h]	0.614 (50.101)[h]	0.698 (57.132)[h]
Exporter Population	0.954 (54.574)[h]	0.511 (14.820)[h]	1.499 (109.526)[h]	1.012 (58.676)[h]
Importer Population	0.178 (10.604)[h]	0.099 (22.001)[h]	0.750 (57.571)[h]	0.132 (8.043)[h]
Per capita income differential	-	-	0.070 (15.413)[h]	
Real exchange rate	-	-	-0.075 (-11.562)[h]	-0.123 (-18.813)[h]
Border	0.077 (39.816)[h]	0.0570 (12.114)[h]	0.737 (37.478)[h]	0.765 (40.956)[h]
EU_ Membership	1.569 (95.538)[h]	1.001 (30.212)[h]	2.166 (168.203)[h]	1.574 (98.685)[h]
TIE_France	1.611 (33.572)[h]	0.099 (10.332)[h]	1.822 (37.241)[h]	1.613 (34.621)[h]
TIE_UK	0.449 (9.382)[h]	0.201 (7.120)[h]	0.357 (7.305)[h]	0.437 (9.414)[h]
Dummy 1996	-0.217 (-9.131)[h]	-0.001 (-4.002)[h]	-0.258 (-10.624)[h]	-0.220 (-19.516)[h]
Dummy 1997	-0.242 (-10.147)[h]	-0.090 (-6.778)[h]	-0.145 (-5.973)[h]	-0.247 (-10.659)[h]
Dummy 1998	-0.295 (-12.347)[h]	-0.102 (-10.120)[h]	-0.182 (-7.470)[h]	-0.299 (-12.916)[h]
Dummy 1999	-0.215 (-9.009)[h]	-0.019 (-4.130)[h]	-0.074 (-3.038)[h]	-0.220 (-9.472)[h]
Dummy 2000	-0.329 (-13.739)[h]	-0.189 (-20.180)[h]	-0.167 (-6.851)[h]	-0.333 (-14.335)[h]
Dummy 2001	-0.351 (-14.650)[h]	-0.052 (-9.700)[h]	-0.193 (-7.916)[h]	-0.355 (-15.269)[h]
Dummy 2002	-0.269 (-11.210)[h]	-0.415 (-15.600)[h]	-0.084 (-3.456)[h]	-0.273 (-11.723)[h]
Dummy 2003	-0.189 (-7.891)[h]	-0.201 (-5.130)[h]	-0.040 (-1.656)	-0.194 (-8.323)[h]
Wald test (H0=no time dummies)	259.880[h]	264.880[h]	180.461[h]	271.875[h]
Adjusted R^2	0.688	0.689	0.665	0.691
SSR	14479.3	14980.3	15135.4	15209.7
Number of observations	3780	3780	3780	3780

Notes: see table 1 in the appendix.

Table 6: Cross-section regression results, individual effects regressed over distance and dummies.

Right hand side variables	FE from model 4	FE from model 5	FE from model 7
Constant	-22.302 (-6.001)[h]	-22.160 (-8.900)[h]	-23.101 (-8. 530)[h]
Distance	1.061 (-4.112)[h]	1.045 (-4.330)[h]	1.066 (-5.001)[h]
Border	0.098 (1.912)	0.091 (2.00)[l]	0.079 (2.202)[l]
EU_ Membership	1.379 (64.614)[h]	1.385 (67.922)[h]	1.372 (66.757)[h]
TIE France	1.485 (24.489)[h]	1.488 (25.686)[h]	1.504 (25.834)[h]
TIE_UK	0.656 (10.824)[h]	0.644 (11.126)[h]	0.630 (11.106)[h]
Adjusted R^2	0.380	0.320	0.401
SSR	602.5	512.4	613.5
Number of observations	420	420	420

Notes: see table 1 in the appendix.

Table 7: Potential Horticultural Exports from South Mediterranean countries to the EU 15.

Forecasted exports	X_ALG_EU	X_EGY_EU	X_JOR_EU	X_ISR_EU	X_MOR_EU	X_SYR_EU	X_TUN_EU	X_TOTAL_EU
1995	41664000	166526330	9086854	985995608	265626330	2028619	9148973	1480076714
1996	147069801	190245035	na	515084210	19245035	756621	34056344	906462789
1997	13618575	95053598	10347116	601082086	150053598	746112	15068471	885969556
1998	19190174	194465594	6034813	911975961	4465594	721788	4957041	1141810965
1999	15011637	78775803	8044531	1101205341	78775803	952607	6331954	1289097676
2000	13861646	59935122	5077260	501089893	70990022	885643	25058014	676897600
2001	13483702	104338515	5092400	971055814	104800515	933287	20045248	1219749481
2002	16569729	76026201	1000725	1111167964	76026201	1141521	10007058	1291939399
2003	22844511	95095655	626831	531454812	150095701	1276510	20068640	821462660
Actual exports	**X_ALG_EU**	**X_EGY_EU**	**X_JOR_EU**	**X_ISR_EU**	**X_MOR_EU**	**X_SYR_EU**	**X_TUN_EU**	**X_TOTAL_EU**
1995	17494360	123668046	9261285	485685008	475825533	4669371	70696279	1187299882
1996	27541207	101178886	na	457236126	538280038	27829190	55414581	1207481774
1997	14500188	56423298	7757299	400913126	459446497	10122703	50409387	999572498
1998	18724666	67523191	9531954	426043129	475882844	3704502	66091205	1067501491
1999	15812858	67987922	9792450	413420118	515173775	27965806	53072727	1103225656
2000	15165302	55174483	3327436	376530000	393080524	9741154	43490143	896509042
2001	15002139	56628857	2502862	361003000	355422140	2482592	70641578	863683168
2002	15375546	71890261	3110158	334767000	435565761	4927455	68098474	933734655
2003	16469839	82766752	3593550	385463000	540772368	8198521	76588316	1113852346
Difference	**X_ALG_EU**	**X_EGY_EU**	**X_JOR_EU**	**X_ISR_EU**	**X_MOR_EU**	**X_SYR_EU**	**X_TUN_EU**	**X_TOTAL_EU**
1995	24169641	42858284	-174431	500310600	-210199203	-2640751	-61547306	292776834
1996	119528594	89066149	na	57848084	-519035003	-27072569	-49658237	-329318984
1997	-881613	38630300	2589817	200168960	-309392899	-9376592	-45140916	-123402943
1998	465508	126942403	-3497141	485932831	-471417250	-2982714	-61134164	74309473
1999	-801221	10787881	-1747919	687785223	-436397972	-27013199	-46740772	185872021
2000	-1303657	4760639	1749824	124559893	-322090502	-8855511	-38832129	-240011443
2001	-1518437	47709658	2589538	610052814	-250621625	-1549305	-66096329	340566314
2002	1194183	4135940	-2109433	776400964	-359539560	-3785934	-62291416	354004744
2003	6374672	12328903	-2966719	145991812	-390676667	-6922010	-68519676	-304389685
Change %	**X_ALG_EU**	**X_EGY_EU**	**X_JOR_EU**	**X_ISR_EU**	**X_MOR_EU**	**X_SYR_EU**	**X_TUN_EU**	**X_TOTAL_EU**
1995	138	35	-2	103	-44.2	-56.6	-87.1	24.7
1996	434	88	na	13	-96.4	-97.3	-38.5	-27.3
1997	-6	68	33	50	-67.3	-92.6	-70.1	-12.3
1998	2	188	-37	114	-99.1	-80.5	-92.5	7.0
1999	-5	16	-18	166	-84.7	-96.6	-88.1	16.8
2000	-9	9	53	33	-81.9	-90.9	-42.4	-26.8
2001	-10	84	103	169	-70.5	-62.4	-71.6	39.4
2002	8	6	-68	232	-82.5	-76.8	-85.3	37.9
2003	39	15	-83	38	-72.2	-84.4	-73.8	-27.3

Notes:
- na- not available
- X_ ALG _EU stands for exports from Algeria to the EU, X_EGY_EU stands for exports from Egypt to the EU, X_ JOR _EU stands for exports from Jordan to the EU, X_ISR_EU stands for exports from Israel to the EU, X_MOR_EU stands for exports from Morocco to the EU, X_SYR_EU stands for exports from Syria to the EU and X_TUN_ EU stands for exports from Tunisia to the EU.

Table 8: Pooled OLS estimates of regressions, 1980-2006 for the Fixed Effect model (augmented generalized gravity equation).

Right hand side variables	First set (15 countries)*	t-Statistic
Exporter GDP	0.833[h]	145.889
Importer GDP	0.092[h]	196.262
Exporter Population	0.357[h]	44.999
Importer Population	-0.559[h]	-71.395
Distance	-1.183[h]	-101.342
Real exchange rate	- 0.146[h]	-43.859
Border	-0.323[h]	-28.347
EU_ Membership	0.763[h]	99.705
TIE_France	1.605[h]	70.129
TIE_UK	1.052[h]	46.869
Dummy1981	1.052 [h]	12.631
Dummy1982	0.242 [h]	9.683
Dummy1983	0.186 [h]	13.198
Dummy1984	0.253 [h]	12.234
Dummy1985	0.235 [h]	9.767
Dummy1986	0.188 [h]	8.433
Dummy1987	0.162	1.001
Dummy1988	0.177 [h]	6.545
Dummy1989	0.126 [h]	11.985
Dummy1990	0.230 [h]	8.170
Dummy1991	0.157 [h]	30.544
Dummy1992	0.587 [h]	32.954
Dummy1993	0.633 [h]	28.265
Dummy1994	0.543 [h]	35.055
Dummy1995	0.820 [h]	42.493
Dummy1996	0.679 [h]	35.171
Dummy1997	0.598 [h]	30.965
Dummy1998	0.538 [h]	27.851
Dummy1999	0.612 [h]	1.103
Dummy2000	0.492 [h]	25.491
Dummy2001	0.468 [h]	24.221
Dummy2002	0.549 [h]	28.444
Dummy2003	0.628 [h]	32.512
Dummy2004	0.612 [h]	31.673
Dummy2005	0.632 [h]	32.718
Dummy2006	0.501 [h]	25.945
Adjusted R^2	0.586	
SSR	12668.0	
Number of observations	11340	

Notes:

* The old EU 15 (Belgium and Luxembourg data are added together) members included

All variables except dummies are expressed in natural logarithms.

Estimation uses White's heteroskedasticity-consistent covariance matrix estimator.

T-statistics are in parentheses.

[h] denotes significance at the 1% level, [m] denotes significance at the 5% level and [l] denotes significance at the 10% level.

F (n-1,nT-n-K) degrees of freedom in brackets. Where K is the number of variables in the regression, n is the number of trading pairs and T is the number of time periods. The number of observations equals (n x T).

Table 9: Pooled OLS estimates of regressions, 1980-1985 for the Fixed Effect model (augmented generalized gravity equation).

Right hand side variables	Second set (10 countries)*	t-Statistic
Exporter GDP	1.229 [h]	39.867
Importer GDP	0.751 [h]	24.316
Exporter Population	-0.830 [h]	-19.617
Importer Population	-0.696 [h]	-16.448
Distance	-1.481 [h]	-26.115
Real exchange rate	-0.058 [h]	-3.519
Border	-1.620 [h]	-29.225
EU_ Membership	0.294 [h]	5.991
TIE_France	2.365 [h]	24.403
TIE_UK	1.557 [h]	17.902
Dummy1981	0.342 [h]	7.456
Dummy1982	0.239 [h]	5.196
Dummy1983	0.360 [h]	7.832
Dummy1984	0.366 [h]	7.968
Dummy1985	0.302 [h]	6.581
Adjusted R^2	0.443	
SSR	10467.0	
Number of observations	1440	

***** The EU 10 member's countries (Belgium and Luxembourg data are added together) before the third enlargement in 1986

Notes: see table 8 in Appendix.

Table 10: Pooled OLS estimates of regressions, 1980-1985 for the Fixed Effect model (augmented generalized gravity equation).

Right hand side variables	Third set (5 countries)*	t-Statistic
Exporter GDP	1.299 [h]	43.721
Importer GDP	1.436 [h]	48.465
Exporter Population	1.080 [h]	23.709
Importer Population	-1.105 [h]	-24.302
Distance	-1.087 [h]	-16.146
Real exchange rate	-0.330 [h]	-17.231
Border	0.360 [h]	-29.225
Dummy1981	0.389 [h]	7.224
Dummy1982	0.369 [h]	6.860
Dummy1983	0.479 [h]	8.893
Dummy1984	0.351 [h]	6.518
Dummy1985	0.272 [h]	5.043
Adjusted R^2	0.563	
SSR	29601.3	
Number of observations	792	

***** 5 EU countries when the Community was enlarged to include Greece (1981), Spain and Portugal (1986), Austria, Finland and Sweden (1995).

Notes: see table 8 in Appendix.

Table 11: Pooled OLS estimates of regressions, 1995-2006for the Fixed Effect model (augmented generalized gravity equation).

Right hand side variables	Fourth set (5 countries)*	t-Statistic
Exporter GDP	0.162 [h]	8.458
Importer GDP	0.671 [h]	37.142
Exporter Population	1.967 [h]	75.319
Importer Population	-0.167 [h]	-6.657
Distance	-2.030 [h]	-53.889
Real exchange rate	-0.217 [h]	-23.818
Border	-0.373 [h]	-9.513
EU_MEM	1.881 [h]	-32.580
Dummy1996	-0.309 [h]	-7.262
Dummy1997	-0.130 [h]	-3.059
Dummy1998	-0.198	-4.651
Dummy1999	-0.083 [h]	-1.942
Dummy2000	-0.170 [h]	-4.001
Dummy2001	-0.216 [h]	-5.083
Dummy2002	-0.046	-1.071
Dummy2003	0.098 [m]	2.299
Dummy2004	0.124 [h]	2.895
Dummy2005	0.131 [h]	3.073
Dummy2006	0.031	0.707
Adjusted R^2	0.597	
SSR	8235.63 .3	
Number of observations	1584	

***** 5 EU countries when the Community was enlarged to include Greece (1981), Spain and Portugal (1986), Austria, Finland and Sweden (1995).

Notes: see table 8 in Appendix.

Table 12: Pooled OLS estimates of regressions, 1995-2006 for the Fixed Effect model (augmented generalized gravity equation).

Right hand side variables	Fifth set (12 new countries)*	t-Statistic
Exporter GDP	0.933 [h]	44.367
Importer GDP	0.220 [h]	13.735
Exporter Population	0.282 [h]	18.688
Importer Population	0.001	0.054
Distance	-2.268 [h]	-110.203
Real exchange rate	-0.085 [h]	-19.150
Border	0.417 [h]	18.289
EU_MEM	0.733 [h]	24.766
Dummy1996	0.053 [m]	2.083
Dummy1997	0.176 [h]	6.716
Dummy1998	0.161 [h]	6.178
Dummy1999	0.096 [h]	3.668
Dummy2000	0.093 [h]	3.569
Dummy2001	0.119 [h]	4.569
Dummy2002	0.217 [h]	8.370
Dummy2003	0.294	11.368
Dummy2004	0.365 [h]	14.056
Dummy2005	0.180 [h]	6.679
Dummy2006	-0.068 [m]	-2.523
Adjusted R^2	0.489	
SSR	20015.3	
Number of observations	4104	

* The new 12 members added to EU in May 2004 and 2007.

Notes: see table 8 in Appendix.

Table 13: Pooled OLS estimates of regressions, 1995-2006 for the Fixed Effect model (augmented generalized gravity equation).

Right hand side variables	Sixth set (27countries)*	t-Statistic
Exporter GDP	1.071 [h]	172.526
Importer GDP	0.917 [h]	153.158
Exporter Population	0.358 [h]	47.470
Importer Population	-0.259 [h]	-35.053
Distance	-1.892 [h]	-162.049
Real exchange rate	-0.062 [h]	-24.409
Border	0.210 [h]	16.644
EU_MEM	0.614 [h]	71.860
TIE_FRENCH	1.204 [h]	33.373
TIE_UK	0.943 [h]	26.116
Dummy1996	-0.026 [m]	-1.964
Dummy1997	0.023 [i]	1.718
Dummy1998	-0.003	-0.240
Dummy1999	-0.025 [i]	-1.867
Dummy2000	-0.055 [h]	-4.199
Dummy2001	-0.067 [h]	-5.095
Dummy2002	-0.017	-1.278
Dummy2003	0.031 [m]	2.331
Dummy2004	0.045	3.429
Dummy2005	-0.137	-10.233
Dummy2006	-0.261	-19.464
Adjusted R^2	0.701	
SSR	61314.6	
Number of observations	12672	

*** All 27 members of EU.**

Notes: see table 8 in Appendix..

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List of Major Works

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2. Younes, H. and Abo Taleb, A. (2006) *Augmented gravity model: an empirical application to Arab Mediterranean countries European Union trade flows***,** Conference on Bridging the gap: the role of trade and FDI in the Mediterranean, CNR - Institute of Studies on Mediterranean Societies, June 8-9 2006, Naples, Italy.

3. Younes, H. (2005) *An Analytical Economic Study of Agricultural Trade between Arab Countries* (PhD Degree thesis), Department of Agricultural Economics, Faculty of Agriculture, University of Mansura, Egypt.

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