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Regional Trade Integration and Spatial Effects in the Euro-Mediterranean Zone

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Abstract

During recent years, regional economic integration has played a crucial role in the conduction of trade policies. Economic integration relies upon the concept of joint commercial policies within regions by which countries enable to promote their trade potentials. Basically, a new type of cooperation throughout new preferential trade agreements has emerged by economic blocks such as MERCOSUR, NAFTA, ASEAN and others. Now, there is an appropriate avenue for the nations of Euro-Mediterranean to deepen their economic relations and benefit from regional integration effects.

The present paper makes attempt to indicate the impact of possible economic integration on the international trade flows of the Euro-Mediterranean countries. Accordingly, it uses a trade gravity model in order to explore main determinants that would significantly affect the trade flows of mentioned countries. To the end, an application of spatial econometric methods can assist us in obtaining relevant estimation results.

The contiguity effect must be considered because of spatial dependence of the Euro-Mediterranean countries. These countries have some common borders and they therefore have impacts on each other and their relations can be influenced by neighborhood. Thus estimating the model through traditional econometrics obtains biased results and the model must be solved by spatial techniques. The paper thus tries to answer the question of to what extent the contiguity factor can influence the intra-trade flows of the Euro-Mediterranean countries.

Keywords: Regional Integration, International Trade Flows, Gravity Model, the Euro-Mediterranean Countries, Contiguity And Spatial Effects.

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1- Introduction

In the late-1980s and early 1990s, the world experienced a new wave of regionalism because of the success of the European countries in implementing the European union (EU). The successful story of the EU in reaching higher culminated in 1990 with "The New Mediterranean policy" of the EU. Then, the EU signed the Euro-Med partnership with 12 Mediterranean countries in 1995. Most of these Mediterranean countries have common water borders with some European countries. Therefore, the EU members influence their neighbors through spillover effects in different sectors including trade. In fact, trade flows between the EU and its neighbors are affected by contiguity and neighborhood.

The contiguity is thus a crucial factor that should be considered to identify the determinants that would increase trade flows between the European and the Mediterranean countries. The paper is going to investigate whether trade integration and spatial effects can affect the trade flows of members. Then, the hypothesis is tested through a gravity model by using spatial econometric techniques. In other words, this paper explores the empirical results of the gravity model when the spatial effects are taken into account in the framework of spatial econometrics. For this purpose section, II will discuss the theory of economic integration and it is followed by a short review of some studies on economic integration and spatial effects in section III. There are some evidences about the EU and its cooperation with the Mediterranean countries in section IV. Section V provides the model used in the paper. Section VI, briefly reviews spatial Econometrics. After explaining the Data and Resources in section VII, obtained results for the case study are discussed in section VIII. The paper will close with a summary and conclude comments in section IX.

II- Theory of Economic integration

Based on theory, economic integration emerges when a set of national economies co-operate with each other to create a larger economic unit. In this way, trade obstacles are removed and members make efforts to increase their trade, monetary and fiscal activities in the framework of integration blocks. Shagi (1987) have explained economic integration as follows:

"Economic integration relies upon economic transaction promotion and unification of resources of two or several isolated systems that leads to a rise in the capability of the larger integration system".

Accordingly, the members apply discriminative policies for non-members, whilst they combine trade liberalization strategies with protective policies to minimize trade restrictions among themselves. Economic integration comprises of various stages, so that each stage is more complete than the pervious one, and more obstacles are removed in respect to former stages to ease more trade and economic co-operation amongst countries (Gurler, 2000).

Although, before economic integration, each country acts as a economic system, after that, trade transactions followed by a decrease in costs and resource reallocation will result in an increase in products, trade and then economic welfare for members.

Economists and other social sciences experts discuss differently about the relationship of integration and globalization; some of them believe that regionalism is one of the prerequisites for globalization or global integration. On the other hand, some experts claim that since members of a block grant trade privileges to them and apply discriminative policies for non-members, regionalism will disorganize the world economy and it will weaken globalization.

III- Literature Review

Many studies have investigated the impacts of trade integration and spatial effects on the economic situation of members. Here, we go through the results of some studies in these regards.

Soloaga and winters (1999) examine "the second wave of regionalism" that began in early 1990s and led to new PTAs in different blocks. They consider nine famous PTAs and investigate the impact of integration on trade flows in various blocks through comparing trade models before and after the formation of each block.

Martinez-Zarzoso and Nowak-Lehmann (2001) have an investigation on the main determinants of trade flows between the European Union (EU) and Mercosur members. They use a trade gravity model to explore how specified factors play their roles in trade flows during the 1988-96 periods. Their results

indicate that potential exports for Mercosur would be predicted to increase relatively more than their real exports in 1996.

Porojan (2000) predicts trade flows between the EU and some of its potential members. He revises the popular trade gravity model in light of the findings of spatial econometrics. Porojan discusses that when the inherent spatial effects are explicitly taken into account, substantial changes occur in both the magnitude and statistical significance of the estimated parameters. Moreover, he claims that the traditional estimates seriously overestimate the size of trade flows to and from island countries, whilst underestimating occurs for countries that have trading neighbors.

Meanwhile, spatial effects between the EU and the Mediterranean countries are considered at Akbari and Farahmand (2002). The objective of this study is to analyze convergence and spillover effects between European countries and their south Mediterranean neighbors. Thus, a spatial form of Solow-Swan growth model has been specified. The results show that there are spatial effects on the growth of considered countries and the estimated coefficient of it, is about 0.21. It indicates that a proportion of the growth rate of each considered country is due to contiguous effects.

IV- The EU and Co-operation with the Mediterranean Countries

The history of the European integration goes back a half a century. The European Union (EU) was set up after the 2nd world war. The process of European integration was lunched on 9 May 1950, when France officially proposed to create "the first concrete foundation of a European federation". Six countries that joined at first were Belgium, Germany, France, Italy, Luxembourg, and the Netherlands. Now, the EU has 15 members and Austria, Finland, and Sweden were the last ones, which joined the EU in 1995 (Other members are Denmark, Ireland, the United Kingdom, Greece, Spain and Portugal). In addition, today, the EU is preparing for the accession of 13 eastern and southern European countries.

The European Union is based on the role of law and democracy and has increased the welfare of people in member countries. The EU is neither a new State replacing existing ones, nor is it comparable to other international organizations. In fact, it is the most successful and strongest regional integration block in the world and has delivered stability and economic prosperity to

members. The EU considers the interests of the Union as a whole. Some principal objectives of the union are: establishing European citizenship and defending civil and political rights; ensuring freedom, security and justice; promoting economic and social progress; and asserting Europe's role in the world (http://europa.eu.int/).

European countries find significant economic power in the global economy. They all are powerful economies. For example, Luxembourg has the highest GDP per capita in the world -$ 44000 according to the estimation of CIA in 2002- meanwhile the incomes per capita of many African countries including Nigeria, Mali, Niger, Ethiopia, and Somalia are less than $ 1000. After Luxembourg, among the EU members, Ireland, Belgium and Denmark have the highest GDP per capita respectively, and the lowest per capita incomes belong to Spain ($ 20700), Greece ($ 19000), and Portugal ($ 18000). Luxembourg has the first rank in terms of GDP per capita in the world and Portugal has the 46th rank (CIA – The World Factbook, 2002). Total population of the EU is about 378.7 million (about 6.2 percent of the world population), and its GDP/PPP is about 8.5 billion dollars – that is about 20 percent of the world (CIA – World Factbook, 2002).

Today, it is clear within the European community that the construction of Europe cannot take place without taking account of other countries, especially neighbors. Therefore, the EU has expanded its relations with other nations. Since the EU members believe that the EU cannot maintain its prosperity and deepen its integration without stability and prosperity in its immediate neighborhood, they have established a partnership with the Mediterranean countries. Of course, the European community has a long history of co-operation with the Mediterranean countries. It began in the 1960s with concessionary trade agreements, expanded in the 1970s to include economic and financial co-operation, and culminated in 1990 with the adoption of the "The New Mediterranean Policy". For developing the relations of the EU and its neighbors, the Euro-Mediterranean conference was launched in 1995 between the EU and its 12 Mediterranean partners. These 12 Mediterranean countries are Algeria, Morocco, Tunisia, Egypt, Israel, Jordan, Lebanon, the Palestinian autonomous territories, Syria, Turkey, Cyprus, and Malta. The Euro-Med Partnership has identified three aspects for co-operation including political and security aspects; an economic and financial aspect for achieving a Euro- Mediterranean economic

area based on free trade in accordance with the obligations arising from the WTO; and a social and human aspect in such areas as education, training and young people, culture and the media, migrant population groups and health.

Most of these 12 Mediterranean countries are low-income ones and they have many socio–economic problems. They mostly have low incomes and growth, but high population. Their population is about 246 million as a whole, which is 4 percent of the world population -65 percent of the EU. Their literacy rate is between 94 percent in Israel and 44 percent in Morocco. The mean of life expectancy in these countries is 5 years less than in the EU (It is 77.9 years in the EU and 72.9 years in these countries). In addition, their GDP/PPP is 1.3 billion dollars as a whole, which is about 3 percent of the world. According to the mentioned data, the GDP gap between the EU and these 12 Mediterranean countries is about 7.2 billion dollars and their GDP/PPP is only 15.3 percent of the EU (CIA – World Factbook, 2002). This gap is considerable and co-operation of the Mediterranean countries with the EU can be helpful in generating economic growth for them. These countries can benefit from the EU spillovers and promote the economic growth and income, and so the welfare of people who live in them.

V- The Model

In this paper, we use a gravity model to estimate the integration between the EU and the Mediterranean countries as well as spatial effects on volume of trade flows. The name of the model has come from Newton's fundamental law of gravity in Physics. This law, which governs the movements of bodies in space, was first applied in the field of social sciences to describe the movement of people between areas. The law states that the force of attraction, or pull F, between two bodies of respective masses M1 and M2, where separated by a distance d, will be equal to:

$$F = g.\ M1\ .\ M2\ /\ d^2 = g\ .\ M1\ .\ M2\ .\ d^{-2} \qquad (1)$$

Where g is a constant (Oppenheim, 1980). In other words, the amount of interaction between two areas will be directly proportional to their masses (their size, population, level of expenditures, etc), but will be inversely proportional to some function of the distance between them.

Tinbergen and Poyhonen first applied trade gravity models to international trade. Since then, it has become a popular instrument in empirical foreign trade analysis. According to the gravity model, exports from country i to country j are explained by their economic and demographic capacities (GDP or GNP, population, etc.), direct geographical distance and a set of dummy variables that explain contiguity and common language effects as well as trade arrangements, etc. The assumptions of the model are that trade flows between two countries are related positively to their GDPs and inversely to their geographical distance. The use of dummy variables is also considered to the model as trade partners belong to the same regional grouping. This determines trade flows within each region what to extent is due to integration effects.

Accordingly, a type of the generalized trade gravity model is specified as follows:

$$LnXij = \alpha + \beta_1 LnGDPi + \beta_2 LnGDPj + \beta_3 Dij + \beta_4 Dist + \beta_5 SXij \qquad (2)$$

Where, Ln denotes variables in natural Logs. Xij explains trade flows between country i, as a exporter, and county j, as a importer. GDPi and GDPj are exporter and importer's GDP, respectively. Moreover, Dij indicates a dummy variable for integration between the EU and the Mediterranean countries. Therefore, it takes the value of one, as exporter and importer are both members of the EU-Mediterranean region and zero otherwise. Dist is geographical distance variable. Since we had some restrictions in accessing data of distance between considered countries, we assign numbers of 1 to 5 to the variable in terms of their distance. We expect that β_4 is negative. In other words, the geographical distance would reduce volume of trade flows, because border closeness leads normally communication expenditures to decrease.

Sxij denotes spatial lag variable, which is explained in section VI. In fact, the coefficient of this variable explains spatial aspects in trade relations between countries that is it shows that contiguity how can affect the trade flows of countries. If $\beta 5$ is positive and statistically significant, it reveals the fact that the more the trade flows in contiguous countries of a country, the more the trade flows in that country. In other words, positive spatial effects exist in the considered sample.

In principal, high level of incomes in exporting countries indicates a high level of production, which increases the availability of exportable goods. Therefore, we expect β_1 that is income elasticity of the exporter, to be positive. Similarly, β_2, which indicates income elasticity of the importer, is also expected to be positive, since a high level of income in the importer country suggests more imports.

VI- A Brief about Spatial Econometrics

Applied work in regional science relies heavily on sample data that are collected with reference to locations measured as points in space. Thus, the locational aspect of sample data must be considered and entered in the model. It is done in spatial econometrics. Anselin (1988) provides a complete treatment of many facts of spatial econometrics. In fact, "spatial econometrics is a subfield of econometrics that deals with the treatment of spatial interaction (spatial autocorrelation) and spatial structure (spatial heterogeneity) in regression models for cross-sectional and panel data" (Anselin, 1999).

Spatial dependence in a collection of sample data observations implies that one observation associated with a location in space which labeled i depends on other observations at locations $j \neq i$. Formally,

$$Yi=f(Yj), \qquad i= 1, 2, \dots, n \quad j \neq i \tag{3}$$

in other words,

$$Cov\,(Yi, Yj) = E(YiYj) - E(Yi).E(Yj) \neq 0 \quad \text{for } i \neq j \tag{4}$$

That this violates the Gauss-Markov assumptions.

There are two reasons for spatial dependence of observations. First, data collection of observations associated with spatial units such as zip-codes, census tracts, etc might reflect measurement error, if the administrative boundaries for collecting information do not exactly reflect the nature of the process generating the data. Second, the spatial dimension of socio-demographic, economic or regional activity may be an important aspect of a modeling problem. Regional science is based on the premise that location and distance are important forces at

work in human geography and market activity. All of these notions have been formalized in regional science that relies on notions of spatial interaction and diffusion effects, hierarchies of place and spatial spillovers (Lesage, 1999, pp. 3-4). These spatial dependencies can be in the form of spatial autocorrelation or spatial heterogeneity.

In this way, the locational aspects of sample data should be quantified that this is done through distance and contiguity. That is, observations that are near each other would reflect a greater degree of spatial dependence than those more distant from each other. In other words, the strength of spatial dependence between observations would decline with the distance. Meanwhile, contiguity – the relative position to other such units- is another source on locational information.

According to the locational information, a spatial weights matrix W can be generated based upon contiguity or distance. In this paper, we use a simple contiguity matrix, so that its elements take values of 0 or 1, in accordance to the absence or presence of a contiguity relationship[1]. That is wij –the element of row i and column j in matrix W- is equal to 1, if the regions i and j are contiguous, otherwise wij=0. Spatial matrix is a N×N one for N observations. For ease of interpretation, the elements of the spatial weights matrix are typically row-standardized, such that for each i, $\sum_j$ wij=1. Premultiplying the spatial matrix by the vector elements of the interested variable, the spatial lag operator of that variable is obtained. The spatial lag may be interested as a weighted average (with the wij being the weights) of the neighbors or as a spatial smoother (Anselin, 1999). Then, we can examine spatial dependence through adding the spatial lag to the main model. Formally, a Spatial Lag Model, or a Mixed Regressive – Spatial Autoregressive model is expressed as:

$$Y = \beta X + \rho WY + \epsilon \qquad (5)$$

Where Y is the N by 1 vector of dependent variable, X is the matrix of explanatory variables, and ϵ is the N by 1 vector of random errors. The

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1- The contiguity relationship can be defined as linear, rook, bishop, double linear, double rook, or queen contiguity like movements in chess. For further discussion, see Lesage, 1999.

significant coefficient of WY - ρ - implies the presence of spatial dependence. [1] In fact, the parameter ρ would reflect the spatial dependence in the sample data, measuring the average influence of neighboring or contiguous observations on observations in the vector Y. Presence of spatial dependence means that some part of the total variation in Y across the spatial sample would be explained by each observation's dependence on its neighbors.

A spatial error model is a spatial case of a regression with non-spherical error terms, in which the off-diagonal elements of the covariance matrix express the structure of spatial dependence. This model is:

$$Y = \beta X + \epsilon \qquad \text{and} \qquad \varepsilon = \lambda W\varepsilon + u \tag{6}$$

Since $\varepsilon = (I - \lambda W)^{-1} u$, and thus $Y = \beta X + (I - \lambda W)^{-1} u$, the above model is equivalent to:

$$Y = \lambda WY + X\beta - \lambda WX\beta + \epsilon \tag{7}$$

Which is a spatial lag model with an additional set of spatially lagged exogenous variables (WX) and a set of nonlinear constraints on the coefficients (the product of spatial autoregressive coefficient with the regression coefficients of β should equal to the negative of the coefficients of WX) (Anselin, 1999).

VII- Data and Resources

To estimate the model, as specified in Eq. (2) we have collected annual data on export flows of some selected the EU and the Mediterranean countries, including France, Germany, Greece, Italy, Spain, the United Kingdom, Algeria, Egypt, Israel, Morocco, Tunisia, and Turkey. Because we use spatial econometric techniques, we have to select the same trade partners for considered countries. For this reason, we choose 50 partners in terms of volume of exports for each one, which consists of all the EU- Mediterranean members and some non-members. Accordingly, we have totally 600 observations. The exports data

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1- This shows spatial autocorrelation. In spatial heterogeneity, there is a spatial dependence between error terms of neighboring regions.

are collected from Direction of Trade Statistical Yearbook. The resource of GDP data is also World Bank Data Base, 2000.

VIII- Estimation Results

We estimate the model, which was specified in Eq. (2) in 2000. The estimated results are as follows:

$$\text{LnXij} = -7.8 + 0.73\text{LnGDPi} + 0.37\ \text{LnGDPj} - 0.0098\text{Dij} - 0.18\text{Dist} + 0.24\text{SXij} \quad (8)$$

(-13.3) (19.7) (7.7) (-0.05) (-2.2) (4.3)

$$\overline{R}^2 = 0.56$$

T-values are presented in parentheses. As we expected, the income elasticity coefficients are both positive and statistically significant. As results show, the income elasticity of the exporter country (i) is higher than of the importer country (j), so that a 10 percent increase in income of the exporter will result in 7.3 percent increase in trade flows, while this is 3.7 percent for the importer country. Hence, incomes of exporter countries play a more important role in the volume of international trade flows.

Although, the estimated coefficient of dummy variable of integration for EU- Mediterranean (Dij) is negative, it is not statistically significant. It reveals the fact that integration between the EU and its Mediterranean partners is below potential level, because the amount of exports from the Mediterranean countries to the EU is negligible, while exports from the EU to the Mediterranean countries is high. The coefficient of distance variable is equal to –0.18 and shows that the longer the distance between two countries, the lower the trade flows between them.

The estimated coefficient of the spatial lag of dependent variable is about 0.24 and is significant at 99%-confidence level. In other words, the significant level of this coefficient implies strong effect of neighborhood on trade flows of considered countries. Thus, a 1 percent increase in the weighted exports of the neighboring countries is associated with an increase of 0.24 percent in the trade flows of a country. The estimated value indicates that a proportion of trade flows of each considered country is due to contiguous effect and this confirms the idea of regional spillovers. Therefore, the Mediterranean countries can benefit from

spillover effects of the EU. In fact, it is an advantage for the Mediterranean countries that are near the EU countries, which are powerful economies. Benefiting from spillovers can be accelerated through expansion of relationship and co-operation. The estimated value is greater than that obtained by Akbari and Farahmand (2002) for the EU- Mediterranean countries.

Meanwhile, adjusted $\overline{R}^2$ is equal to 0.56 and, it shows that considered variables explain 56 percent of the model's variations.

IX- Conclusions

To examine the effect of integration and spatial effects on EU-Med trade flows, this paper has investigated the conduction of integrating the block's members in economic activities, based upon an application of the trade gravity model. It specified an empirical model of the trade gravity, including some rich EU and poor African countries to be presented in multilateral transactions.

Overall, estimation results obtained indicate that income elasticities of exporter and importer countries are both positive but the former is higher than the latter. Meanwhile, trade integration between EU-Med is less than its potential level. As we expected, distance has negative impact on trade flows. In accordance with the spatial structure of considered countries, the spatial dependence hypothesis is confirmed in them.

Consequently, the Mediterranean countries can benefit from the EU spillovers and increase through expanding trade, joint activities and regional co-operation. It also can be along the avenue of globalization.

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