Avrupa Bütünleşmesi: Ticari Başarım Açısından Bir İrdeleme

European Integration: An Examination in Terms of Trade Performances

Burak BEYHAN*
Fikret ZORLU**

ÖZET

Avrupa Birliği'nin (AB) en önemli hedeflerinden birisi olan bütünleşme değişik yön ve boyutlarıyla tanımlanabilir ve ölçülebilir. Bu bakımdan, ilgilenilen konuya bağlı olarak, bütünleşme siyasal, toplumsal, kültürel ve iktisadi boyutlarıyla ayrı ayrı irdelenebilir. Bu çalışma, AB içerisindeki bütünleşmenin düzeyini ölçmek için üye ülkelerin ticari başarımlarına odaklanmaktadır. Araştırma sonuçları Avrupa içerisindeki ticaret hacminin 1995-2006 yılları arasında AB'nin genişleme süreci boyunca arttığını göstermektedir. Buna ilaveten, Avrupa içindeki ticaretin toplam ticaretten aldığı pay da artmıştır ki, bu durum iktisadi anlamda birlik içinde belli düzeyde bir bütünleşmenin olduğunu açığa vurmaktadır. Bununla birlikte, önemli iktisadi bloklar üye ülkelerin uzmanlaştıkları sektörlere göre irdelendiğinde AB dahil hiç bir küresel bloğun kendi içerisinde sektörel çeşitlilik bakımından yeterli çeşitliliğe sahip olmadığı tespit edilmiştir. Araştırmada ülkeler arasındaki etkileşimlerin haritalanmasında etkin bir biçimde Toplumsal Ağyapı Çözümlemesi (TAÇ) araçları kullanılmıştır. Çalışmanın önemli bir diğer özelliği, hem AB'ye üye ülkeler arasında hem de AB üyesi ülkeler ile diğer ülkeler arasındaki uluslararası ticaret örüntüsünün, TAÇ'daki araçlar zenginleştirilerek ve ülkelere göre hakim sektörler belirginleştirilerek çözümlenmesidir.

Anahtar kelimeler: Avrupa bütünleşmesi; ticari başarım; toplumsal ağyapı çözümlemesi.
Çalışmanın Türü: Araştırma

ABSTRACT

Integration, one of the major objectives of European Union (EU), can be described and measured through various aspects and dimensions. In this respect, depending on the subject of interest, integration may be evaluated according to political, social, cultural and economic dimensions. This paper focuses on the trade performances of member countries in order to measure the level of integration within the EU. Research findings show that intra-European trade volume has increased during the expansion process of the EU between 1995 and 2006. In addition, share of intra-trade in total has also increased, which reveals a certain level of integration in economic terms. The export volumes among countries revealed that the member states of the European Union constitute a strong economic block with respect to the export-import relationships among themselves. In this study, tools of social network analysis (SNA) are actively employed in order to map the interactions between corresponding countries. For this purpose, a certain level of minimum value is defined for the volume of trade occurring between countries in order to identify quasi-components, (i.e. bi-components or blocks). Furthermore, the reciprocity analysis is also employed in order to observe the mutual integration of countries. In this respect, what is evident from the mapping of import and export relationship between countries is that European Union, South East Asian, Latin American, and East and Central European countries have distinct cluster formations, albeit with some exceptions. The United States, Germany and Japan also appear to be the major trade partners between the blocks. In terms of reciprocity between countries, it is remarkable that the pattern of international trade among the countries who are member of EU seem to be slightly more reciprocal than other regional blocks. This particular situation partly reflects the fact that compared to other blocks the EU is an intensely integrated economic block. Nevertheless, this integration appears to be partial. Indeed, although trade flows among central countries of the EU network (Germany, Netherlands, France, United Kingdom, Denmark, Italy, and Belgium) are reciprocal, most of flows between the central countries and the rest of EU are not reciprocal. Another distinctive characteristic of this study is the analysis of the pattern of international trade occurring both between the countries that are members of the EU and between the EU member countries and others by enriching the tools available in SNA for the illustration of the dominant sectors according to the countries. For this purpose, firstly localization indexes are used to reveal the specialization of the countries in economic sectors. Although two methods of localization indices (Location Quotient Index and Contingency Index (CI)) are reviewed, only one of them (CI) is employed in this study. Sectoral specialization of each country is defined according to the sector for which CI value is calculated to be maximum. In this respect what is further evident from this study is that when sector-based specialization of countries are taken into account major economic blocks are found to be not self-sufficient in terms of involvement of a spectrum of member states meeting the demand of the block in some specific sectors. Overall, this study reveals the fact that SNA has a high capacity in terms of exploration and representation of interactions between countries, and also explaining the rational behind particular groupings of countries, which otherwise are invisible to the observer without a proper representation of the data. Research data employed in this study is obtained from EUROSTAT, ITC and Correlates of War Project. Future studies may be devoted to the identification of sources and specific dimensions of lack of integration between central countries and more peripheral parts of the EU in a more detailed

* Yrd. Doç. Dr., Mersin Üniversitesi
** Yrd. Doç. Dr., Mersin Üniversitesi

context. Further SNA based studies focusing on specific sectors and country profiles may also have sound contribution to the international trade theory and the issue of integration.

Keywords: European integration; trade performances; social network analysis.
The Type of Research: Research

1. INTRODUCTION

In the last decades many researchers have dealt with the growth in international trade and trade dynamics (Dalum et. Al., 1998; Brasili et.al., 2000; Henderson et.al., 2002; Proudman and Redding, 2000; Fligstein and Merand, 2002; Coe and Hess, 2005; Zaghini, 2005). According to ITC statistics (2005) volume of international trade shows gradual increase (ITC, 2001-2005). Growth of GDP countries, diminishing factor prices, diminishing trade costs, international agreements and the economic theory of gravity are regarded as main factors of increase in international trade volume. This study investigates the international trade performances of member countries in order to reveal the extent of economic integration in European Union.

This issue may be assessed through various methods and indicators. For example both Krempel and Plümperc (2003), and Anderson and van Wincoop (2004) provide an economic theory of gravity model in order to understand geographical determinants of international trade pattern. Brasili et al. (2000) investigated the shape of the sector-specific distribution of an index of trade specializations for fourteen countries and its evolution over time. Zaghini (2005) investigated the evolution of the specialization pattern of 10 countries that joined the EU in 2004. Zaghini also analyzed comparative advantages as 'revealed' by trade flows by an index of specialization over the period 1993–2001. He found that new members show a dynamic trade pattern and they gained comparative advantages especially in some 'high tech' products. Eaton and Kortum (2002) examined the role of geography and technology in the formation of trade patterns and sector-specific specialization. They also investigated the role of trade in spreading the benefits of new technology. The researchers developed a Ricardian model and found that geographic barriers have significant role in countries' specialization.

Coe and Hess (2005) investigated the implications of rapid internationalization of selected transnational corporations on international trade. According to Fligstein and Merand (2002) rapid expansion of world trade can be regarded as the central feature of globalization. On the other hand, regional agreements have notable impacts on trade pattern. Fligstein and Merand (2002) found that, in 1999, trade between European countries accounts for approximately 40% of their GDP, and 70% of their total exports are directed to another. These figures represent a strong integration of European Community. In other words, integration is a strategy to provide both sustainability and survival of domestic economies. This form of integration, which is sometimes called "conceptions of control", is an interaction among groups (Fligstein and Merand, 2002). In such an interdependent domain, groups will have more power in order to reproduce their dominant position. Fligstein and Merand (2002) explained production of social structures in markets, in terms of four factors, which are property rights, governance structures, rules of exchange and conceptions of control. They stated that (2002) European market integration, regarded as "Europeanization", is part of the regionalization of the world economy and played an important role in increasing trade volumes in the world since the early 1980s.

In the last decades trade volumes among countries show significant growth. Reporting and partner countries have interdependencies in both export and import performances. Some authors explore these relationships with reference to globalization theories by arguing that "globalization is not about the developed world losing ground to cheap labor in the undeveloped world", but "about how the largest and most advanced economies are increasing their interdependence" (Fligstein and Merand, 2002: 12). In the last decades national policies of trade and financial systems have been implemented with the aim for adaptation to new global market:

> *Closer integration of national economies into the international trading and financial systems by an increasing number of countries has created a new environment for national policy action. Although countries have lost some degree of freedom in designing and implementing their own economic policies, there has been considerable diversity in macroeconomic policies, both in developed and developing economies, in response to the new challenges arising from globalization and increased interdependence. (UN, 2006)*

Hettne (2002) states that there is a new global trend towards regionalization, which he calls the 'New Regionalism'. This concept addresses geographical blocks which are regarded as political responses to globalization. Payne (2005) clarified that the European Union, the North American Free Trade Area (NAFTA) and the Asia Pacific Economic Co-operation (APEC) completely or partially removed barriers against trade within those blocks, but did not allow free market environment to the rest of the world. Henderson et al. (2002) argued that regional blocks are also outcomes of the evolution of global production networks that integrate firms into structures. While traditional organizational boundaries are rearranged, national economies are integrated in order to increase internal trade. Proudman and Redding (2000) investigated mobility and specialization of countries in international trade, and found that overall, mobility was found to be highest in France and the United Kingdom. Henderson et al. (2002) adds that, input-output relations of firms, which are also interrelated to export and import performances of countries, are major characteristics of global production networks.

This research offers that import-export pattern can also be regarded as one of the major indicators of integration within regional blocks. In this research import and export performances are used to explore integration and interdependence of national economies. Trade performances of EU member countries and their main partners from the rest of the world are investigated by employing SNA. A sector-specific analysis is also conducted in combination with SNA in order to reveal the pattern of sectoral specialization for each country between 1995 and 2006. Overall SNA is employed in order to unveal the nature of relationships between member countries, and explore whether or not there are sub-groups and clusters within EU. Characteristics of clusters and the formation of such clusters between 1995 and 2006 are clarified by employing specified indexes and tools of social network analysis.

2. METHOD AND DATA

In order to analyze trade relations both among European countries and among European countries and other countries, a series of import and export matrices are obtained from EUROSTAT (1995 and 2006), ITC (2002-2003), and Correlates of War Project (1995). Import and export performances for specific economic sectors have been distinguished for each reporter and partner country. In the analysis of the databases compiled from EUROSTAT, ITC and Correlates of War Project, two methods of analysis have been employed; Social Network Analysis (SNA) and Localization Indices. In fact our effort is similar to the one experienced by Krempel and Plümperc (2003) who combine statistical analyses and visualization techniques in order to analyse economic integration by drawing on the world trade data.

2.1. Social Network Analysis

SNA is actually based on simple counting operations that can be employed in order to detect sub-groups involved within a social network. In SNA, "a social network is an analogy relating actors and relations to points and lines" (Moody, 2000). In this analogy, graph theory is used to analyze social systems. Any graph is composed of nodes corresponding to actors in the network and lines (or edges) corresponding to relations. In this study, nodes represent countries, and lines represent export and import relationships among countries.

In this study parallel to Beyhan (2011), in line with Everett and Borgatti (1998) more deterministic definitions of cohesive sub-graphs are employed. Accordingly, the first step is the identification of components involved in the network data. A component can be defined as a collection of nodes for which a path between each pair exists and each node in a connected component can reach other nodes in the component (Moody, 2000). The next step is to identify bi-components embedded in the network data. Graph theoretically, bi-components can be identified by making use of cut-points existing in a network data. A cut-point of a graph is a vertex (node) whose removal increases the number of components (Borgatti, Everett, and Freeman, 2002). Literally, components that come into surface after the removal of cut-points are named as blocks or bi-components. It is important to note that bi-components (or blocks) overlap with each other because of the existence of cut-points in separate blocks. Within this framework, in this study, blocks refer to the groups of countries linked to each other through a single country.

Because of the increasing level of globalization, and exponential increase in international trade it is clear that it is not possible to detect more than one major component for the international trade relations between countries if the absolute volume of trade occurring between countries are employed in SNA. Yet, if a certain level of minimum value of trade volume is introduced into the analysis, as it is done in this study, one can easily identify quasi-components, i.e. bi-components or blocks. In this study, the graphical output of the reciprocity analysis is also employed in order to observe the mutual integration of countries. Indeed, integration can be properly measured by mapping the connectivity and observing for the reciprocity among countries. Lastly, in this study we also employ centrality analysis in order to reveal the dominant countries in the international trade. Centrality analysis measures the centrality of the nodes involved in a network by employing various algorithms developed in order to calculate different forms of centrality. The simplest one which is also used in this study is the degree centrality that is based on the simple counting of the ties incoming or outgoing from a node.

In this study, UCINET and NetDraw softwares (Borgatti, Everett and Freeman, 2002) are used to represent social network and perform necessary computations in order to find out respective social network parameters. In SNA, representation of a network can be realized by employing a series of alternative layouts. In this study, only two of them are employed; Principle Component (PC) for the representation of global network and Gower Metric Scaling (GMS) for the representation of European network. In a graph employing GMS or PC, two nodes are located closer if they are intensely connected directly or through other nodes. Thus, countries closer to each other are more likely to be in the same regional block, and each block represents an integrated group of countries in terms of import-export performances. Yet, as Verspagen and Werker (2003: 14) note, reliance on the graphical outcome of SNA "is impressionistic, and at the level of individual network members, positions may be subject to significant stress (mismatch between true distances and distances in the 2-dimensional plane)". A serious of examples of the employment of the method (GMS) are available in Mei, Cai, Zhang and Zhai (2008), Verspagen and Werker (2003), and McCaffrey and Smith (2007).

2.2. Calculation of Localization Indices

Localization indexes, in general, are used to reveal specialization of geographic units (regions, countries etc.) in economic sectors. Respective indexes are also employed to measure spatial concentration of any sector in a country or region. Two methods of localization indices were reviewed but only one of them is employed in this study; Location Quotient Index (LQ) and Contingency Index (CI). LQ (also known as coefficients of specialization) was developed by Florence (1939 and 1948 quoted in Guimarães, Figueiredo and Woodward (2009: 360), Spiegelman (1964: 85) and Burange (2003: 15)) in 1930s and 1940s. In the subsequent years, in the measurement of export specialization, Revealed Comparative Advantage (RCA) index is also widely used, but in essence there is no difference between LQ and RCA (Hoen and Oosterhaven, 2004). In international trade studies, Zaghini (2005) particularly analyzes comparative advantages by using RCA (see also the studies conducted by Aynagöz Çakmak (2005) and Serin and Civan (2008) for the employment of RCA). Overall both RCA and LQ Index are based on the comparison of the row profiles of a contingency table with the profile of the column-wise sum of the rows. For this purpose, firstly, the share of each item in the row-wise sum is calculated. Secondly, the share of each item of the column-wise sum of the rows in the row-wise sum of the respective row is calculated. The ratio of the first share to the second one gives us LQ values. The formal calculation of LQ (2) can be given as below;

Assume that the following matrix (1) represents a contingency table with r rows and c columns:

$$X_{ij} = \begin{array}{|cccccc|} \hline X_{11} & X_{12} & \cdots & \cdots & \cdots & \cdots & X_{1(c-1)} & X_{1c} \\ X_{21} & X_{22} & \cdots & \cdots & \cdots & \cdots & X_{2(c-1)} & X_{2c} \\ \cdots & \cdots & \cdots & \cdots & \cdots & \cdots & \cdots & \cdots \\ \cdots & \cdots & \cdots & \cdots & \cdots & \cdots & \cdots & \cdots \\ \cdots & \cdots & \cdots & \cdots & \cdots & \cdots & \cdots & \cdots \\ \cdots & \cdots & \cdots & \cdots & \cdots & \cdots & \cdots & \cdots \\ X_{(r-1)1} & X_{(r-1)2} & \cdots & \cdots & \cdots & \cdots & X_{(r-1)(c-1)} & X_{(r-1)c} \\ X_{r1} & X_{r2} & \cdots & \cdots & \cdots & \cdots & X_{r(c-1)} & X_{rc} \\ \hline \end{array} \qquad (1)$$

LQ values for the table given above are calculated by using the following formula;

$$LQ_{ij} = \frac{\dfrac{x_{ij}}{\sum_{j=1}^{c} x_{ij}}}{\dfrac{\sum_{i=1}^{r} x_{ij}}{\sum_{i=1}^{r}\sum_{j=1}^{c} x_{ij}}} \qquad (2)$$

Based on this formula (2), one can easily infer that three observations are noteworthy for any individual LQ value; LQ < 1, LQ ≅ 1 or LQ > 1. If LQ > 1, it means that the respective item exhibits a concentration above the level observed for the corresponding column-wise sum. If LQ < 1, it means that the respective item displays a concentration below the level observed for the corresponding column-wise sum. If LQ ≅ 1, it means that the level of concentration of the respective item is almost equal to the level of concentration of the corresponding column-wise sum. The major drawback of the LQ analysis is the fact that even though it tells much about the localization of the socio-economic categories, it does not tell anything about the relative importance of the absolute figures. Thus, the results of the analysis may be misleading if the absolute figures of each item is not checked. Indeed, by employing LQ analysis, one can find that there exist remarkable localization trends for certain socio-economic categories but some of these categories may involve items having very little importance in terms of their absolute figures.

This pitfall of LQ analysis led us to employ a more reliable index of localization; CI. Calculation of CI index is actually very similar to Chi-square. Nevertheless, in contrast to Chi-square, CI can take negative values. In some studies, CI is also named as Chi-square index. For example, Pianta and Archibugi (1992: 85-86) employ Chi-square analysis as an indicator of technological specialization and concentration in order to examine the historical evolution of the specialization of countries in different sectors. In a similar vein, Yentürk and Başlevent (2007: 41) also use Chi-square analysis as an indicator of concentration in their study on the issue of unemployed youth in Turkey. For the sake of convenience, in this study we named the index as CI in order to prevent any ambiguity that may stem from the employment of the concept of Chi-square index due to the special meaning of the respective concept in statistics. Parallel to LQ, CI is also based on the comparison of the row profiles of a contingency table with the profile of the column-wise sum of the rows. However, CI is more successful in taking the weight of the absolute figures of the items into account, thanks to its logic of calculation of the localization index. Nevertheless, the calculation of CI is a little bit more complicated than the one for LQ index. In order to calculate CI

values, firstly a matrix of expected values is calculated according to the observed values given in the contingency table. For this purpose, a very simple logic is employed by assuming that the proportion of each row item to the corresponding item of the row of the column-sum should be equal to the proportion of the respective row-sum to the matrix-sum (table-sum). After calculating the expected values, in the second stage, two additional matrices are created; one for the difference between the observed and the expected values, and the other for the sign of this difference. If the square of the difference matrix is divided by the multiplication of the matrix of expected values with the sign matrix, we obtain CI values for each item of the contingency table. Based on the example matrix created for the calculation of LQ values, the formal calculation of CI (3) can be given as below;

$$CI_{ij} = \frac{\left(x_{ij} - \frac{\sum_{j=1}^{c} x_{ij} \times \sum_{i=1}^{r} x_{ij}}{\sum_{i=1}^{r}\sum_{j=1}^{c} x_{ij}} \right)^2}{\frac{\sum_{j=1}^{c} x_{ij} \times \sum_{i=1}^{r} x_{ij}}{\sum_{i=1}^{r}\sum_{j=1}^{c} x_{ij}} \times \frac{\left| x_{ij} - \frac{\sum_{j=1}^{c} x_{ij} \times \sum_{i=1}^{r} x_{ij}}{\sum_{i=1}^{r}\sum_{j=1}^{c} x_{ij}} \right|}{x_i^j - \frac{\sum_{j=1}^{c} x_{ij} \times \sum_{i=1}^{r} x_{ij}}{\sum_{i=1}^{r}\sum_{j=1}^{c} x_i^j}}} \qquad (3)$$

Based on this formula, one can easily infer that three observations are noteworthy for any individual CI value; $CI < 0$, $CI \cong 0$ or $CI > 0$. If $CI > 1$, it means that the respective item exhibits a concentration above the level observed for the corresponding column-wise sum. If $CI < 1$, it means that the respective item displays a concentration below the level observed for the corresponding column-wise sum. If $CI \cong 1$, it means that the level of concentration of the respective item is almost equal to the level of concentration of the corresponding column-wise sum. In this study, a find-maximum-assign-tag algorithm is also employed in order to facilitate both the calculation of CI values and the association between the row and the column categories of the table by way of CI values. For this purpose, a small macro, which has facilitated the calculation of LQ and CI values for large and periodic tables, is written in Excel. Sectoral specializations of the countries analyzed in this study are identified by employing CI.

3. ANALYSIS

3.1. Trends in International Trade Pattern

International trade showed a considerable increase between 1960 and 2001 (Table 1 and Table 2). This fact can also be related to regional blocks. In the last decades, an enormous number of regional and sub-regional trade agreements have been signed (UN, 2004). The intensification of mutual trade, the expansion of exports, and the growth in national economies are the major objectives of these agreements. According to a research conducted by UN (2004), all agreements have not systematically resulted in increased intra-trade within the trade groupings that have been created; however, between 1960 and 2002, notable growth in intra-trade has been accounted for regional blocks.

Figure 1 shows major trade partners, and classification of counties according to trade performances. The figure also shows groupings of countries and their sector specific specialization, based on international trade volumes among partners. The export volumes among countries revealed that the member states of the European Union constitute a strong economic block with respect to the export-

import relationships among themselves. Figure 1 also offers that United States, Germany and Japan seem to be the major trade partners. Unsurprisingly, with some exceptions, European Union, South East Asian, Latin American and East and Central European countries have distinct cluster formations. Position of the member states in Figure 1 also unveils the forms of articulation of the EU to the other major economic blocks (East Asia and North America). In Figure 1, the thickness of the lines shows the strength of the ties between countries in terms of total trade volume and the colors of the lines show the reciprocity between the respective countries (red color stands for mutual relationships).

Table 1. Distribution of Exports by Destination, 1960 and 2001.

		Africa	America	Asia	DINGC	CEE	DEDC	Total
1960	Developing countries (DINGC)	4,4	6,4	12,9	23,8	7,6	67,5	100
	Developing Africa	9,5	0,8	6,5	16,8	4,8	76,6	100
	Developing America	1,2	16,5	1,1	18,9	2,6	78,2	100
	Developing Asia	4,4	1,7	24,5	30,6	12,5	55,5	100
	Central and Eastern Europe (CEE)	1,9	1,8	13,5	17,1	63,4	19,3	100
	Developed countries (DEDC)	7,5	9,3	10,7	27,5	3,0	69,0	100
	World	6,2	7,9	11,5	25,6	10,2	63,6	100
2001	Developing countries (DINGC)	2,4	5,4	33,3	41,2	1,5	56,9	100
	Developing Africa	11,5	3,2	13,0	27,9	1,5	68,8	100
	Developing America	1,1	17,8	5,5	24,5	0,9	73,3	100
	Developing Asia	1,9	2,7	41,5	46,2	1,9	51,8	100
	Developing Occeania	0,3	9,9	18,0	29,9	1,0	51,3	100
	Central and Eastern Europe (CEE)	1,2	2,1	9,8	13,1	24,8	57,1	100
	Developed countries (DEDC)	2,2	5,9	14,3	22,5	4,3	71,3	100
	World	2,2	5,6	20,0	27,9	4,4	66,1	100

Source: UN (2004).

Table 2. Intra-trade as share of total exports of Regional Blocks.

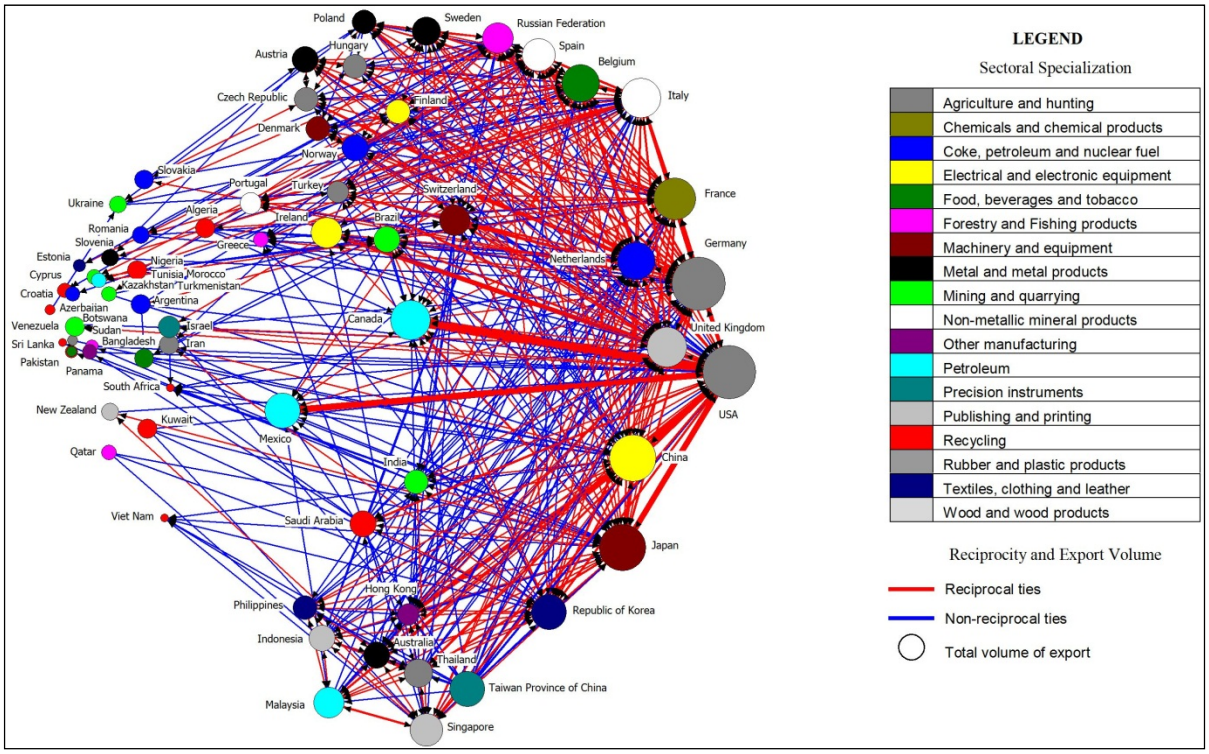
Trade groupings	1960	1970	1990	2002	Total Exports (2002) in million US$
Free Trade Area of the Americas	45,0	43,4	46,6	60,7	788.114
Latin American Integration Association	9,9	13,9	11,6	13,6	43.094
Southern Common Market	9,4	11,6	8,9	17,7	16.544
North American Free Trade Agreement	36,0	33,6	41,4	56,0	612.965
Association of South-East Asian Nations	22,4	17,4	19,0	22,8	94.760
European Union and accession countries	60,1	60,9	67,1	66,6	1.699.581
Asia-Pacific Economic Cooperation	57,9	57,9	68,4	73,5	2.169.919
Black Sea Economic Cooperation	3,3	5,9	4,2	13,9	25.599

Source: UN (2004).

In terms of reciprocity between countries, it is remarkable that the pattern of international trade on the upper part of the graph where the member countries of EU are concentrated is slightly more reciprocal than other parts of the graph. This particular situation partly reflects the fact that compared to other blocks the EU is an intensely integrated economic block. The position of the individual countries on the graph reveals that the USA has a hegemonic position and major economic blocks are identifiable with respect to not only the position of each country in the block but also the position of the leader of each block. For example, it can easily be recognized that Germany has a leading position in Europe in terms of its international trade capacity. Location of the other major countries on the graph also tells their individual stories about not only their economic power but also international political relations.

For example, it is noticeable that even though the United Kingdom is located closer to the USA in comparison to Germany, total trade volume of the UK is lower than not only Germany but also France. Internal colors of the nodes on Figure 1 shows the economic sectors in which the countries represented by the respective nodes are specialized. In terms of sector-based specialization of countries, it is remarkable that major economic blocks are not self-sufficient in terms of creation of a spectrum of member states meeting the demand of the block in some specific sectors. For example, it is noticeable that three countries in the EU block has a leading role in non-metallic mineral products and seem to serve to not only the EU but also other countries. In other words, in terms of international division of labor, the

EU part of the graph represents a superior position compared with other parts. Another interesting finding is the specialization of the closely agglomerated three member states (Austria, Poland and Sweden) of the EU in the same sector, metal and metal products.



Source: ITC's TradeSim model, version 3, 2002-2003 (trade volume over 1,000,000,000 USD).

Note: In this figure, size of the circles represents total export volume of the respective country (i.e. degree centralization). In order to increase the lucidity of the graph, square root of the values are employed, not the original values. The layout is produced by employing PC analysis. Color of the cricles indicates the sectors in which the respective countries are specialized according to CI.

Figure 1. Trade volume and reciprocity between countries according to sectoral specializations.

3.2. Trade Performances of EU Member Countries

Regionalization or geographical blocks are assumed to have advantages for trade integration and provide strong interaction among member countries; however, trade figures between 1999 and 2006 showed that, intra-EU-27 trade grows relatively less than extra-EU-27 (Table 3). Member countries have also strong trade partnerships with the rest of the world. This fact can be linked to rapid transformation and trends toward barrier free trade in the global market. EUROSTAT statistics show that the growth rates of arrivals and dispatches were slightly below the annual average growth rates displayed by extra-EU-27 imports (8.9%) and exports (7.8%) between 1999 and 2006. These figures reflect the growing internationalization of the EU-27's trade in goods (EUROSTAT, 2007). Intra-EU-27 dispatches were fluctuated between 64 % and 68% of total exports, while import share stayed at 64 % of total between 1995 and 2006 (EUROSTAT, 2007).

EU-27 countries represent 18% of the total exports in the world and 19% of the total imports (EUROSTAT, 2007) in 2005. From 1995 to 2006, export and import volumes of both intra-EU and between EU and the rest of the world have increased remarkably. Among 27 member countries, Germany ranks highest in export (22 %) and import (19,4%) shares of total trade in 2006. United Kingdom (11,4%

of exports, and 15% of imports), France (11,7% of exports and 9,8% of imports), and Italy (11,2% of exports and 11,1% of imports) have high shares in EU (EUROSTAT, 2007).

Table 3. Trade Performance of EU between 1995-2006.

REPORTER	Export (Bn. Euro)		Import (Bn. Euro)	
	1995	2006	1995	2006
A-INTRA EU	1000,3	2489,1	954,5	2407,4
B-EU-OUT	573,3	1189,1	545,3	1364,0
C-EU TOTAL	1573,6	3678,2	1499,8	3771,4
A/C	0,64	0,68	0,64	0,64

1- Values of the year 1995 represent those of EU-15

2- Values of the year 2006 represent those of EU-27

Source: EUROSTAT, 2007, 2008, EU External Trade Statistics; ITC International Trade Statistics.

Germany has also recorded highest export volume (321,1 bn. Euros in 2006) among total exports from EU to the rest of the world. France (135,8 bn. Euros), United Kingdom (132,3 bn. Euros) and Italy (129,6 bn. Euros) have also remarkable shares in total trade. Import figures show a little bit different ranking; accordingly, Germany (262,3 bn. Euros), United Kingdom (202,3 bn. Euros), Netherlands (166,8 bn. Euros) and Italy (150,2 bn. Euros) have the highest volumes (EUROSTAT, 2007). On the other hand, Central European states display particularly highest growth rates of imports between 1999 and 2006 (EUROSTAT, 2007). Czech Republic, Slovakia and Luxemburg have carried out a higher proportion of their trade with EU members in 2006 (EUROSTAT, 2007). A remarkable share of Intra-EU trade is specialized in Machinery and Vehicles. Chemical products and food products stand at second and third rank. These figures have also significant effects in specialization indexes of EU member countries in the world.

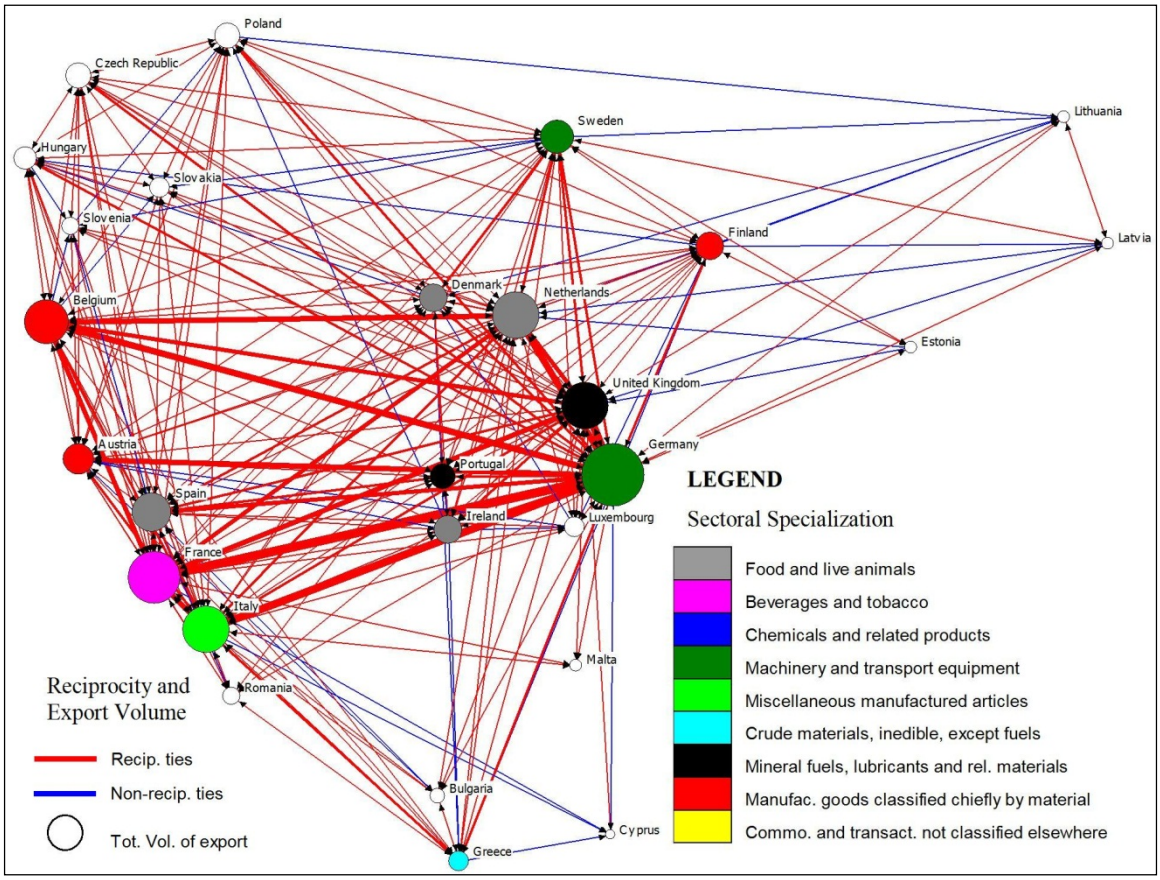
3.3. Specialization and Sub-Group Formations in EU

At the first stage of the SNA analysis, trade values of EU member countries are processed in order to obtain grouping patterns. Then specialization and cluster formations are examined through CI and plotting of the network on a Gower Metric Scaling layout. Trade pattern of Intra-EU-27 (includes candidate countries) in 1995 is shown in Figure 2. In this figure a clear cluster formation or a grouping has not been observed. Among them Germany, United Kingdom, Netherlands and Denmark are placed around central region of trade interaction. In addition, Belgium, Austria, Spain, France and Italy constitute a group, but this group is not completely separated from other countries. Germany, due to its total trade performance, seems to be the major trade partner. Almost all candidate countries were located around peripheral parts of the network. In Figure 2, the thickness of the lines shows the strength of the ties between countries in terms of total trade volume and the colors of the lines show the reciprocity between the respective countries. In order to facilitate the emergence of economic blocks, trade volume only over 100 million USD between the countries is taken into account.

In terms of reciprocity between countries in Figure 2, the pattern of Intra-EU trade for almost all countries is slightly more reciprocal than of Figure 3. This particular situation partly reflects the fact that after integration of candidate countries, EU-15 has recorded more export or import values than new members. While the position of the individual countries on the graph in figure reveals that none of the member countries has a strong hegemonic position, in 2006 (figure 3) Germany's trade volumes and its interaction with all member countries epitomize its leading position. Figure 2 also offers that while Belgium, United Kingdom, France, Italy and Netherlands have central positions, almost all new members are at the peripheral part of the network. This fact can also be associated with geographic location and size of national economies. Among them Lithuania, Estonia and Latvia constitute a clear group that is not completely separated. In addition, Slovenia, Romania, Bulgaria and Slovakia are grouped in the same part of the network. Check Republic, Hungary, Sweden and Poland are located between center and periphery.

Internal colors of the nodes on Figure 2 and Figure 3 show the economic sectors in which the countries represented by the respective nodes are specialized. In terms of sector-specific specialization of

countries, countries have specialized in different sectors that offer a complementary network model. Among them Germany has a leading role in machinery and transport equipments, and seem to serve to almost all EU members. Netherlands is relatively specialized in food and live animals, and France is relatively specialized in beverages and tobacco.

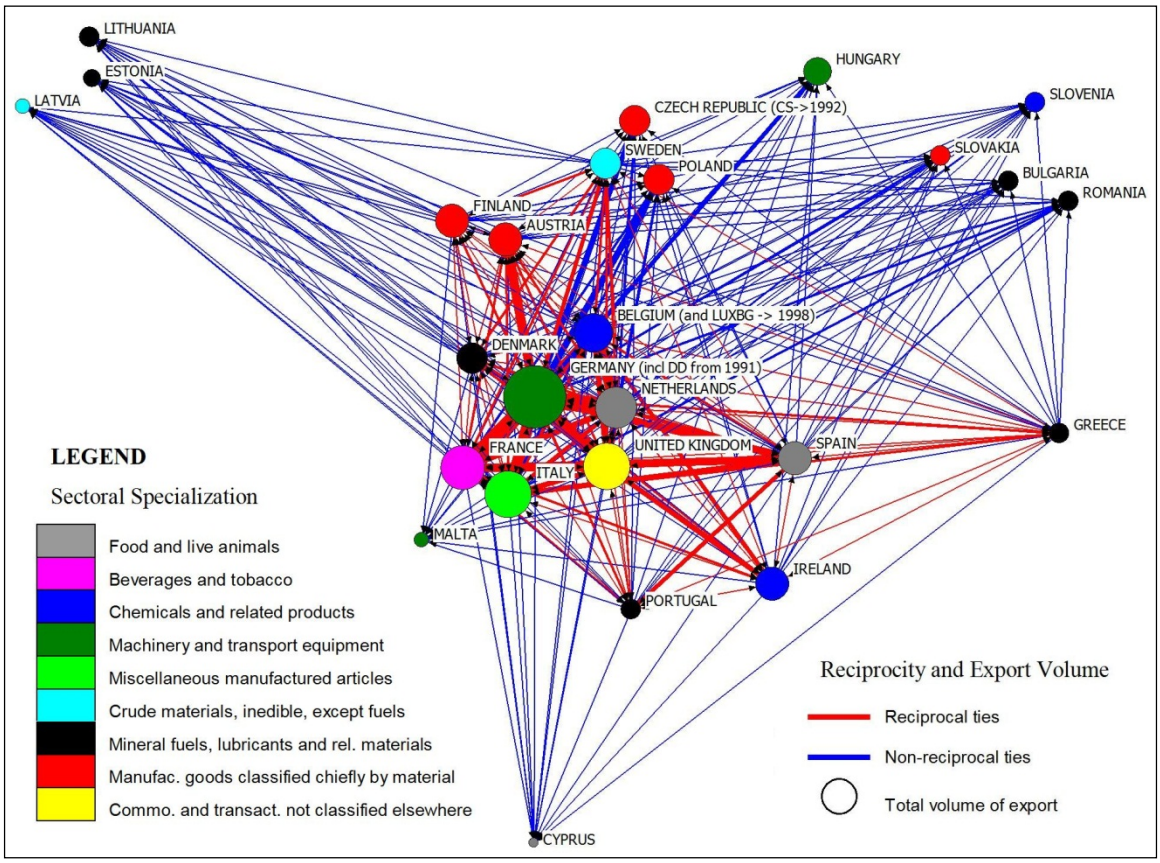


Source: Correlates of War Project Trade Data Set Codebook, Version 2.0 (trade volume over 100,000,000 USD); EUROSTAT (For identification of sector-based specializations, shares are included).

Figure 2. Trade volume and reciprocity between and sectoral specializations [ss] according to EU countries (SNA, Gower Metric layout for 1995– ss according to maximum CI).

While Figure 2 suggests a dispersed network formation, some sub-group formations are observed in Figure-3, both in terms of centrality measures and integration pattern. Trade flows among central countries of the network (Germany, Netherlands, France, United Kingdom, Denmark, Italy, and Belgium) are reciprocal (interdependent). However, most of flows between the central countries and the rest of EU are non-reciprocal (one directional). The sources and specific dimensions of integration shall be investigated in further studies, but at this stage a remarkable finding is that, as far as whole network is considered, EU as a total is subject to integration. Assume that country A is the primary importer of commodity x from country B, and country B is primary importer of commodity y from country C, and country C is primary importer of commodity y from country A. This form of integration is called network integration. Figures are graphical representations of sector-based trade interactions among countries. The distances in the figures representing proximity among countries are determined by trade volumes between each binary group. Figure 3 suggests that there is strong network integration in EU-27. However, central

countries have also major partners from the rest of the world while peripheral ones are more dependent to the EU members.



Source: EUROSTAT (trade volume over 100,000,000 Euros).

Figure 3. Trade volume and reciprocity between and sectoral specializations [ss] according to EU countries (SNA, Gower Metric layout for 2006– ss according to maximum CI).

4. CONCLUDING REMARKS

Research outcomes showed that, both international trade volume in total and intra-European trade has shown remarkable increases; however the share of intra-European trade in total EU, and in the world has not changed during the expansion process of the European Union between 1995 and 2006. Trade figures showed that Germany has a leading position in Europe in terms of its international trade capacity. In addition, Germany, UK, France, Spain and Netherlands have various distinct trade partners which are not EU countries. In terms of reciprocity between countries, it is remarkable that the pattern of international trade among the member states of EU is more reciprocal than other regional groupings. However, the share of reciprocal ties among EU members, in 2006, is less than those of 1995.

In terms of sector-based specialization of countries, it is remarkable that major economic blocks are not self-sufficient in terms of creation of a spectrum of member states meeting the demand of the block in some specific sectors. For example, it is noticeable that three countries in the EU block has a leading role in non-metallic mineral products and seem to serve to not only the EU, but also other countries.

Research outcomes showed that geography has still a significant role in the formation of trade pattern, clustering and grouping. Both specialization and partnerships are influenced by geographic proximity. Besides, scale of national economies is one of the predominant factors of trade; however, macroeconomic

analysis is beyond the scope of this study. Figures showed that in terms of export and import performances, EU is a highly-concentrated regional block. The economic integration of member states in terms of import and export relations has increased between 1995 and 2006; however, it is hard to specify values of surplus transfers. Overall, this form of integration can be explored by the rationale of interdependent block, in which strong trade partnerships are necessary in order to compete with other blocks and countries in the global market.

This research focused on trade interactions and their representation by employing a spatio-metric method (i.e. SNA and localization indices). What is evident from this study is that SNA combined with the techniques and methods of analysis available in urban and regional planning (such as localization indices) has a high capacity in terms of exploring and representation of interactions, understanding particular groupings of countries, which otherwise are invisible to the observer without a proper representation of the data. Indeed, one of the basic pursuits of this study is to show that SNA can be effectively employed not only for the exploration of forms and density of relations among units of analysis, but also for the explanation of the pattern of relations between the respective units by integrating some geographical indicators (such localization indexes) into SNA. Further SNA based studies focusing on specific sectors and country profiles may have sound contribution to the international trade theory and the issue of integration at the national and regional level.

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Appendix

Table 4. Share of Intra-EU-27 Trade in Total EU-27 Trade by DeclaringCountries.

	Dispatches (bn. Euro)	Arrivals (bn. Euro)	Total (bn. Euro)	Share of Intra in Total Trade (%)	Average annual growth rate 1999-2006 (%)
EU-27	2489.1	2407.4	4896.4	66.1	7.2
Czech Republic	64.8	59.8	124.6	83.1	16.8
Slovakia	28.9	27.7	56.5	81.0	18.9
Luxembourg	16.3	14.9	31.3	79.3	13.5
Portugal	26.7	40.2	66.9	76.4	4.7
Austria	81.2	89.6	170.7	76.4	8.0
Poland	69.3	72.9	142.2	75.6	18.6
Latvia	3.6	7.0	10.6	75.1	15.9
Belgium	224.1	201.4	425.4	74.3	7.8
Hungary	46.9	42.8	89.6	74.3	13.1
Slovenia	12.7	14.9	27.6	73.3	11.5
Denmark	52.4	49.5	101.9	71.5	6.6
Estonia	5.0	7.8	12.8	70.8	14.4
Cyprus	0.8	3.8	4.5	68.9	18.4
France	254.7	293.4	548.1	67.1	3.6
Romania	18.2	25.8	44.0	66.0	17.6
Ireland	56.3	39.6	95.9	65.5	3.3
Netherlands	292.2	164.9	457.1	65.3	8.2
Spain	116.3	153.8	270.1	65.0	7.1
Sweden	70.6	70.4	141.0	64.6	5.1
Germany	564.5	461.4	1025.8	63.7	7.8
Lithuania	7.1	9.6	16.8	63.0	20.7
Malta	1.1	2.2	3.2	60.9	2.3
Finland	35.2	35.0	70.2	60.4	4.4
United Kingdom	225.5	283.0	508.4	60.3	5.5
Bulgaria	6.9	9.3	16.3	60.2	18.3
Greece	10.5	28.9	39.4	58.8	6.2
Italy	197.4	198.2	395.6	58.6	4.9

Source: EUROSTAT, 2007.