KIEP Working Paper 10-02

# Intra-industry Trade in an Enlarged Europe: Trend of Intra-industry Trade in the European Union and its Determinants

Yoo-Duk Kang

KIEP Korea Institute for International Economic Policy

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Korea Institute for International Economic Policy
108 Yangjaedaero, Seocho-Gu, Seoul 137-747, Korea
Tel: 02) 3460-1114 / FAX: 02) 3460-1144,1199
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**KOREA INSTITUTE FOR**
**INTERNATIONAL ECONOMIC POLICY (KIEP)**
108 Yangjaedaero, Seocho-Gu, Seoul 137-747, Korea
Tel: (822) 3460-1178 Fax: (822) 3460-1144
URL: http://www.kiep.go.kr

Wook Chae, *President*

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## Executive Summary

In this paper I examine the evolution of intra-industry trade (IIT) in intra-European trade in the period of accession of the Central and Eastern European countries (CEEC). In order to identify changes in IIT in intra-European trade, I calculate the Grubel and Lloyd index for the static dimension and Brülhart A index for the dynamic dimension. Based on Grubel and Lloyd index, I conduct gravity-type empirical tests to verify determinants of IIT at the intra-European level. I find that CEECs experienced considerable increase in IIT, particularly during transitional periods before their accession. However, the level of IIT between CEECs is still considerably low. Given that a trade-investment nexus exists to explain IIT in intra-European trade, IIT in CEECs can increase further, as they receive more FDI from their neighbors.

**Keywords:** Intra-industry trade, foreign direct investment, EU enlargement, European integration

***JEL Classification***: F14, F15

# 국문요약

EU는 선진국간 경제공동체의 대표적인 예로서, EU의 역내무역구조는 산업내무역의 비중이 높은 것이 특징이었다. EU의 확대는 1990년대 중반까지는 비교적 소득수준이 유사한 서유럽 국가들을 대상으로 점진적으로 이루어져 왔으나, 2000년대 들어서는 경제적 발전 수준이 상이한 10개 중·동유럽국가들을 대상으로 진행되었다. 중·동유럽 국가들의 EU 가입은 EU의 역내무역구조에 큰 변화를 가져왔는데, 특히 EU에 비해 낮은 소득수준의 신규가입국들이 대거 역내시장에 편입됨에 따라, 역내/역외무역 비중의 변화뿐만 아니라 산업간/산업내무역으로 구분되는 무역의 성격에도 많은 변화를 가져왔다.

본 연구에서 EU의 확대에 따른 역내무역구조의 변화를 산업내무역을 중심으로 살펴보았다. 특히 회원국 수의 증가로 인해 서로 상이한 경제수준, 경제구조의 국가들이 역내시장을 형성하게 되었다는 점에서 이러한 EU의 확대에 따라 산업내무역이 어떻게 변화하였는지 국가별로 살펴보았다. 이를 위해서 1988~2006년의 기간 동안 2,200여 개 하부산업(SITC 5단위)에서 이루어진 산업내무역 수준을 Grubel and Lloyd (GL) 인덱스를 통해 수치화하였으며, 산업내무역 구조의 변화방향을 알 수 있는 Brulhart A 인덱스를 계산하였다.

연구결과를 요약하면 대부분의 서유럽국가에서 산업내무역 수준은 증가해온 것으로 나타났다. 중·동유럽국가들의 경우 산업내무역 수준이 서유럽국가들에 비해 낮은 것으로 나타나나, GL 인덱스를 통해 본 산업내무역 수준은 꾸준히 증가해온 것으로 나타난다. 중·동유럽국가들 간의 산업내무역은 아직 낮은 수준인 것으로 나타나며, 따라서 이들 국가의 산업내무역 증가는 역내 선진국과의 교역에서 이루어졌다는 것을 알 수 있다. 같은 기간 동안 서유럽국가들의 A 인덱스는 비교적 높게 나타나는 데 비해, 중·동유럽국가들은 낮은 수준의 A 인덱스를 기록하는 것으로 나타났다. 이는 서유럽국가들은 산업내무역이 강화되어온 반면, 중·동유럽국가들은 주로 산업특화를 통한 변화를 겪어 왔음을 나타낸다.

한편 역내산업내무역 수준의 결정요인을 찾기 위하여 실시한 회귀분석에서 산업내무역 수준은 무역상대국으로부터 유치한 FDI의 스톡과 양의 상관관계를 가지고 있는 것으로 나타났다. 이는 산업내무역과 FDI 간에 깊은 연관성이 있음을 보여주는 것으로, 앞으로 중·동유럽국가들이 보다 많은 역내 FDI를 유치할 경우, 산업내무역의 비중이 높아질 것임을 시사해 준다.

Dr. Yoo-Duk Kang is Associate Research Fellow of the KIEP. He received MA in International Trade and Ph.D in Economics from Institut d'Etudes Politiques de Paris (Sciences Po). His main research fields include international trade, economic integration and comparative area studies on Europe and East Asia.

**강유덕 (康裕德)**

한국외국어대 불어과 졸업
파리정치대학(Sciences Po) 국제통상, 국제관계 석사
파리정치대학(Sciences Po) 경제학 박사
대외경제정책연구원 세계지역연구센터 유럽팀 부연구위원 (現, Email: ydkang@kiep.go.kr)

**저서 및 논문**

"Comparative Analysis on Economic Integration: Europe and East Asia" (2009) 외

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# Intra-industry Trade in an Enlarged Europe: Trend of Intra-industry Trade in the European Union and its Determinants

Yoo-Duk Kang[1]

## I. Introduction

One of the most fundamental and enduring assumptions in international trade is that international trade flows are determined by differences in factor endowments among countries, which characterize trade between developed and developing countries. However, empirical observations have shown that trade has occurred increasingly within similar industries. This intra-industry trade (IIT) based on product differentiation has characterized trade between developed countries. It was only from the late 70s that new trade theories appeared, based on economies of scale and monopolistic competition to explain IIT.

Trade flows between European countries have provided good examples for developing theories and empirical studies in IIT. Largely composed of developed nations, the European Union (EU) had been considered as a community of advanced economies. With some excep-

[1] Korea Institute for International Economic Policy, 108 Yangjaedaero Seoch-gu, Seoul 137-747, Korea. Email address: ydkang@kiep.go.kr.

tions, European countries were characterized by relatively equal level of development, labor productivity and scarcity in natural resources, so that intra-European trade had been largely dominated by intra-industry type of trade. However, the last enlargement of the EU involving Central and Eastern European Countries (CEECs) has changed economic map in Europe considerably. First, the level of economic development of CEECs was far from that of the EU-15, which stood in sharp contrast with its previous enlargement in the 90s. Second, the last expansion accepted twelve candidates almost simultaneously, while previous expansions were gradual in that the candidate countries joined the EU in sequence, for example, Greece in 1980 and Spain and Portugal in 1986. For the expansion in 90s involving Austria, Finland and Sweden, the candidates had already been well-integrated into the European free trade network long before their accession. Finally, CEECs had been in close relations with the former Soviet Union and their accession to the EU meant that they would undergo considerable changes not only in trade, but in overall economic and political system during their transitional period.

On the spectrum of economic integration conventionally defined by economists, EU has represented its most intensive manifestation, distinguishing itself from integration schemes in other regions. EU has been a unique example in that its integration has aimed at achieving a certain level of economic convergence among members and has been considered successful compared to integration in other regions. However, as a result of the expansion, the EU is now a community more disparate than ever. In this context, it is necessary to review the pattern

of trade between European countries between EU-15 and CEECs.[2] Particularly, with regard to the high level of IIT in intra-European trade, it is interesting to know how much the last expansion has affected the pattern of intra-industry trade in Europe during the period of accession of CEECs. In this paper, I raise two principal questions. How has IIT in Europe been changed due to the enlargement? What are main determinants of IIT in Europe?

To answer these questions as well as to draw a new trade map in *an enlarged Europe*, this paper is organized as following: the first section describe the last expansion process and the outcome of integration in terms of trade and investment as compared to previous enlargements. The second section revisits empirical indicators of IIT and their features, and I will measure IIT in intra-European trade at both static and dynamic levels. Supposing that intra-European trade had been characterized by a high share of IIT before accession of CEECs to the EU, I will focus on evolution of IIT in trade between CEECs and the EU-15. The final part of this paper will be devoted to empirical analyses based on regression models to determine driving factors of IIT in Europe.

[2] In this paper, EU-15 refers to EU composed of following fifteen countries before the last expansion: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden and the United Kingdom.
CEECs mean the following twelve countries (including Cyprus and Malta) that joined EU at the last expansion in 2004 and 2007: Bulgaria, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia and Slovenia. Due to data availability, Cyprus and Malta are excluded in some of statistical indexes.

# Ⅱ. Enlargement of the EU toward the East

## 1. CEECs' Accession to the EU

In early 90s, CEECs experienced unprecedented changes in all policy arenas as they broke out of the Soviet bloc and reoriented their economic and political relations toward EU. As they shifted from centrally-planned to market economies, their trade became further oriented toward EU. They submitted official applications for EU membership from 1994 on, but their integration procedure had started much earlier in economic terms, as they established preferential trade arrangements, "Europe agreement" with the EU on a bilateral basis. The agreements aimed at providing the CEECs a transition period before their full membership to the EU and required the CEECs to accept *acquis communautaire* (Feldmann 2003).[3]

Economic integration established by European agreements had two common features. First, this integration between the EU and CEECs was rather asymmetric: access for EU goods to CEEC markets was liberalized more slowly than that of CEEC goods to EU markets, which gave an impression that EU offered preferential market access to CEECs. However, sensitive sectors, including clothing, steel and agri-

[3] The European Council made it clear that from the very beginning of the negotiation process, associated status was not related to future membership. But the first three negotiating countries (Czech Republic, Slovakia, Hungary and Poland) considered the agreement as a preparatory procedure for full membership.

culture, were largely excluded to impede access for CEEC industries to EU markets. Second, the agreements did not state how trade relations between CEECs should be organized. In 1992 four OECD candidates countries; the Czech Republic, Hungary, Poland and Slovakia established the Central European Free Trade Agreement (CEFTA) of their own accord. The CEFTA was modeled on the Europe agreements and it aimed not only to liberalize trade between the CEECs, but also to harmonize preferential trade liberalization between CEECs and EU in consideration of accession of the former to the latter. Slovenia (in 1995), Romania and Bulgaria (in 1998) joined the CEFTA by accession agreements and three Baltic countries Estonia, Latvia and Lithuania concluded FTAs with the rest of the CEECs outside of CEFTA. So before complete accession to the EU, CEECs had obtained to certain degree of free trade status with EU-15.[4]

After a ten-year transitional period, ten candidates including Malta and Cyprus completed their accession to the EU in 2004 and two others, Bulgaria and Romania in 2007. Particular features of this expansion can be summarized as follows:

First, accession period of CEECs to EU was relatively short compared to that of previous candidates. The latter had had free trade status with the EU long before their official application for membership, either by bilateral trade agreements or in the framework of the European Economic Area. They were all members of the European Free Trade Association (EFTA), which played a key role as a 'waiting room'

[4] For illustrative explanation, see the annex.

for countries anticipating accession to EU.

Second, previous enlargements were relatively well sequenced in a sense that only a small number (maximum three)[5] of candidates entered the EU at the same time, which seemed to attenuate *integration stress* for the EU. For example when Austria, Finland and Sweden joined the EU in 1995, their population accounted for only 6.3% of that of the EU-12. For the last enlargement, twelve candidates entered the EU almost simultaneously and their population came to comprise almost 30% of EU-15's population.

Third, previous candidates were already developed economies at the time of accession, with a few exceptions.[6] For example, average GDP per capita of Austria, Finland and Sweden was even higher than the EU average at the time of their accession. This made their integration into EU relatively smoother without considerable structural change. However, as more than ten transitional economies entered the EU, European countries encountered considerable challenges in trade and investment restructuring, not to mention a squeezing distribution policy based on limited restructuring funds. As a consequence, it follows that EU became more disparate than ever.[7]

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[5] There are two instances where three countries joined the EU simultaneously; United Kingdom, Denmark and Ireland in 1972; Austria, Finland and Spain in 1995.

[6] Exceptions are accessions of Ireland (1972 year of accession), Greece (1980), Spain and Portugal (1986). Those few less developed countries are small in number and structural funds contributed considerably to reducing an economic gap between regions. In 1996, the transfer through the European structural funds to recipient countries accounted for 3% of national GDP in Portugal, 1% in Spain and 2.5% in Ireland.

[7] For convergence/divergence between European countries, see the table A. in the appendix.

## 2. Changes in Intra-European Trade and Investment in the Context of the Enlargement

### 2.1. Change in Trade

Economic integration involves a reorientation of trade and investment at intra/extra-regional level. For that reason, it is necessary to review the development of trade and investment flow during the transitional period.

Table 1 gives an overview of the evolution of the share of intra-regional trade in Europe. Given that the EU started with six founding Member States and has since expanded to 27 countries over different periods, several groups from EU-6 to EU-25 can be set as intra-regional trade units.[8] Different groupings of countries over different periods allow us to observe trade regionalization in a more suitable way. European countries had already reached a considerable level of trade regionalization before the completion of the formation of a customs union (European Economic Community: EEC) and a free trade association (EFTA) in the late 60s. The share of intra-regional trade of the EU-6 was already nearly 50% by 1970 and if future Member States of the EU are included, intra-regional trade represented more than half of total trade. It should be remembered that most European countries had been tied up by free trade agreements since the British withdrawal from the EFTA in favor of the EEC in 1972. The accession of EFTA countries – Aus-

[8] As trade data for Cyprus and Malta are not available on a bilateral basis, we exclude those two countries from calculation of intra-regional trade share.

tria, Finland and Sweden - to the EU didn't have a great impact on the trade reorientation of these countries. However, for the CEECs, their detachment from the former Soviet bloc and the prospect of accession to the EU led to significant trade reorientation, which increased the overall intra-regional trade of the EU-25. With 25 countries, the share of intra-regional trade reached 67% in 1995.

**Table 1. Development of Intra-Regional Trade Share in Europe[9]**

(unit: %)

| Enlargement of the EU | 1967 | 1970 | 1975 | 1980 | 1985 | 1990 | 1995 | 2000 | 2005 |
|---|---|---|---|---|---|---|---|---|---|
| EU-6 | 46 | 49 | 45 | 44 | 42 | 46 | 42 | 38 | 38 |
| EU-9 | 48 | 50 | 49 | 50 | 51 | 55 | 51 | 48 | 47 |
| EU-12 | 51 | 52 | 51 | 52 | 53 | 60 | 58 | 55 | 54 |
| EU-15 | 57 | 58 | 56 | 57 | 59 | 66 | 63 | 60 | 59 |
| EU-25 | | | | | | | 67 | 65 | 65 |

Notes: EU-6: founding member States of the EEC/EU (Belgium, France, Germany, Italy, Luxembourg and Netherands).
EU-9: EU-6 + Denmark, Ireland and United Kingdom.
EU-12: EU-9 + Greece, Portugal and Spain.
EU-15: EU-12 + Austria, Finland and Sweden.
EU-25: EU-15 + Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia.
Source: author's elaboration based on CEPII-Chelem database.

Tables 2 and 3 give additional information on the share of intra-regional trade according to groupings of countries new to EU. It shows particularly the evolution of intra-regional trade share of new members

[9] For some countries, trade and investment data are not available due to their independence from the former Soviet Union or their secession from Yugoslavia and Czechoslovakia.

before and after accession to the EU. Group 1 (United Kingdom, Ireland and Denmark) and Group 2 (Greece, Spain and Portugal) had experienced considerable increase in intra-regional trade during the 10 years following their accession. The increase was more important for Group 2 states, which were less developed than the rest of the EU-12 at the time of their accession. In 1980, the trade share of Greece, Spain and Portugal with the EU-12 accounted for 44% of their total trade. Their intra-regional trade share (EU-12) increased following their accession in 1986 (for Greece, 1980) and in 1995 almost 70% of their trade took place within the EU-12.

**Table 2. Intra-regional Trade Share with the EU (- 9, 12, 15) Before and After Membership to the EU**

(unit: %)

| | 1967 | 1970 | 1975 | 1980 | 1985 | 1990 | 1995 | 2000 | 2005 |
|---|---|---|---|---|---|---|---|---|---|
| **Group 1** Trade with EU-9/Trade with the world | 33 | 32 | 38 | 43 | 46 | 50 | 49 | 47 | 47 |
| **Group 2** Trade with EU-12/Trade with the world | 52 | 48 | 44 | 44 | 48 | 66 | 69 | 66 | 62 |
| **Group 3** Trade with EU-15/Trade with the world | 62 | 60 | 57 | 60 | 60 | 67 | 65 | 62 | 60 |

Notes: Group 1: Denmark, Ireland, United Kingdom (membership to the EU since 1972).
Group 2: Greece (1980), Portugal, Spain (1986).
Group 3: Austria, Finland, Sweden (1995).
Source: Author's elaboration based on CEPII-Chelem database.

However, the countries of Group 3 did not show significant increase in intra-regional trade share (EU-15) after their accession. Contrary to what

was expected, their trade with the EU-15 has fallen since their accession. This can be explained by the fact that they were already linked to the EU within the framework of the European Economic Area (EEA), which enabled them to integrate into the EU in all but a few areas. Their official accession had only limited impact on their trade structure. On the other hand, their membership to the EU was confirmed at the same time as the opening of EU toward the CEECs, which diluted trade effects of EU enlargement with the addition of Group 3.

**Table 3. Intra-regional Trade Share of the EU-25 and CEECs**

(unit: %)

| | 1995 | 1997 | 1999 | 2001 | 2003 | 2005 |
|---|---|---|---|---|---|---|
| **EU-25** Intra-regional trade share (EU-25) | 65 | 64 | 67 | 65 | 66 | 66 |
| **CEEC-10** | | | | | | |
| Imports from EU-25/Imports from the world | 72 | 73 | 77 | 74 | 75 | 71 |
| Exports to EU-25/Exports to the world | 75 | 74 | 81 | 80 | 80 | 77 |
| Trade with EU-25/Trade with the world | 73 | 74 | 79 | 77 | 77 | 74 |

Notes: EU-25: Belgium, France, Germany, Italy, Luxembourg, Netherlands, Denmark, Ireland, United Kingdom, Greece, Portugal, Spain, Austria, Finland, Sweden, Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia.

CEEC-10: Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia.

Source: author's elaboration based on CEPII-Chelem database.

With respect to the CEECs, they have experienced a rapid reorientation of their trade flows to EU since the early 90s and saw significant increase in intra-regional trade share. It is difficult to examine trade between CEECs and the EU over a long period, as some countries were

born by breakup of the Soviet bloc.[10] However, it is clear that CEECs are the group of countries most dependent when it comes to intra-European trade. Share of intra-regional trade in all trading by CEECs' (EU-25) was 66% in 1993. It reached 79% by 1999 and since then has stabilized at around 75%. It is noteworthy that 80% of their exports have been destined to the EU since the late 90's.

### 2.2. Change in Investments

As the CEECs gained free trade status with the EU-15, CEECs experienced significant increase in inward foreign direct investments (FDI) both from the EU-15 and the rest of the world. How did their expected accession to the EU affect their inward FDI? It is difficult to answer this question because there are many different channels through which economic integration could potentially impact the destination of FDI. Moreover, not all of these channels are oriented in the same direction. The impact could depend on the reasons that bring FDI to a particular country and on the nature of the FDI.[11] We can advance two type of

[10] Due to the history (independence and separation) of some CEECs, it is difficult to find trade data which cover periods before 1990, especially for Baltic countries (Estonia, Latvia and Lithuania) and former Yugoslavian countries (Slovenia).

[11] For example, a firm may invest abroad in order to enter a highly protected domestic market (for tariff-jumping purpose). Alternatively, it may invest abroad following a strategy of international vertical integration, exploiting differences in comparative advantages for different stages of production of a given good. The impact of regional trade agreements (RTA) on bilateral FDI will depend on whether the source country is a member of the RTA or an outsider. For FDI with tariff-jumping purposes, member countries' FDI may be reduced as a consequence of forming the RTA, owing to the removal of tariff barriers. However, attracted by the free trade status, non-members' FDI may increase. Depending on the motives, natures and sources of

increase in FDI resulting from economic integration.

First, when a firm invests abroad in order to reduce production costs, this vertical FDI involves, for the source country, relocation of some production facilities to a member with low production cost; and the host country exporting products back to the source. Vertical FDI is therefore complementary to trade. Since barriers to trade discourage vertical FDI by increasing transaction costs in a vertical integration strategy, a reduction of trade barriers will encourage vertical FDI. This explains the increase in inward FDI from *old Europe* to CEECs.

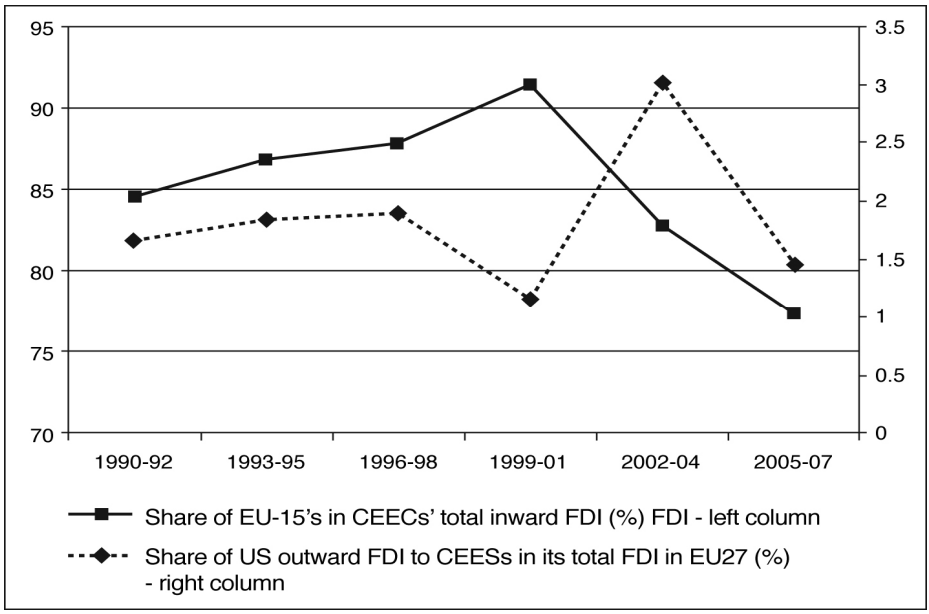
Second, economic integration can be regarded by foreign investors as market expansion, which enables firms to take advantage of positive effects – economy of scale, more competition etc. - of economic integration. The positive impacts on FDI are most expected for horizontal FDI aiming at market penetration. The Irish experience in the 90s is a good example. Ireland hosted massive FDI from US multinationals who aimed to use Ireland as a platform for penetrating into European markets.

Figure 1 illustrates the evolution the share of EU-15 and US outward FDI to CEECs. FDI from the EU-15 to CEECs increased starting in the early 1990s, as CEECs reoriented their economic relation toward Western Europe and it reached the highest point in 1991-2001 period; investment from developed EU-15 represented more than 90% of total investment that CEECs hosted during this period. This suggests that European firms were attracted by trade opportunities created by free trade status of CEECs and their expected accession. But since early

FDI, the formation of regional trading blocs may have completely different implications for the location of FDI.

2000, FDI from the EU-15 to CEECs has decreased, which suggests that early *signal effect* of integration has been depleted.

**Figure 1. CEECs' Inward FDI Share**

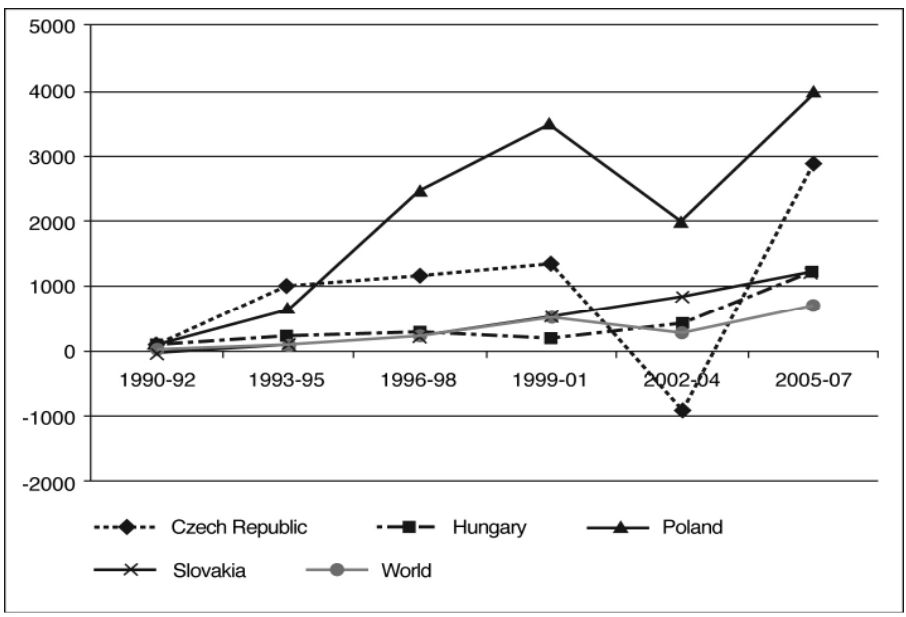



Source: OECD.

Figure 2 allows to compare the magnitude of the increase in EU-15's FDI outflow to four CEECs relative to the world. I fixed the value of FDI of the period 1990-92 as 100 and traced the evolution of FDI from that period onward. With the exception of the Czech Republic, who experienced a fluctuation in FDI, other three countries have shown more important evolution than the world. Poland is the most notable in

that it experienced most important evolution in FDI in relative terms.

**Figure 2. Comparison of EU's FDI to CEECs and the world**




Source: OECD.

The remainder of this paper is organized, mainly in two parts. The first part reviews arguments on trade type – *inter*-industry trade vs. *intra*-industry trade - and its implication on economic integration with reference to European integration. I present empirical indicators to quantify the share of IIT and measure IIT in intra-European trade. The second part focuses on determinants of IIT in intra-European trade with empirical tests on possible determinants on IIT.

# Ⅲ. Intra-industry Trade

## 1. Economic Integration and Intra-industry Trade

### 1.1. Smooth Adjustment Hypothesis

The Heckscher-Ohlin-Samuelson (HOS) model explains international trade by differences in factor endowments between countries, which are origins of the concept of comparative advantage. Along the same line, the Vinerian framework assumes implicitly that countries' production and trade occur according to their sectoral comparative advantages, which implies *inter-industry* trade. However, in the late 1960s there was an increasing number of observations of trade within the same industries, especially between developed countries. This brought about progressively shifts of research interests from *inter-industry* trade to *intra-industry* trade (IIT). Trade theories associated to the HOS model did not explain why countries exchange similar products. Even when trade flows are observed at a highly disaggregated level, IIT still appears between countries and comparative advantage-based arguments did not explain this trade pattern. Focusing on the rise of IIT, trade research has been reoriented from country-specific determinants of trade to industry-specific determinants, such as increasing returns to scale, monopolistic competition and external economies (Dixit and Stieglitz 1977; Krugman 1979; Lancaster 1980).

A large number of empirical studies confirm increasing IIT share in total trade from the 60s on (Grubel and Lloyd 1975; Aquino 1978). This upward trend is particularly remarkable as the period 1959-1970 is marked by significant growth of international trade supported by trade liberalization. The growing presence of IIT is often investigated in close relation to adjustment costs caused by regional economic integration (Balassa 1966; Krugman and Venables 1996). There is a consensus that a high level of IIT makes easier industrial adjustment related to economic integration, termed *smooth adjustment hypothesis* (SAH) (Brülhart and Elliott 1999). This is one of the important factors in explaining how previous European integration could be successful as compared to economic integration between developing countries.

### 1.2. Intra-industry Trade and European Integration

Largely composed of developed countries, the EU constitutes a relatively homogeneous region in terms of development level. Because of this, it was assumed that intra-regional trade in Europe was intra-industry rather than inter-industry. This assumption has been subject to a number of empirical studies which confirms that intra-European trade has higher share of IIT than intra-regional trade of any other region. In this regard, Bonzom *et al.* (2006) argue that EU's intra-regional trade is characteristic of substitution between consumer goods. With respect to investment, the European firms have tended to locate their production base within EU through *horizontal* FDI rather than *vertical*.

Indeed, a number of studies advance that the high level of IIT in Eu-

rope had mitigated adjustment costs of the European industries in the process of integration (Greenaway and Hine 1991; Grant *et al.* 1993; Brülhart and Elliott 1999). In this regard, two explanatory arguments can be advanced as follows: first, when IIT accounts for a significant share of total intra-regional trade, that is, when a country already has considerable exports and imports in the same industry with its potential preferential trade agreement (PTA) partner, it is more likely that the country will experience an increase in both its exports and imports in the same industries with its PTA partner after establishing the PTA. This would reduce the possibility of potential conflicts between winning and losing industries. Second, industrial adjustment costs between similar industries are less expensive than between industries/sectors that are not industrially related.

However, the latest expansion of the EU might bring considerable changes to this situation, because of the very nature of the integration between unequal partners, *developed Europe* and *transitional Europe*. I cite two main changes. First, from CEECs' point of view, integration to the EU induces considerable industrial restructuring. This is in fact a somewhat expected consequence, streamlining industrial structures in a more efficient manner. However, this process could nonetheless bring about considerable adjustment costs in the short and medium term. Long-term benefits arise only if key industries survive integration-induced restructuring and prosper. Second, from EU-15's point of view, arrival of new less-developed members to the EU may bring about restructuring of labor-intensive sectors or reorganize production processes either by losing them or by shifting their production facilities to East-

ern Europe. In both cases, this can contribute to developing *inter-industry* trade or *vertical* intra-industry (VIIT) trade rather than *horizontal* intra-industry trade (HIIT).

## 2. Measuring Intra-industry Trade

In this section, I present indicators typically used to measure IIT. In the first sub-section, I present the Grubel and Lloyd index (GL index) which is used most commonly to measure the level of IIT. In the second sub-section I extend this static measure to a dynamic dimension in order to capture change in inter/intra trade structure, which is termed "marginal intra-industry trade" (MIIT).

### 2.1. Static Intra-industry Trade

#### 2.1.1. Grubel and Lloyd Index

Most commonly used measure on IIT is the GL index (Grubel and Lloyd 1975). The index is based on sectoral trade balance share relative to sectoral trade (export+import).

Equation 1.

$$GL_j = 1 - \frac{|X_j - M_j|}{X_j + M_j}$$

where $X_j$ and $M_j$ are respectively export and import in industry $j$.

This index consists of comparing the sectoral net trade ($X_j$-$M_j$) with the sectoral total trade ($X_j$+$M_j$) of industry $j$ of a given country. The upper limit of the index is 1, which means that the sectoral export matches exactly with the sectoral import. At the national level, the index can be aggregated in the following way.

Equation 2.

$$GL_i = 1 - \frac{\sum_{j=1}^{n} \left| X_j - M_j \right|}{\sum_{j=1}^{n} \left( X_j + M_j \right)}$$ where $n$ refers to a number of industries of country $i$.

$GL_i$ indicates the level of IIT of country $i$ with the rest of the world. However, shortcomings of the index are eventually found, especially in its empirical use. I present here two possible bias of GL index: sectoral and geographic.[12]

### 2.1.2. Possible Bias in Using GL Index

- Sectoral bias

Sectoral bias stems from an insufficient disaggregation in classifying trade data. When using a less detailed nomenclature, it is likely that more products are grouped in a same industry. This gives rise to an upward biased GL index and more trade appears to be IIT in nature. This problem can largely be solved, when trade data are analyzed at a

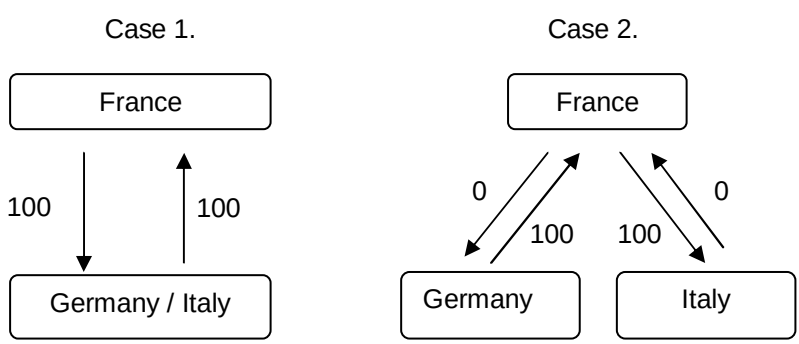
[12] For literature review on intra-industry trade, see Fontagné and Freudenberg (1997) and Lloyd (2002).

more disaggregated level.

- Geographical bias

Geographical bias occurs, when several countries are grouped as a unit before calculating the IIT share. I take an example of European countries. When one calculates IIT of France with the rest of European countries (EU-15 minus France, therefore, EU-14), using trade flows between France and the EU-14 usually creates a geographical bias. Figure 3 illustrates the bias in a simple schema. In case 1, trade between France and "Germany-Italy" as a unit in a particular product is crossed exactly, which means that the trade is intra-industry. However, if one examines trade flow on a bilateral basis as shown in case 2, trade is actually not crossed. France exports only to Italy and imports only from Germany.

**Figure 3. Example of Geographical Bias**




Source: adaptation from Fontagné and Freudenberg (1997).

To avoid the geographical bias, GL index can be obtained in the following ways.

Equation 3.

$$GL_i = 1 - \frac{\sum_{k=1}^{m}\sum_{j=1}^{n}\left|X_{ikj} - M_{ikj}\right|}{\sum_{k=1}^{m}\sum_{j=1}^{n}\left(X_{ikj} + M_{ikj}\right)}$$

$X_{ikj}$: country $i$'s export in industry $j$ to country $k$
$M_{ikj}$: country $i$'s import in industry $j$ from country $k$
$n$: number of industries
$m$: number of trading partner countries

### 2.2. Dynamic Intra-industry Trade

I present measures on how to quantify change in the IIT level and use them to indicate change in IIT.

#### 2.2.1. Change in IIT between two periods

Change (dynamic) in IIT level over a period can be measured by the difference between two GL indexes of different times in the following, and rather simple, way.

Equation 4.

$$\Delta GL = GL_t - GL_{t-n} = \left(1 - \frac{\sum_{j=1}^{n}\left|X_j - M_j\right|}{\sum_{j=1}^{n}\left(X_j + M_j\right)}\right)_t - \left(1 - \frac{\sum_{j=1}^{n}\left|X_j - M_j\right|}{\sum_{j=1}^{n}\left(X_j + M_j\right)}\right)_{t-n}$$

where *t* and *n* refer respectively to end year and to time interval.

However, it is argued that this measure derived directly from GL index does not show changes in inter/intra-industry relations in trade flows. GL index is a static measure in the sense that it captures IIT share of total trade at a specific time. Given that change in trade flows involves a dynamic adjustment on both inter-industry and intra-industry trade, measuring change in IIT levels should reflect the interaction between two types of trade. In some cases, an increase in IIT measured by equation 8 can actually hide an important increase in inter-industry trade.

Noticing this potential flaw, Hamilton and Kniest (1991) suggested that a high level of IIT observed in a particular year gives offers no predictions for changes in patterns of trade toward inter-industry or intra-industry. They show that an increase in "inter-industry" trade in an industry can appear as a rise in the GL index, if it contributes to reducing trade imbalance in the industry. Juxtaposing GL indexes of different times provides information on trade structures over time, but it does not lead to a conclusion on what direction (inter- vs. intra-industry trade) the trade pattern has changed towards over a certain period. This observation leads us to the following section about changes in trade structure in terms of IIT.

### 2.2.2. Marginal Intra-industry Trade

The change in IIT level, termed "marginal intra-industry trade (MIIT)" can be calculated by different measures. Most commonly used

measure is the Brülhart A index developed by Brülhart (1994).

Equation 5.

$$A(MIIT) = 1 - \frac{\left|\left(X_t - X_{t-n}\right) - \left(M_t - M_{t-n}\right)\right|}{\left|X_t - X_{t-n}\right| + \left|M_t - M_{t-n}\right|} = 1 - \frac{\left|\Delta X - \Delta M\right|}{\left|\Delta X\right| + \left|\Delta M\right|}$$

where $t$ and $n$ refer respectively to end year and to time interval.

The index varies between 0 and 1. A value of 0 indicates that change in the pattern of trade progresses completely towards the inter-industry direction and a value of 1 means inversely that marginal change in trade occurs in completely towards the intra-industry direction. The Brülhart A index is not biased downward according to the level of disaggregation (Mursed and Noonan 1994).

The sectoral Brülhart A index can be aggregated over all industries ($j$=1..., $k$), following the equation 6 to obtain a weighted average.

Equation 6.

$$A_{tot} = \sum_{j=1}^{k} w_j A_j \qquad w_j = \frac{\left|\Delta X_j\right| + \left|\Delta M_j\right|}{\sum_{j=1}^{k}\left(\left|\Delta X_j\right| + \left|\Delta M_j\right|\right)} \quad \text{where}$$

$j$: industry

$k$ : total number of industries

$A_{tot}$ is the weighted average of MIIT over all industries.

As for the interpretation of the index, its limit should be noticed

above all. The index indicates the direction (inter-industry vs. intra-industry) of change in the pattern of trade, but it does not show changes in the GL index which captures the IIT level at a specific time. This notice suggests that the Brülhart A index can be used for a complementary purpose to the comparison between GL indexes over time. If a difference of GL indexes of two different years - as presented in the equation 8 - is positive and only if Brülhart A index is relatively close to 1, one can conclude that the pattern has been changing towards the intra-industry direction with increasing IIT.

# Ⅳ. Results: Intra-industry Trade in an Enlarged Europe

## 1. Intra-industry Trade at the Static Dimension (GL index)

### 1.1. Data

To quantify IIT in intra-European trade, I use the International Trade by Commodity Statistics (ITCS) data set compiled by the OECD. The ITCS provides data on bilateral trade of 31 OECD member countries with most countries in the world. Among CEECs, only four countries (Czech Republic, Hungary, Poland and Slovakia) are members of the OECD. For the rest of the CEECs, I use trade data of European OECD member countries – for example trade data of Germany vis-à-vis CEECs. Due to limited data availability and coherence, the data base does not include bilateral trade between CEECs that are both non-members of the OECD.[13]

Based on this data base, I calculate the GL index of 2,247 manufacturing industries (SITC 5-digit level, codes 51111-89997) over the period 1988-2006. This calculation of GL index is a novel attempt in following three aspects. First, intra-European trade is counted on a bilateral basis, while other studies often use one country's trade with the

[13] For example, ITCS dataset does not include trade between Romania and Latvia.

rest of the countries grouped as a bloc (e.g. France's trade with the EU), which causes geographical bias. Second, IIT is calculated at the most disaggregated level – 5 digit -, which reduces possibility of sectoral bias. Finally, this research is extends over two periods, *pre*-accession and *post*-accession period, which is important in observing transitional effects of the enlargement on CEECs.

### 1.2. Results

Tables 4 presents evolution of IIT at intra-European trade captured by GL indexes over the period 1988-2006 at 3-year interval. The index is based on the equation 3 which is constructed to avoid geographical bias (calculated on bilateral basis).

In EU-15, more than half of intra-regional trade appears as IIT in 2006. Its increase is the most salient over the period 1988-1994, for which GL index increased from 0.42 to 0.52. In fact, this period is characterized by massive liberalization of European markets by implementation of the Single Market Program. The markedly visible evolution of IIT in late 80s and early 90s seems to be related to this revitalization of economic integration. Since the mid-90s, there was stabilization of the upward trend in IIT. At the country level, major industrialized powers such as Germany, France and highly open economies such as the Netherlands recorded high index figures, while highly specialized economies such as Ireland and Finland and less developed countries such as Greece had low shares of IIT in trade with their neighbors.

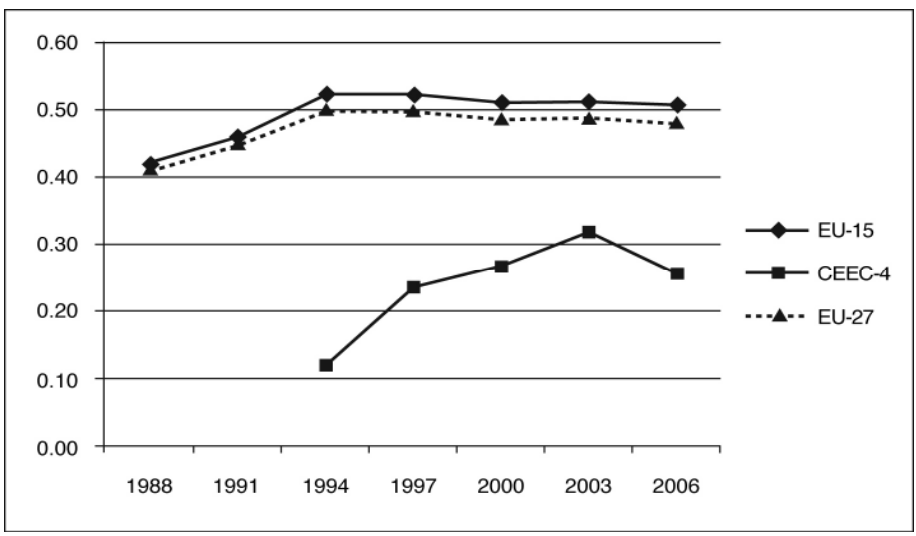
**Table 4. Grubel and Lloyd Index on Intra-European Trade**

| | | 1988 | 1991 | 1994 | 1997 | 2000 | 2003 | 2006 |
|---|---|---|---|---|---|---|---|---|
| EU-15 | Austria | 0.40 | 0.45 | 0.43 | 0.41 | 0.43 | 0.43 | 0.46 |
| | Belgium | - | - | - | 0.15 | 0.41 | 0.38 | 0.38 |
| | Denmark | 0.36 | 0.38 | 0.37 | 0.37 | 0.37 | 0.38 | 0.42 |
| | Finland | 0.24 | 0.24 | 0.27 | 0.28 | 0.27 | 0.28 | 0.28 |
| | France | 0.44 | 0.49 | 0.54 | 0.55 | 0.54 | 0.55 | 0.53 |
| | Germany | 0.48 | 0.53 | 0.61 | 0.62 | 0.61 | 0.63 | 0.62 |
| | Greece | 0.10 | 0.11 | 0.16 | 0.14 | 0.17 | 0.18 | 0.20 |
| | Ireland | 0.35 | 0.33 | 0.32 | 0.31 | 0.31 | 0.22 | 0.24 |
| | Italy | 0.36 | 0.38 | 0.40 | 0.41 | 0.42 | 0.42 | 0.44 |
| | Luxembourg | - | - | 0.36 | 0.37 | 0.29 | 0.34 | 0.38 |
| | Netherland | 0.41 | 0.45 | 0.58 | 0.58 | 0.57 | 0.58 | 0.56 |
| | Portugal | 0.17 | 0.22 | 0.26 | 0.27 | 0.32 | 0.35 | 0.36 |
| | Spain | 0.36 | 0.37 | 0.40 | 0.42 | 0.41 | 0.43 | 0.43 |
| | Sweden | 0.49 | 0.53 | 0.51 | 0.48 | 0.48 | 0.49 | 0.51 |
| | United Kingdom | 0.41 | 0.46 | 0.52 | 0.51 | 0.51 | 0.49 | 0.48 |
| | EU-15 | | 0.46 | 0.52 | 0.52 | 0.51 | 0.51 | 0.51 |
| CEECs | Bulgaria | 0.05 | 0.07 | 0.17 | 0.15 | 0.16 | 0.19 | 0.19 |
| | Cyprus | 0.05 | 0.06 | 0.11 | 0.09 | 0.13 | 0.21 | 0.39 |
| | Czech | | - | 0.35 | 0.40 | 0.44 | 0.46 | 0.45 |
| | Estonia | - | 0.08 | 0.21 | 0.22 | 0.23 | 0.28 | 0.20 |
| | Hungary | 0.15 | 0.27 | 0.29 | 0.32 | 0.36 | 0.34 | 0.34 |
| | Latvia | - | 0.04 | 0.15 | 0.16 | 0.11 | 0.12 | 0.10 |
| | Lithuania | - | 0.00 | 0.12 | 0.12 | 0.15 | 0.14 | 0.12 |
| | Malta | 0.14 | 0.14 | 0.22 | 0.36 | 0.22 | 0.29 | 0.32 |
| | Poland | 0.10 | 0.17 | 0.21 | 0.23 | 0.30 | 0.34 | 0.36 |
| | Romania | 0.06 | 0.10 | 0.18 | 0.23 | 0.23 | 0.25 | 0.27 |
| | Slovak | - | - | 0.20 | 0.24 | 0.27 | 0.28 | 0.29 |
| | Slovenia | - | - | 0.25 | 0.25 | 0.28 | 0.29 | 0.30 |
| | EU-27 | 0.41 | 0.45 | 0.50 | 0.50 | 0.49 | 0.49 | 0.48 |

Source: author's calculation based ITCS data set, OECD.

With regard to the CEECs, it appears clearly that CEECs' record concerning IIT are less salient than old members of the EU as was expected, ranging roughly from 0.12 to 0.45. Among them, Czech Republic, Poland and Cyprus are marked by relatively high GL index, which is higher than some members of EU-15. It is noteworthy that most CEECs experienced significant increases in IIT share at the intra-European level over the period 1991-2000, though this upward trend in IIT appeared in different years between countries. This means that most CEECs had undergone trade reorientation and restructuring in their industries in the pre-accession period. Since 2003, changes in IIT share have been small, with the exception of Cyprus.

**Figure 4. Evolution in GL Index in Intra-group Trade (EU-15, CEEC-4 and EU-27)**




Source: author's calculation based ITCS data set, OECD.

What were the changes in IIT between CEECs? Figure 4 illustrates the GL index in intra-group trade of 3 groups: EU-15, CEEC-4 and EU-27. It is immediately found that the IIT share between CEECs is a lot lower than levels for EU-15. It increased significantly over the period 1994-2003 and has dropped since 2003. Low level of IIT in trade between CEECs is as I expected, because their development level is lower than that of EU-15. IIT between CEEC-4 has shown a downward trend since 2003, while IIT at EU-27 level has held steady or even increased during the same period. This suggests that recent increases in IIT in CEECs appeared in their trade with their more developed neighbors, the EU-15.

**2. Intra-industry Trade at Dynamic Dimension (MIIT)**

From the same dataset used in computing the GL index, I calculate the Brülhart A index on intra-European trade over 1988-2006 at 3-year intervals. Table 5 summarizes the result. Among the EU-15, Belgium shows high indexes over all periods, followed by Denmark and Germany. Finland and Greece constitute the most lagging group with Ireland and Portugal in terms of dynamics toward IIT. Those countries appear to have kept inter-industry-oriented development for most of periods.

With respect to CEEC-4, except the Czech Republic, marked by indexes higher than the EU-15 average, the rest of the countries recorded indexes lower than EU-15. This finding allows me to advance the idea that CEECs' trade reorientation toward the EU over *pre*-and *post*-accession periods are based on trade specialization, and they expe-

rienced increases in exports and imports in different sub-sectors of industries.[14]

**Table 5. Brülhart A Index (marginal intra-industry trade) on Intra-European Trade (1988-2006)**

| | | 1988-1991 | 1991-1994 | 1994-1997 | 1997-2000 | 2000-2003 | 2003-2006 |
|---|---|---|---|---|---|---|---|
| EU-15 | Austria | 0.33 | 0.23 | 0.21 | 0.22 | 0.26 | 0.28 |
| | Belgium | - | 0.77 | 0.54 | 0.40 | 0.61 | 0.60 |
| | Denmark | 0.38 | 0.29 | 0.20 | 0.20 | 0.35 | 0.34 |
| | Finland | 0.01 | 0.01 | 0.01 | 0.04 | 0.03 | 0.02 |
| | France | 0.28 | 0.22 | 0.25 | 0.27 | 0.28 | 0.28 |
| | Germany | 0.33 | 0.28 | 0.28 | 0.28 | 0.30 | 0.34 |
| | Greece | 0.07 | 0.07 | 0.09 | 0.09 | 0.11 | 0.11 |
| | Ireland | 0.21 | 0.17 | 0.15 | 0.19 | 0.11 | 0.12 |
| | Italy | 0.23 | 0.20 | 0.23 | 0.21 | 0.25 | 0.25 |
| | Luxembourg | - | - | - | 0.27 | 0.23 | 0.18 |
| | Netherland | 0.18 | 0.17 | 0.18 | 0.24 | 0.19 | 0.18 |
| | Portugal | 0.16 | 0.11 | 0.15 | 0.15 | 0.18 | 0.17 |
| | Spain | 0.25 | 0.17 | 0.26 | 0.20 | 0.28 | 0.23 |
| | Sweden | 0.18 | 0.18 | 0.22 | 0.20 | 0.21 | 0.22 |
| | UK | 0.26 | 0.23 | 0.26 | 0.25 | 0.24 | 0.31 |
| Simple average of EU-15 | | 0.20 | 0.22 | 0.22 | 0.21 | 0.24 | 0.24 |
| CEEC-4 | Czech | - | - | 0.33 | 0.24 | 0.29 | 0.31 |
| | Hungary | 0.00 | 0.25 | 0.19 | 0.20 | 0.18 | 0.19 |
| | Poland | - | 0.16 | 0.15 | 0.14 | 0.20 | 0.04 |
| | Slovak | - | - | 0.24 | 0.13 | 0.19 | 0.18 |
| Simple average of CEEC-4 | | 0.00 | 0.20 | 0.23 | 0.18 | 0.21 | 0.18 |

Source: author's calculation based ITCS data set, OECD.

[14] One of reasons that we obtained rather low level of MIIT for most of countries is that we used highly disaggregated data (SITC 5-digit) and bilateral trade data.

# V. Determinants of IIT

In this section, I examine various determinants of IIT in intra-European trade. Before conducting an empirical analysis based on GL index as a dependent variable, I will provide a brief overview of some typical hypothesis and argument on determinants of IIT.

**1. Hypothesis of Determinants of IIT**

Identifying determinants of IIT begins with several assumptions from the new theories of international trade (Krugman 1979; Lancaster 1980; Brander 1981; Helpman 1987; Feenstra, et al. 2001). The most widely shared assumption is that the level of IIT is directly related to the level of GDP per capita. To explain this causality, Barker (1977) proposes that the demand for variety of goods (differentiated goods) increases as per capita income increases. In the same vein, Hirsch (1977) illustrates that differentiated products are generally capital-intensive and are typical products of rich countries. This argument is taken as an axiom that explains the high IIT share in trade between developed countries. Principal determinants of IIT are as follows:

- Per capita income

Given that demand for differentiated products is more important in developed countries, a country's per capita income, represented by

GDP per capita, is supposed to be positively correlated to its IIT level. Less developed countries tend to be specialized in exports of less differentiable products and have less import demand for differentiated products.

- Difference in factor endowments/difference in consumer tastes

The two determinants represent different aspects; the difference in factor endowments concerns mainly difference in export composition, while the difference in consumer taste explains the difference in import composition. However, both determinants are often represented by the same proxy variable, the difference in GDP per capita between a pair of countries.[15]

The difference in factor endowments leads to development of different comparative advantages, which contribute to inter-industry trade. The more two countries are different in factor endowment, the less IIT share they are supposed to have in trade between them. The difference in consumer tastes is also expected to be negatively correlated to IIT share. Given that IIT is trade between similar goods, the more two countries are different in consumer tastes, the less likely they will have significant IIT share in trade between them (Linder 1961).

However, interpreting the two determinants empirically requires a cautious approach, because their proxy, difference in GDP per capita

[15] Helpman et Krugman (1985) consider difference in GDP per capita between a pair of countries as proxy of difference in factor endowments (ratio capital/labor). A number of studies follow their interpretation in the absence of real ratio capital/labor.

does not inform level of development of the pair of countries. For example, a pair of developed countries and a pair of developing countries can have the same value of difference in GDP per capita, while the latter is not expected to have a high IIT share.

- Distance

Geographical distance is often used as a proxy variable for transaction cost. While distance is assumed to be negatively related to IIT level, the theoretical models of IIT do not explicitly explain how the distance exerts an influence on IIT between countries. It is assumed that differentiated products are less sensitive to the geographic distance than relatively homogenous products, because the differentiation can create a monopolistic situation for each demand.

- Country size

It is difficult to explain clearly how country size is related to the level of IIT. Speculative arguments on this relation are as following.

Large countries can take advantage of their large domestic markets as outlets for their products. This enables them to have evenly-developed industrial structure, in which each industry can achieve its minimum level of economies of scale. In contrast, small countries are more likely to be specialized in a limited number of industries, which leads them to be oriented towards inter-industry trade. This argument can be justified in following two cases. First, for small developed coun-

tries, their domestic markets are too small to absorb their own production and so, from the beginning of their industrialization process, they have aim to export their products to their larger trading partners. This may lead to inter-industry-oriented trade pattern. Second, for small developing countries, their trade is rather inter-industry in nature, because their products are essentially primary commodities and low-technology products which are less differentiable.

Country size is often used as a proxy for sectoral economies of scale (Helpman and Krugman 1985) which allows for differentiation of products and IIT (Brülhart 1995).[16] Therefore, *ceteris paribus*, variety of products and the share of IIT are positively related to country size.

However, country size does not automatically mean that the country has a high level of GDP per capita, which is likely to exert the most decisive influence on the share of IIT (e.g. China, India). Achieving economies of scale in production of medium and high-technology products suppose implicitly that producing countries are already rich enough to have sufficient domestic demand on these products. Therefore, one can identify country size with economies of scale, but only for developed countries (e.g. European countries).

- Foreign direct investment (FDI)

When a firm invests abroad in order to reduce production costs, this

[16] As far as internal economies of scale at firm level is concerned, minimum efficient scale (MES) is preferred to economic size, GDP. In this regard, see Caves et al. (1975). Here, we focus on external economies of scale.

vertical FDI involves, for a source country, relocation of some production facilities to a member with low production cost; and the host country exporting products back to the source. This division of production process in same industries is therefore complementary to trade. In this framework, vertical FDI can exert positive effects on intra-industry trade.

With regard to horizontal FDI, it is in a substitutional relation to trade and theoretical frameworks suggest that horizontal FDI tend to reduce IIT between investing and host countries. However, when countries already formed free trade areas, as in the case of European countries, tariff-jumping is no longer the principal purpose of horizontal FDI, but in their global network strategy, firms tend to use the expanded market to locate their production facilities (Dunning 2002). Firms aim to use specific locations as production platforms and circulate products over the expanded market. In this case, horizontal FDI can be regarded as complementary to trade, contributing to increases in IIT.

## 2. Regression Model

### 2.1. Data

I conducted a regression analysis on the share of IIT in trade between European countries. As a dependant variable, I use the GL index calculated on a bilateral basis (SITC 5 digit) from the same dataset that I used in section 3. The period includes four years for the period 1997-

2006 at 3-year intervals.

### 2.2. Regression Model

I used a regressed GL index on the following independent variables as presented in the equation 7.[17]

Equation 7.

$$\begin{aligned}\log(GL\_index) = {} & c_0 + c_1\log(GDP_{EX}) + c_2\log(GDP_{IM}) + c_3\log(GDPPC_{EX}) \\ & + c_4\log(GDPPC_{IM}) + c_5\log(ABS\_DIFF\_GDPPC) \\ & + c_6\log(DISTANCE) + c_7\log(FDI) + c_8 BORDER \\ & + c_9 LANGUAGE + c_{10} CONTINENT + c_{11} CEEC \\ & + c_{12} EU15 + c_{13} TIME + \varepsilon\end{aligned}$$

**Variables (expected coefficient sign)**

**Dependent variable**:
*GL* : GL index – based on the equation 2

**Independent variables**:
$GDP_{EX}$ : GDP of exporting country (+)
$GDP_{IM}$ : GDP of importing country (+)

[17] We use log transformation of variables for regression analyses.

*GDPPC*$_{EX}$: GDP per capita of exporting country (+)

*GDPPC*$_{IM}$ : GDP per capita of importing country (+)

*ABS_DIFF_GDPPC*: absolute difference in GDP per capita between a pair of countries (-)

*FDI_ST*: Inward FDI stock of exporting country from importing country

*DISTANCE* : Geographic distance between capitals of two countries (-)

**Dummy variables**:

*COMBORDER*: taking the value of 1 if exporter and importer share a common border, otherwise being zero (+)

*LANGUAGE*: taking the value of 1 if exporter and importer share a common language, otherwise being zero. (+)

*CONTINENT*: taking the value of 1 if exporter and importer are located in the European continent otherwise being zero. (+)

CEEC: taking the value of 1 if exporter and importer are both CEECs, otherwise being zero. (-)

EU15: taking the value of 1 if exporter and importer are both EU-15, otherwise being zero. (-)

*T+year*: time dummy variables reflecting business cycle

### 2.3. Empirical Results

Table 6 summarizes the results of regression analysis on IIT (meas-

ured by GL index) between pairs of the European countries over the period 1997-2006.[18] In order to capture possible changes in determinants of IIT related to the expansion, I grouped European countries into 3 different groups, namely EU-27 (all members of EU), EU-19 (OECD members of EU) and EU-15. For EU-27, due to lack of coherent bilateral trade data between non-OECD countries (e.g. between Latvia and Romania), the data set does not include GL index of these countries.

In most cases, $GDP_{EX}$ and $GDP_{IM}$ are positively correlated to the level of IIT and their coefficients are statistically significant, which is consistent with our hypothesis. $GDPPC_{EX}$ is positively correlated to the level of IIT, which conform to the hypothesis that per capita income level is positively correlated to IIT. Contrary to the hypothesis, $GDPPC_{IM}$ is negatively correlated to the level of IIT, but its coefficient is not statistically significant. The variable on differences of GDP per capita between pairs of countries does not provide clear-cut evidence to our assumption. Its coefficients appear rather unstable in different analyses. This may be due to ambiguous feature of this variable, as I mentioned previously. FDI stock from a trading partner is positively correlated to the level of IIT in most cases and its coefficients are statistically significant. This means that share of IIT in bilateral trade between European countries is higher, when importing countries invested more in exporting countries. As I argued previously, this finding suggests that intra-industry type of trade may have its origin in investment from trading partners.

[18] For more comprehensive results, see annex.

**Table 6. Summary of Regression Results on IIT in Europe**

Method: OLS

| | EU-27 | | | EU-19 | | | EU-15 |
|---|---|---|---|---|---|---|---|
| | Pooled data | CEEC Fixed | EU Fixed | Pooled data | CEEC Fixed | EU Fixed | Pooled data |
| GDP_IM | 0.29*** | 0.20*** | 0.23*** | 0.26*** | 0.11*** | 0.13*** | 0.26*** |
| | (0.02) | (0.02) | (0.02) | (0.03) | (0.03) | (0.03) | (0.03) |
| GDP_EX | 0.17*** | 0.08*** | 0.11*** | 0.15 | 0.03 | 0.04 | 0.23*** |
| | (0.03) | (0.03) | (0.03) | (0.03) | (0.03) | (0.03) | (0.03) |
| GDPPER_IM | -0.11 | -0.51*** | -0.44*** | -0.13 | -0.68*** | -0.60*** | -0.29*** |
| | (0.07) | (0.06) | (0.06) | (0.11) | (0.07) | (0.07) | (0.10) |
| GDPPER_EX | 0.34*** | 0.14*** | 0.16*** | 0.48*** | 0.25*** | 0.30*** | 0.40*** |
| | (0.06) | (0.04) | (0.05) | (0.09) | (0.05) | (0.06) | (0.09) |
| ABS_DIFF_GDPPER | 0.05* | -0.03 | 0.02 | -0.03 | -0.1*** | -0.09*** | -0.02 |
| | (0.03) | (0.03) | (0.03) | (0.03) | (0.03) | (0.03) | (0.02) |
| FDI_ST | 0.04*** | 0.15*** | 0.14*** | 0.03 | 0.16*** | 0.15*** | 0.08*** |
| | (0.02) | (0.01) | (0.01) | (0.02) | (0.02) | (0.02) | (0.02) |
| DISTANCE | -0.53*** | | | -0.44*** | | | -0.29*** |
| | (0.05) | | | (0.07) | | | (0.06) |
| BORDER | 0.02 | | | 0.06 | | | -0.06 |
| | (0.10) | | | (0.11) | | | (0.09) |
| LANGUAGE | 0.05 | | | -0.01 | | | 0.18* |
| | (0.15) | | | (0.15) | | | (0.11) |
| CONTINENT | 0.04 | | | 0.06 | | | 0.11* |
| | (0.07) | | | (0.08) | | | (0.06) |
| CEEC | -0.21 | -0.55*** | | 0.11 | -0.42** | | |
| | (0.15) | (0.13) | | (0.25) | (0.20) | | |
| EU15 | -0.17 | | 0.08 | -0.23 | | -0.08 | |
| | (0.12) | | (0.10) | (0.15) | | (0.11) | |
| Included observations | 1,326 | 1,326 | 1,326 | 867 | 867 | 867 | 572 |
| Adjusted R-squared | 0.41 | 0.31 | 0.30 | 0.38 | 0.29 | 0.29 | 0.58 |
| S.E. of regression | 0.96 | 1.04 | 1.05 | 0.84 | 0.89 | 0.90 | 0.56 |
| Durbin-Watson stat | 0.84 | 0.82 | 0.79 | 0.88 | 0.89 | 0.87 | 2.04 |
| Akaike info criterion | 2.77 | 2.92 | 2.93 | 2.50 | 2.62 | 2.63 | 1.70 |
| Schwarz criterion | 2.83 | 2.95 | 2.97 | 2.58 | 2.67 | 2.67 | 1.80 |
| F-statistic | 63.05 | 86.04 | 82.25 | 36.63 | 51.95 | 51.19 | 62.80 |
| Prob(F-statistic) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

Notes: Standard errors are given in parentheses

***, ** and * indicate statistical significant levels at 1%, 5% and 10%, respectively.

The variable for distance has a negative coefficient, as observed in most analyses using gravity models. Given that a typical coefficient of distance in gravity models is -0.6[19], the less important effect of distance on IIT conforms to our expectation. However, other variables on geographic location and common language do not show clear-cut and statistically significant coefficients. These findings suggest that IIT between European countries are not determined by country-specific factors, but by industry-specific factors.

I used dummy variables for EU-15 and CEECs in order to capture "group effect" on IIT. While no statistically significant coefficient shows in *EU15*, *CEEC* is negatively correlated to the level of IIT and its coefficients are statistically significant in both EU-27 and EU-19 cases. This means that IIT between CEECs is still less active than that between *old members* of EU. While IIT of CEECs increased significantly during transitional periods as I indicated in previous sections, the visibly low level of IIT between CEECs suggests that a high level of IIT in some CEECs are largely explained by their trade with developed EU-15.

[19] According to Leamer and Levinsohn (1994), the typical coefficient of distance in gravity models of trade is -0.6.

# VI. Conclusion

In this paper I examined the evolution of IIT in intra-European trade over periods involving accession of the CEECs. I started from the assumption that EU was previously a community of developed countries and trade between them was characterized by intra-industry type of trade. I supposed that accession of the CEECs brought about considerable changes in intra-European trade, not only in apparent trade orientation, but also in nature of trade. In order to identify changes in IIT at the expanded EU level, I calculated Grubel and Lloyd index for static dimension and Brülhart A index for dynamic dimension. Based on Grubel and Lloyd index calculated on bilateral trade between European countries, I conducted a gravity type of empirical tests to verify determinants of IIT at the intra-European level. The findings are threefold. First, while trade in EU-15 is characterized by high share of IIT, CEECs have experienced considerable increase in IIT, particularly during their transitional periods before their accession, which suggest their trade and industrial relation with EU-15 underwent changes during this period. Since completing their accession in the mid-2000s, increase in IIT in their trade has stagnated. Second, the level of IIT in trade between CEECs is still considerably low, being half of that between EU-15 countries, as shown by GL index and empirical tests. This means that increase in the level of IIT in their trade can be attributed largely to trade with EU-15. Third, it appears that there exists a trade-investment

nexus in explaining IIT in intra-European trade. This suggests that IIT in CEECs could increase, as they host more FDI from their developed neighbors. This finding implies that IIT between CEECs will also increase, as cross investments between them increase in future.

# References


Aquino, Antonio. 1978. "Intra-Industry Trade and Inter-Industry Trade Specialization as Concurrent Sources of International Trade in Manufactures." *Weltwirtschaftliches Archiv*, Vol. 114, No. 2, pp. 275-96.

Baker, James. 1988. "The Geographical Implications of the US-Canada Trade Pact." *The International Economy*, pp. 34-41. (January-February)

Balassa, Bela. 1966. "Tariff Reductions and Trade in Manufactures among the industrial Countries." *American Economic Review*, Vol. 56, No. 3, pp. 466-473.

Bonzom, Philippe, Sopanha Sa and Marc-Olivier Strauss-Kahn. 2006. "Interaction between regional economic integration and institutional integration: European experience." *Banque de France Bulletin Digest*, No. 145. (January)

Brülhart, Marius. 1994. "Marginal Intra-Industry Trade : Measurement and Relevance for the Pattern of Industrial Adjustment." *Weltwirtschaftliches Archiv*, Vol. 130, No. 3, pp. 600-613.

Brülhart, Marius and Robert Elliott. 1999. "A Survey of Intra-Industry Trade in the European Union" In Brülhart, Marius and Robert C Hine eds. *Intra-industry Trade and Adjustment: the European Experience*. London: Macmillan.

Caetano, Jose and Aurora Galego. 2005a. "In Search for the Determinants of Intra-industry Trade within an Enlarged Europe." *South-Eastern Europe Journal of Economics*, Vol. 2, No. 5, pp. 163-183.

_____. 2005b. *Trade Flows among CEEC and EU Countries: what future perspectives?* University of Evora. Mimeo.

Dixit, Avinash K. and Joseph E. Stiglitz. 1977. "Monopolistic Competition and Optimum Product Diversity." *American Economic Review*, Vol. 67, No. 3, pp. 297-308.

Dunning, John Harry. 2002. *Determinants of Foreign Direct Investment: Globalization Induced Changes and the Role of FDI Policies*. London: World Investment Prospects Economist Intelligence Unit.

Feenstra, Robert C., James A. Markusen and Andrew K. Rose. 2001. "Using the Gravity Equation to Differentiate Among Alternative Theories of Trade." *Canadian Journal of Economics*, Vol. 34, No. 2, pp. 430-447.

Feldmann, Magnus. 2003. "EU-Poland Association Agreement." In Sampson, Gary P. and Stephen Woolcock eds. *Regionalism, Multilateralism and Economic Integration: The Recent Experience*. Tokyo: United Nations University Press.

Fontagne, Lionel and Michael Freudenberg. 1997. "Intra-Industry Trade: Methodological Issues Reconsidered." *Document de Travail*, No. 97-01. Centre français d'étude et de recherche en économie internationale (CEPII). (January)

Gabrisch, Hubert. 2006. "Vertical intra-industry trade between EU and Accession Countries." IWH Discussion Paper 12/2006.

Grant, Richard C., Maria C. Papadakis and David J. Richardson. 1993. "Global Trade flows: Old Structures, New issues, Empirical Evidence." In Bergsten, C. Fred and Macus Noland eds. *Pacific Dynamism and the international Economic system*. Washington, DC: Institute for International Economics.

Greenaway, David and Robert C. Hine. 1991. "Intra-industry Specialization, Trade Expansion and Adjustment in the European Economic Space." *Journal of Common Market Studies*, Vol. 29, No. 6, pp. 603-622.

Grubel, Herbert G. and Peter John Lloyd. 1975. *Intra-Industry Trade: the Theory and Measurement of International Trade in Differentiated Products*. London: Macmillan.

Hamilton, Clive and Paul Kniest. 1991. "Trade Liberalization, Structural Adjustment and Intra-Industry Trade : A Note." *Weltwirtschaftliches Archiv*, Vol. 127, No. 2, pp. 356-67.

Helpman Elhanan and Paul Krugman. 1985. *Market Structure and Foreign Trade, Increasing Returns, Imperfect Competition and the International Economy*. Cambridge, M.A.: MIT Press.

Hirsch, Seev. 1977. *Rich Man's, Poor Man's and Every Man's Goods: Aspects of Industrialisation*. Tubingen: Mohr Siebeck.

Kandogan, Yener. 2003. "Reconsidering the Adjustment Costs of the Europe Agreements." *Applied Economics Letters*, No. 10, pp. 63-68.

Krugman, Paul. 1979. "Increasing Returns, Monopolistic Competition and International Trade." *Journal of International Economics*, Vol. 9, No. 4, pp. 469-479.

Krugman, Paul and Anthony J. Venables. 1996. "Integration, Specialization and Adjustment." *European Economic Review*, Vol. 40, No. 3-5, pp. 959-967.

Lancaster, Kelvin. 1980. "Intra-industry Trade under Perfect Monopolistic Competition, *Journal of International Economics*." Vol. 10, No. 2, pp. 151-176.

Leamer, Edward and James Levinsohn. 1994. "International Trade Theory: The Evidence." NBER Working Papers No. 4940. National Bureau of Economic Research.

Linder, Staffan Burenstam. 1961. *An Essay on Trade and Transformation*. New York: John Wiley.

Lloyd, Peter John. 2002. "Controversies Concerning Intra-Industry Trade." In LEE Hyun-Hoon and Peter John Lloyd eds. *Frontiers of*

*Research in Intra-Industry Trade*. New York: Palgrave Macmillan.

Murshed, S. Mansoob and David Noonan. 1994. *Measures of Marginal Intra-Industry Trade: A comment on the Brülhart Index*. University of Bradford. Mimeo.

Rault, Christophe, Robert Sova and Ana Mara Sova. 2008. "Modeling Inetrnational Trade Flows between CEEC and OECD Countries." CESIFO Working Paper No. 2282.

# Appendix

**Table A. Development of GDP Per Capita in Europe**

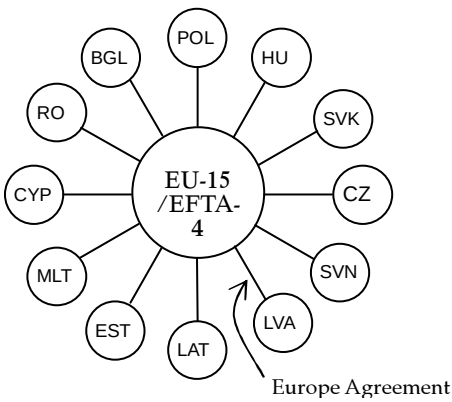
(EU-15's average=100)[20]

| | | 1960 | 1970 | 1980 | 1990 | 1995 | 2000 | 2005 | 2008 |
|---|---|---|---|---|---|---|---|---|---|
| EU-6 | France | 124 | 119 | 122 | 109 | 112 | 102 | 101 | 102 |
| | Belgium | 120 | 115 | 123 | 104 | 119 | 106 | 108 | 111 |
| | Luxembourg | 210 | 180 | 159 | 169 | 214 | 217 | 238 | 253 |
| | Germany | 111 | 127 | 130 | 125 | 131 | 109 | 101 | 102 |
| | Italy | 76 | 86 | 79 | 102 | 83 | 89 | 91 | 91 |
| | Netherlands | 100 | 114 | 124 | 101 | 115 | 114 | 116 | 120 |
| EU-9 | United Kingdom | 131 | 95 | 93 | 90 | 84 | 117 | 112 | 101 |
| | Ireland | 64 | 61 | 60 | 69 | 79 | 120 | 149 | 150 |
| | Denmark | 127 | 142 | 132 | 135 | 148 | 141 | 141 | 143 |
| EU-12 | Greece | 47 | 61 | 55 | 47 | 53 | 57 | 69 | 76 |
| | Spain | 37 | 50 | 59 | 68 | 64 | 68 | 83 | 91 |
| | Portugal | 33 | 36 | 31 | 39 | 48 | 51 | 52 | 52 |
| EU-15 | Finland | 111 | 103 | 108 | 143 | 109 | 111 | 111 | 119 |
| | Sweden | 186 | 186 | 154 | 145 | 121 | 129 | 121 | 121 |
| | Austria | 88 | 86 | 104 | 109 | 126 | 111 | 110 | 115 |
| Normalized average of EU-15 | | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Actual average of EU-15 | | 1,066 | 2,372 | 10,301 | 19,611 | 23,548 | 21,285 | 33,620 | 43,647 |
| Standard deviation of EU-15 | | 50 | 44 | 38 | 37 | 42 | 39 | 42 | 45 |
| EU-27 | Bulgaria | 30 | 30 | 22 | 12 | 7 | 8 | 11 | 16 |
| | Cyprus | - | - | 34 | 42 | 54 | 58 | 65 | 71 |
| | Czech Republic | - | - | - | - | 23 | 26 | 36 | 49 |
| | Estonia | - | - | - | 14 | 11 | 19 | 31 | 41 |
| | Hungary | 26 | 23 | 21 | 17 | 19 | 22 | 33 | 35 |
| | Latvia | - | - | - | 14 | 9 | 15 | 21 | 33 |
| | Lituania | - | - | - | 15 | 9 | 15 | 21 | 30 |
| | Malta | 39 | 29 | 30 | 33 | 37 | 47 | 44 | 47 |
| | Poland | 33 | 28 | 16 | 9 | 15 | 21 | 23 | 31 |
| | Romania | 26 | 24 | 13 | 9 | 7 | 8 | 13 | 20 |
| | Slovakia | - | - | - | - | 16 | 18 | 26 | 40 |
| | Slovenia | - | - | - | 45 | 44 | 46 | 53 | 62 |

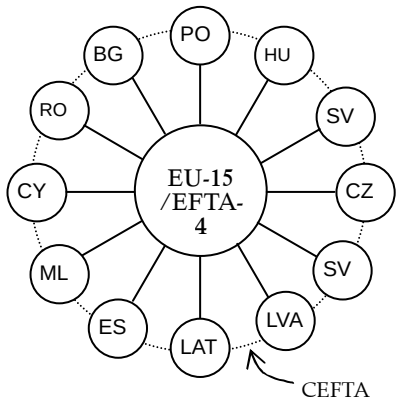
Source: author's own calculation based on CEPII-Chelem data.

[20] In order to keep analytical coherence in comparison over different years, we include in the calculation countries that were not member countries of the CEE/EU in reference years.

**Figure A. Trade Structure Between EU and CEECs in the 90s**




Trade structure between the EU and CEECs in the early 90s




Trade structure between the EU and CEECs in the late 90s

Data sources of variables used in the models.

- FDI:

1) FDI data are obtained from OECD Stat. OECD Stat data set provide inward and outward FDI flow and stock of 31 OECD countries from and to the most of countries in the world. 19 European countries including Czech Republic, Hungary, Poland and Slovakia are members of the OECD. I used bilateral inward FDI stock for exporting countries from importing countries. When FDI stock is not available, I used FDI flow summed over all years available, principally from year 1990. For non-OECD members among CEECs, I used outward FDI stock from European OECD members to them.

- GDP, GDP per capita, distance, common border and language: CEPII-Chelem database.

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# Intra-industry Trade in an Enlarged Europe: Trend of Intra-industry Trade in the European Union and its Determinants

Yoo-Duk Kang

This paper examines the evolution of IIT (intra-industry trade) in intra-European trade over periods involving accession of the CEECs (Central and Eastern European Countries). The author concludes that CEECs have experienced considerable increase in IIT, particularly during their transitional periods before their accession, which suggest their trade and industrial relation with EU-15 underwent changes during this period. However, the level of IIT in trade between CEECs is still considerably low. This means that increase in the level of IIT in their trade can be attributed largely to trade with EU-15. The author find also that there exists a trade-investment nexus in explaining IIT in intra-European trade. This suggests that IIT in CEECs could increase, as they host more FDI from their developed neighbors. This finding implies that IIT between CEECs will also increase, as cross investments between them increase in future.

KIEP Korea Institute for International Economic Policy

108 Yangjaedaero, Seocho-gu, Seoul 137-747, Korea
P.O.Box 235, Seocho, Seoul 137-602, Korea
Tel 02-3460-1001, 1114 / Fax 02-3460-1122, 1199
http://www.kiep.go.kr

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