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The intra-industry trade dynamics in CEE countries: The role of trade agreements*

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Abstract

This paper investigates the impact of regional trade agreements (RTAs) on the development of intra-industry trade (IIT) for eight Central and Eastern Europe countries (CEE) from 1997 to 2019. The aim of the paper is to compare and explain the possible heterogeneous impact of different RTAs on IIT across countries while controlling for differences in development levels between economic integration member states. Our analysis is based on country-product level data obtained from UN Comtrade. The main hypothesis of the paper is that the CEFTA and EU integration agreements have a highly positive effect on IIT in comparison with other RTAs. However, the scope of the impact varies across countries, primarily depending on the economic development asymmetries that are in this paper proxied by the GDP per capita. We developed and estimated an augmented structural gravity model using Pseudo-Poisson Maximum Likelihood Estimator. The main contribution of our paper is the inclusion of the FTA-economic development gap interaction term, which enabled us to enrich the empirical findings of the research. Our results show that the main hypothesis holds, but also that an increase in economic asymmetries between integration members negatively affects IIT, thus indicating potentially increasing trade adjustment costs for new member states of an integration. These results go in favor of EU pre-integration and post-integration policies that have the goal of diminishing the economic development gap between future and present integration members.

Key words: *intra-industry trade, regional trade agreements, CEE countries, development asymmetries*

JEL classification: *F10, F14, F15*

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1. Introduction

Intra-industry trade (IIT) is an international trade phenomenon brought to the spotlight by Grubel & Lloyd (1971), the concept unknown before Verdoorn (1960) noticed that trade specialization between members of the Benelux Union was happening within different trade categories rather than between them. In that period, the prevalent idea was that bilateral trade with similar goods could not be explained by classical models of international trade, which helped increase the appeal of the researchers on this topic (see Krugman, 1979; Lancaster, 1980). A decade later, Davis (1995) showed that we could explain intra-industry trade between countries by combining classical – Ricardian trade theory with neoclassical – Heckscher-Ohlin trade theory. Moreover, he showed that the assumption of increasing returns to scale considered a prerequisite for intra-industry trade development, in fact, is not necessary for intra-industry trade to happen.

Concurrent with the rise of interest in IIT, the inquiries into the effects of economic integrations, regional trade agreements (RTA) in particular, on international trade also rose. The seminal paper on this topic is that of Viner (1951) and Balassa (1961). Subsequently, papers connecting IIT and RTA began to emerge, with the paper of Marvel & Ray (1987: 1279) noting the need to focus on "…the role of trade liberalization in creating larger markets with increased opportunities for specialization…" when empirically investigating determinants of IIT. The connection between IIT and RTA is a natural one since RTA removes artificial trade barriers made by governments, which in turn should influence trade flows between member states. This paper is focused on the type of these trade flows. The importance of exploring changes in trade flows that correspond to IIT is in the observation that a rise in bilateral trade of IIT type will cause lower adjustment costs in the RTA-joining economies because these costs are internal to industry (Menon & Dixon, 1996). Apart from RTA, one of the main determinants of IIT is the demand structure of national economies, thus, when investigating determinants of bilateral IIT, the similarity between the demand structure of trading partners should be controlled for. A seminal paper/Ph.D. dissertation where demand structure is the main determinant of international trade, and which is directly related to IIT is that of Linder (1961).

This paper especially emphasizes the importance of relatively high ratio IIT as opposed to inter-industry trade for mitigating risks to economies of the member states of the economic integration of higher-order, like the European Union (EU), due to asymmetric shocks, as well as the effects of economic integration-induced trade liberalization that incurs adjustment costs to firms and industries in general. These adjustment costs can be substantial in the case of the economic integration of countries with a significant difference in the economic development level, as is the case with CEE countries that entered the EU in the 2004-2013 period. Researching

the size of adjustment costs is not only important for the ex-post analysis of economic integration outcomes on trade, but also for future expansions of the EU, which will include countries that are less developed than countries that joined the EU in the 21st century.

The paper is developed around the issues mentioned above while investigating the changes in trade patterns attributed to the growth of IIT due to trade agreements in Europe for the case of Central and Eastern Europe countries (CEE), namely, Bulgaria, Croatia, Czech Republic, Hungary, Poland, Slovenia, Slovakia, and Romania. The selected countries share similar social, political, and economic backgrounds. After the Second World War, they had adopted centrally-planned economies that lasted until the end of the 1980s. After the economic reforms in the 1990s, all countries had set a goal to become EU members. Indeed, it happened in the 2000s and 2010s.

This paper aims to upgrade and develop empirical investigations of IIT and RTA linkages and test them on the sample of the countries mentioned above by controlling for interaction between regional trade agreements and the difference between demand-side conditions (à la Linder). On bilateral trade panel data spanning from 1997 to 2019, and for each country, we distinguish between three different RTA dummies and RTA-Linder interactions, namely (1) European Union integration (EU), (2) Central European Free Trade Agreement (CEFTA), as well as (3) all other RTA that those countries joined throughout the observed period and that are represented by one dummy variable in our dataset. The main hypothesis of the paper is that the EU and CEFTA integration have a stronger (positive) impact effect on IIT in comparison with other RTAs, but the size of the impact varies across countries, depending on the difference between the demand size conditions, measured as the absolute difference in gross domestic product based on purchasing power parity by capita between trading partners. Our methodological approach adds a new twist to the story about the impact of RTA on IIT because we measure for the probable heterogeneous impact of RTA after accounting for the different demand structures between trading partners, that is, when accounting for the differences in the economic development levels. Moreover, there is a clear gap in the literature dealing with IIT in the case of CEE countries that places these countries in the research focus. These countries had experienced the transition period from a planned to a market economy. Afterward followed a process of stabilization and association with the EU (most of them in the late 1990s) and finally, accession to the EU (most of them in 2004). The last 30 years have been unstable from an economic perspective, which has severely affected trade patterns; starting with the end of the Cold War, China's economic rise and WTO entry in 2001, Global Financial Crisis, and the increasing trade protectionism that followed. In this paper, we aim to assess the IIT dynamics during this period and the role of RTA, and economic development differences between trading partners.

The rest of the paper consists of four sections. The second section provides a theoretical background related to the IIT and RTA, while the third deals with methodology and data. The fourth section obtains and discusses the empirical results, and the fifth section contains the conclusions

2. Literature review

Intra-industry trade (IIT) generally refers to the simultaneous import and export of the same product group (or within the same industry) between trading partners. IIT typically takes place between rich countries with similar economic structures and levels of development that are geographically close to each other (OECD, 2010). In addition, as multinational enterprises establish subsidiaries in multiple countries and exchange goods and services with the parent firm, IIT is frequently accompanied by foreign direct investment (FDI), which indicates the importance of monitoring changes in trade patterns and trade structure. The basis for IIT trade theory can be found in the work of Verdoorn (1960) and Balassa (1965), but the most important theoretical and methodological contribution to the measurement of IIT was made by Grubel and Lloyd (1971; 1975). The authors note that trading partners do not exchange identical products, but different variations of that product. To measure IIT, Grubel and Lloyd (1975) developed the Grubel-Lloyd index, which measures the size of IIT in an industry. Although the classic Grubel-Lloyd index has its drawbacks, it is still extensively used in the empirical literature on IIT. The strain of literature in international trade that in empirical research heavily relies on IIT is that connected with the research of Staffan Linder. In 1961, in his Ph.D. thesis, Linder starts with the notion that international differences in demand structure for various goods create differences in production functions across countries. Accordingly, the "the more similar the demand structures of two countries, the more intensive, potentially, is the trade between these two countries" (Linder, 1961: 94). This is usually called the Linder hypothesis. Thus, high IIT between countries is usually used as an indicator of the similarity of the demand structures. We use the difference between GDP per capita as a proxy variable for the similarity/dissimilarity of the demand structures of trading partners.

When it comes to economic integration theory, one of the seminal authors was Balassa, who in his paper from 1961, defined economic integration as "the abolition of discrimination within an area". Also, Balassa defined and classified different stages of economic integration: Free Trade Agreement, Customs Union, Common Market, and Economic Union. Free Trade Agreements are the most common form of economic integration because they allow each signatory keeps its tariff and non-tariff barriers to trade with the Rest of the World (ROW). Within the economic integration theories, the early focus was on the static effects of the economic integration within integration members and between members and ROW countries,

namely trade creation and trade diversion. From the 1960s, the importance of dynamic effects of economic integration was acknowledged, especially effects on economies of scale, technological advancement, productivity growth, market structure, and competition, as well as investment activity (Hosny, 2013). Bergstrand (1990), for example, examines the relationships between the share of intra-industry trade between trading partners and the average level of inequality between their GDPs, GDP per capita, capital-labor ratios, and tariffs. The analysis was conducted against the background of the theoretical framework of international trade such as the Heckscher-Ohlin-Samuelson theory and Linder's hypothesis. The model found that greater similarity in per capita income between two countries is associated with greater intra-industry trade, for both supply and demand reasons. Discussion about economic and especially trade integration usually starts with defining the main drivers of it. In the literature, we can find both inter and intra-industry trade considered to be one of the drivers. One usually finds that intra-industry is the predominant driver of the two, as shown by Menon & Dixon (1996). Their results underpinned the theoretical propositions and findings of early economic integration researchers like Verdoorn (1960), Drèze (1960), and Balassa (1965). One of the reasons for conducting our research is that the IIT-RTA relationship has not been thoroughly explored, especially using product-level data and controlling for the economic development differences as we do in this paper.

Clark and Stanley (1999) examine the determinants of IIT between the United States and developing countries at the country and industry levels. Their results show that the size of the economy and the trade orientation of the developing country has a positive effect on IIT and that IIT occurs in "nonstandard, made-to-order, vertically differentiated, labor-intensive products produced by large, globally integrated industries." Zhang et al. (2005) analyzed the determinants of Chinese IIT, comparing the effects on vertical and horizontal IIT. They used data at the 4-digit SITC level for the period from 1992 to 2001 for Chinese trade with its 50 trading partners. The estimation results show that vertical and horizontal IIT are determined differently, but trade liberalization and FDI inflows had positive effects on both. Trade openness was also found to drive IIT, as did economic size and trade composition. Chemsripong et al. (2009) investigate the impact of regional integration on intra-industry trade, proxied by the Gruber-Lloyd index in manufacturing between Thailand and other APEC economies. The analysis is based on the 3-digit SITC level and the results show that after integration, intra-industry trade increased, but at the same time trade with third countries, especially America, decreased, indicating ambiguous overall effects of trade liberalization.

Foster & Stehrer (2011) examine the impact of preferential trade agreements on IIT between members of preferential trade agreements on a panel of members over the period from 1962 to 2000. The results suggest that preferential trade

agreements are associated with the growth of intra-industry trade between members of preferential trade agreements and that the impact is higher in the case of developed member countries than for IIT between developing countries. Akram & Mahmod (2012) examine the determinants of IIT in the case of Pakistan's trade with its SAARC trading partners, taking into account country- and industry-specific determinants. The results of their panel data analysis show that country-specific determinants are significantly associated with IIT trade compared to industry-specific determinants. In addition, their results show that a relative increase in the supply of skilled labor in the reporting country compared to the partner country increases the supply of vertically differentiated goods for export, leading to an increase in IIT.

Macphee & Sattayanuwat (2014) examine the impact of major regional trade agreements on intra- and extra-regional trade flows in developing countries that are members of RTAs over the period from 1981 to 2008. In contrast to previous findings, their results suggest that regional integration does not appear to be a viable option as a substitute for multilateral trade liberalization and that this may be due to non-tariff barriers and trade policy implementation, particularly in the case of developing countries. In general, the growth of intra-industry trade dominates inter-industry trade (Baier et al., 2014), and trade agreements are considered an important trade policy tool. From an economic and trade policy perspective, studying the impact of RTAs on the further economic development of countries is crucial. Considering that most empirical studies do not focus specifically on CEE countries and do not use this type of disaggregated trade data, this study fills the gap in the current literature on the RTAs-IIT nexus.

3. Methodology

When calculating IIT, there are three major decisions to make: (1) which IIT formula to choose, (2) which classification of goods to choose, and (3) which level of aggregation to use.

Although over the years a multitude of different formulas for measuring IIT was developed, we choose original Grubel & Lloyd (1975) version, to have comparable results with the bulk of research results in this research field. So, we calculate IIT for trade between country *i* and *j* with good *k* in time *t* using the following formula:

$$iit_{ijkt} = 1 - \frac{|x_{ijkt} - m_{ijkt}|}{x_{ijkt} + m_{ijkt}} \quad (1)$$

where x_{ijkt} denotes the exports of product *k* from country *i* to country *j* in time *t*, while m_{ijkt} denotes imports of product *k* of country *i* from country *j* in time *t*.

When choosing classification, one usually chooses between Harmonized System (HS) or Standard Industrial Trade Classification (SITC). We choose HS at the tariff line level (6-digits). The reason we choose HS is the same as with the IIT formula, namely, getting in line one part of our methodology with similar research in this field. After deciding on the shape of the left-hand side of the future econometric model, we focused on determinants of IIT, where we decided to control for standard (gravity model) variables that are used in this research field, but with a special emphasis on the impact of RTA, that is, the impact of the interaction of RTA with the difference between the demand structure between countries, proxied by the difference between GDP per capita based on the purchasing power parity in current USD.

Due to the fact that trade policy is not an exogenous variable, our RTA variable can be a source of potential endogeneity issues. As argued in Baier and Bergstand (2007) it is important to account for such bias using panel analysis techniques. Therefore, to deal with the endogeneity issue in this analysis we include in the estimation importer and exporter fixed effects, time fixed effect, and country-pair fixed effect. Although this technique does not solve the problem entirely it for sure is plausible in gravity model estimation.

We present our econometric model by Equation (2).

To test our hypotheses, we develop the following econometric models:

$$\begin{aligned} iit_{ijt} = {} & \beta_0 + \beta_1\, linder_{jt} + \beta_4\, eu_{jt} + \beta_5\, eu_{jt} \times linder_{jt} + \beta_6\, cefta_{jt} + \\ & + \beta_7\, cefta_{jt} \times linder_{jt} + \beta_7\, rta_{jt} + \beta_8\, rta_{jt} \times linder_{jt} + \lambda_t + \\ & + \alpha_i + \gamma_j + u_{ijt} \end{aligned} \tag{2}$$

where iit_{ijt} is the value of Grubel-Lloyd IIT index for product i in the bilateral trade of particular CEE country with partner country j in year t. Since we have dyadic data, where one member of the dyad is always the same (one of CEE countries), we leave out the subindex denoting reporter country. Therefore, our panel unit is commodity defined at HS6 level and a partner country. $linder_{jt}$ is log-transformed absolute difference in GDP per capita based on the purchasing power parity in current USD between particular CEE country and the partner country j in time t. eu_{jt} is a dummy variable with value one if both trading partners are EU member states, zero if not. $cefta_{jt}$ is a dummy variable with value one if both trading partners are CEFTA member states, zero if not. rta_{jt} is a dummy variable with value one if both trading partners are members of the same regional trade agreement, zero if not, λ_t represents time fixed effects that are included in all estimations, α_i are product fixed effects, γ_j are partner country fixed effects, while u_{ijt} is the regression error term at the panel unit level. It should be noted that standard variables in the gravity models, apart from GDP are distance and contiguity, which are not included in Equation (2). The reason for omission of these variables is that by inclusion of partner country fixed effects and product fixed effects (i.e. multilateral resistance terms), the

other time invariant variables such as aforementioned variables are automatically omitted from the equation because of perfect collinearity. The reason why we used this approach and included multilateral resistance terms is to estimate structural gravity model, which has strong micro-foundations. For the sake of completeness, we also tested Equation (2) without country and product fixed effects just to check whether the signs and sizes of the distance and contiguity variables are in line with expectations based on previous research. As a benchmark for the estimation results, we used the results of meta-analysis done by Head & Mayer (2014), and the results for in line with expectations (coefficient for distance around minus 1 and for contiguity around 0.5, exact results are available upon request). Table 1 shows selected results for structural gravity estimates of RTA and EU, that are in the focus of interest of this paper.

Table 1: Estimates of selected structural gravity variables

Estimates	Median	Mean	St. deviation	No. of papers
RTA/FTA	0.28	0.36	0.42	108
EU	0.19	0.16	0.50	26

Notes: (1) Adapted from Handbook of International Trade, Chapter 3 by Head & Mayer (2014: 160)
Source: Authors' calculations

We estimate Equation (2) for each of the eight CEE countries separately using Poisson Pseudo Maximum Likelihood (PPML) estimator. PPML is usually used in estimating gravity and gravity-like models such as proposed here. The reason for its usage is ability to easily incorporate zero observations that are dominating trade data, particularly when analyzing IIT at disaggregated level, such as in this paper (HS6 level). It also handles well heteroscedasticity through usage of robust covariance matrix, resulting in consistent estimates even if the data at hand is not distributed following Poisson distribution.

4. Empirical data and analysis

4.1. Data

We gathered data from two sources. Bilateral trade data from 1997 to 2019 at a 6-digit HS level was obtained from UN Comtrade, while the rest of the data, including GDP per capita, distance, contiguity, EU and RTA dummies were obtained from Centre d'Etudes Prospectives et d'Informations Internationales (CEPII), while CEFTA definition was obtained from official CEFTA webpage. For each one of the CEE countries, we merged the aforementioned datasets using

the HS6 product-partner key, obtaining from around 1.6 million observations for Croatia to more than 3.2 million observations for the Czech Republic (the exact number of observations, together with descriptive statistics is shown in Table 1).

We start with the statistical analysis of the datasets (we have one dataset for each country). Table 2 shows average trade flows between a particular CEE country and all partner countries over the observed period. Apart from the exports and imports dependent on the size of the country, all other variables show that the selected group of CEE countries is relatively homogenous, which justifies the selection of these groups of countries for the analysis. (i.e., trading partners' average GDP PPP per capita, trading partners' average distance, the average number of traded products with trading partners in the same regional trade agreement). The statistics shown in Table 2 are mean and standard deviation (in parentheses). For example, contiguity of 0.13 (or 13%) for Croatia informs us that out of all bilateral trade flows at the HS6 level, 13% is with countries with which Croatia shares a common border, a value of 0.39 (39%) for FTA informs us that out of all bilateral trade flows, 39% was with countries with which Croatia has signed FTA (other than EU and CEFTA).

The results in Table 3 show that, except for the case of Bulgaria, the Linder hypothesis does not hold. The average Linder coefficient across all eight countries is 0.08, suggesting that an increase in the absolute difference in GDP per capita between trading partners increases bilateral IIT on average. For example, in the case of Croatia, the size of the Linder coefficient is 0.07, which is interpreted as the percentage increase of the IIT index if the difference in GDP per capita between Croatia and its trading partner increases by 1%.

Furthermore, the negative effect is also observed when we control for regional trade agreements signed with Third countries (predominantly outside the European continent; RTA-Linder interaction coefficient), but the size of the coefficient is quite smaller, the possible reason being the fact that such RTAs are shallower as opposed to EU and CEFTA trade agreements. For the case of CEFTA-Linder interaction, there is an outlier in the sign of the coefficient for Croatia (positive), which can be explained by the idiosyncrasies of Croatian economies in the 2000s, with the opening to international trade after the war period in the 1990s and WTO membership in the year 2000. Overall, the average effect of the RTA-Linder dummy is -0.14, -0.8, and -0.03, for EU, CEFTA, and other RTA respectively[2].

We also tested whether our results are robust to changes in aggregation level, so we aggregated the data at 2-digit HS and rerun the estimations. The Linder coefficients

[2] Calculated by simple average of row value of the respective interaction coefficients shown in Table 3. The CEFTA-Linder coefficient could not be calculated for Romania due to collinearity between EU, EU-Linder, CEFTA and CEFTA-Linder dummy variables, so only EU-Linder interaction coefficient is shown.

Table 2: Descriptive statistics of the data

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Croatia	Slovakia	Slovenia	Hungary	Poland	Bulgaria	Romania	Czech R.
IIT	0.07	0.09	0.08	0.10	0.10	0.07	0.07	0.11
	(0.190)	(0.210)	(0.209)	(0.225)	(0.221)	(0.193)	(0.188)	(0.234)
exports	1.4e+05	6.2e+05	2.3e+05	7.9e+05	9.8e+05	2.2e+05	5.1e+05	7.8e+05
	(2,429,395.0)	(11,581,230.5)	(3,511,445.7)	(13,143,210.1)	(11,546,178.6)	(4,109,020.4)	(7,498,432.7)	(12,392,873.4)
imports	2.6e+05	5.6e+05	2.4e+05	7.6e+05	1.1e+06	2.8e+05	2.8e+05	7.3e+05
	(5,101,147.6)	(13,953,951.7)	(3,837,912.6)	(15,377,032.4)	(28,972,706.2)	(9,695,232.0)	(9,655,754.5)	(1,479,1543.7)
GDPpc	28.30	28.21	26.81	28.02	28.34	27.05	28.29	26.77
	(16.40)	(16.82)	(16.95)	(17.21)	(18.62)	(16.58)	(17.09)	(18.26)
Distance	2,481.72	2,802.44	2,771.37	2,697.59	3,263.11	2,715.76	2,714.45	3,310.98
	(3,304.6)	(3,437.7)	(3,508.0)	(3,342.7)	(3,521.8)	(3,074.8)	(3,051.2)	(3,704.3)
contiguity	0.13	0.18	0.15	0.17	0.16	0.13	0.15	0.12
	(0.334)	(0.388)	(0.360)	(0.376)	(0.366)	(0.340)	(0.360)	(0.327)
EU	0.19	0.40	0.36	0.37	0.39	0.32	0.35	0.34
	(0.395)	(0.490)	(0.479)	(0.483)	(0.487)	(0.465)	(0.477)	(0.474)
CEFTA	0.05	0.05	0.03	0.04	0.01	0.02	0.03	0.04
	(0.208)	(0.209)	(0.172)	(0.203)	(0.111)	(0.154)	(0.162)	(0.185)
RTA	0.39	0.26	0.32	0.32	0.25	0.36	0.38	0.28
	(0.488)	(0.440)	(0.465)	(0.466)	(0.435)	(0.480)	(0.485)	(0.451)
N	1,672,542	1,915,208	2,207,987	2,249,906	3,107,688	1,851,856	1,867,042	3,243,945

Notes: (1) mean coefficients; standard deviation in parentheses

Source: Authors' calculations

Table 3: Estimation results of the gravity model (Equation 2)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Croatia	Slovakia	Slovenia	Hungary	Poland	Bulgaria	Romania	Czech R.
Linder	0.051***	0.259***	0.109***	0.052***	0.085***	-0.079***	0.002	0.183***
	(0.010)	(0.017)	(0.013)	(0.007)	(0.008)	(0.007)	(0.030)	(0.008)
EU	0.818***	0.414***	0.225***	-0.065*	0.052	0.005	0.000	0.493***
	(0.037)	(0.056)	(0.035)	(0.026)	(0.034)	(0.044)	(.)	(0.031)
EU#Linder	-0.275***	-0.289***	-0.165***	-0.052***	-0.084***	-0.020	-0.004	-0.231***
	(0.013)	(0.018)	(0.013)	(0.008)	(0.009)	(0.015)	(0.034)	(0.009)
CEFTA	-0.207***	0.527***	0.187***	0.024	0.512***	-0.176		0.342***
	(0.048)	(0.044)	(0.033)	(0.028)	(0.043)	(0.112)		(0.024)
CEFTA#Linder	0.160***	-0.099***	-0.183***	-0.102***	-0.156***	0.022		-0.224***
	(0.023)	(0.018)	(0.017)	(0.012)	(0.024)	(0.057)		(0.014)
RTA	0.407***	0.178**	0.071*	-0.005	0.033	-0.122***	0.019	0.282***
	(0.026)	(0.058)	(0.034)	(0.029)	(0.034)	(0.027)	(0.125)	(0.029)
RTA#Linder	-0.118***	-0.083***	-0.053***	0.042***	0.064***	0.072***	-0.019	-0.111***
	(0.009)	(0.020)	(0.013)	(0.011)	(0.012)	(0.011)	(0.035)	(0.009)
Const.	-2.284***	-2.355***	-2.061***	-1.869***	-1.949***	-1.947***	-1.584***	-2.112***
	(0.027)	(0.052)	(0.033)	(0.020)	(0.027)	(0.025)	(0.037)	(0.027)
N	1,615,525	1,837,197	2,116,312	2,149,595	3,004,631	1,761,501	206,228	3,166,821
Pseudo R2	0.177	0.176	0.167	0.153	0.170	0.148	0.145	0.168

Notes: (1) Standard errors in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Source: Authors' calculations

were still positive and significant for Croatia, Czech Republic, Hungary, Poland, and Slovakia, while for Bulgaria, Romania and Slovenia were positive and non-significant (results available upon request).

To check validity of our results, namely, size of the coefficients related to the three different economic integration dummies (EU, CEFTA, RTA respectively) we compared our results with those gathered by Head & Mayer (2014) and that are shown in Table 1. Mean value for EU dummy coefficient in our case is 0.24 (vs 0.16 in Table 1), 0.17 for CEFTA and 0.11 for other RTAs (vs 0.36 in Table 1) which is well within one standard deviation of the results reported in Table 1 in both cases and shows that our results are comparable with the bulk of the results in this field of research. It also indicates that, although we cannot compare them directly with similar studies, because to the best of our knowledge this type of methodological approach, combining RTA and Linder hypothesis, has not been done elsewhere, our interaction terms coefficients can be trusted.

What is outstanding in our results is the "EU-IIT switch" and "CEFTA-IIT switch", that is, the situation where for bilateral trade between CEE countries and other EU member states, the interaction between a regional trade agreement and Linder variable is (for most countries) negative and significant. We can see that when controlling for economic integration and the Linder variable, IIT gives place to inter-industry trade, indicating potentially increasing trade adjustment costs for new member states of integration and higher vulnerability to asymmetric shocks. An increase in the difference between tastes and/or supply-side factors like capital per labor ratio, proxied by the Linder variable and within EU integration, will have significant negative effects on IIT, and therefore trade adjustment costs. This result adds one justification to within-EU financial transfers predominantly aimed at EU candidate countries and new member states in the form of structural and cohesion funds.

5. Results and discussion

Our results, even though not directly comparable due to different methodological approaches, are close to the findings of Ramakrishnan & Varma (2014). In their paper, they examined the impact of FTA on IIT in the case of India. Their results also indicated that FTAs have a significant and positive impact on IIT. However, in their case, the Linder hypothesis was in line with Linder's original predictions, which is not surprising given the dataset they gathered: bilateral trade of India with Southeast Asian countries. Here we again stress the advantages of our approach. By using an interaction term between FTA and GDP per capita difference we can test and expand the empirical understanding of the relationship between these two variables. Our results show that the effect of FTA is biased if

we fail to account for the difference in the economic development level of the integration members.

Our findings also fit in with the research findings of Urata and Okabe (2009) as well as that of Foster and Stehrer (2011). Later mentioned paper investigated the impact of the RTAs on the structure of trade, where among different indicators of the structure of trade, they choose Grubel-Lloyd index. Their findings showed that the effects of RTA on IIT are generally positive, although there are differences that can be attributed to the differences in per capita GDPs between the trading partners, and that they "tend to suggest that the formation of RTAs between dissimilar countries has a negative effect on IIT" (Foster and Stehrer, 2011: 407). Urata and Okabe (2009) on the other hand focused more on explanation of trade flows and with that in mind, they used income gap, defined as the log of the absolute value of the difference in GDP per capita, as one of the determinants of the change in trade flows. They expected that relatively large income gap increases inter-industry trade, while relatively small income gap increases IIT, which is line with our predictions. Their results on the product groups showed that IIT is indeed sensitive to differences in GDP per capita of trading partners. Our results unifies and upgrades methodological approaches, as well as the findings of these papers and clearly shows the advantages of using product-level data and interaction term between FTA and income gap.

Overall, in our paper we showed how income gap between trading partners need to be considered jointly with trade liberalizing policies. We showed that two most important economic integration agreements on European continent caused positive, but less than optimal economic consequences, since it caused significant adjustment costs to economies joining already established economic integrations, such as EU and CEFTA.

6. Conclusion

From the beginning of its inclusion in international trade research, the simultaneous export and import of similar but slightly differentiated commodities – intra-industry trade – was often regarded merely as a statistical phenomenon arising from the chosen level of a particular trade classification, i.e., not as something worthy of a separate study. These views gradually changed, with the real starting point being Linder's theory of overlapping demand. On the other hand, the theory of economic integration was early recognized as one of the pillars of the theories of international trade. The status of IIT theory arose in the 1980s and 1990s as a result of the evolution of trade theory toward market imperfections and trade adjustment costs, the latter bringing IIT and economic integration (especially FTA) theories closer together.

The aim of this paper was to test IIT-RTA interaction within the scope of Linder's hypothesis, that is, we hypothesized that deeper economic integrations

like EU and CEFTA will have a stronger effect on IIT, but also, that economic development differences matter and can attenuate the positive impact of RTA on trade. To test the hypothesis, we developed an appropriately adjusted structural gravity model, that was estimated using the PPML estimator. Our results, robust to the different aggregation levels of the HS classification, have shown that for CEE countries that are part of EU economic integration, the Linder hypothesis by itself does not hold, but holds when taking into consideration interaction between the economic development differences and RTA status, namely, the impact of RTA on IIT is sensitive to the degree of asymmetry of economic integration, where the degree of asymmetry is measured by the difference in GDP per capita of integration members. On average, the negative effect of RTA on IIT was strongest for EU integration, followed by the CEFTA integration and then all other RTAs that CEE countries signed with Third countries. Including the RTA-Linder interaction, the term deepened the level of analysis in this particular level of research and brought closer together two fields of research, economic development, and economic integration.

Our results highlight the importance of considering development imbalances during the economic integration process and indicates that even with pre-accession and post-accession funds that the EU uses to tackle these imbalances, more effort was required to lower the costs of the integration process. Future research should focus more on the economic development integration with international trade and economic integration studies on the industry-product level.

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Dinamika intraindustrijske trgovine u zemljama SIE: uloga sporazuma o slobodnoj trgovini

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Sažetak

U ovom se radu istražuje utjecaj regionalnih trgovinskih sporazuma (RTS) na razvoj intra-industrijske trgovine (IIT) za slučaj osam zemlja Srednje i istočne Europe (SIE) od 1997. do 2019. godine. Cilj rada je usporediti i objasniti mogući heterogeni utjecaj različitih RTS na IIT, kontrolirajući za razliku u ekonomskoj razvijenosti između zemalja partnera. Analiza se temelji na razini podataka zemlja-proizvod, a izvor podataka su UN Comtrade i CEPII baza podataka koja sadrži varijable gravitacijskog modela. Hipoteza rada je da CEFTA i EU ekonomske integracije imaju snažniji (pozitivni) učinak na IIT u usporedbi s ostalim RTS, ali snaga utjecaja varira između zemalja, s obzirom na razvojne nejednakosti zemalja, koje su u ovom radu mjerene kroz razliku u BDP po glavi stanovnika. U radu je razvijen i procijenjen model koristeći PPML procjenitelj. Doprinos rada jest uključivanje interakcijske varijable između RTS i razvojne nejednakosti. Rezultati rada su ukazali da je hipoteza rada validna, kao i da razvojne nejednakosti između zemalja članica integracije imaju negativan učinak na IIT, što potencijalno znači povećanje troškova prilagodbe zbog ekonomskog integriranja. Rezultati podupiru EU pred-pristupne i post-pristupne politike koje imaju za cilj smanjiti razvojne nejednakosti između zemalja članica integracije.

Ključne riječi: *intraindustrijska trgovina, regionalni trgovinski sporazumi, SIE zemlje, asimetrije razvoja*

JEL klasifikacija: *F10, F14, F15*

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