IRYNA NASADIUK
Katarzyna Śledziewska

How does regional integration among developed countries influence trade. Does the impact differ among sectors?

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SUMMARY

In the paper we investigate the impact of regionalism on trade. The importance of regionalism, which we can define as actions by governments to liberalize or facilitate trade on a regional basis (through Partial Scope Agreements PTA, Free Trade Agreements FTA, Customs Unions CU or Economic Integration Agreements EIA), is growing – as has been evidenced by the number of regional trade agreements (Regional Trade Agreements – RTAs) as well as the fact that almost every country in the world has entered at least one RTA agreement. In May 2015, 407 RTAs were in force (counting goods and services separately). Each regional trade agreement has various features from elimination of tariffs to deeper forms of integration such as technical and phyto-sanitary measures harmonization. This paper aims to identify deeper integration with RTAs on the sectoral trade between industrialized, old and newly, over 1995-2011. The impact of RTAs are evaluated for 17 WIOD sectors and follow the research of Baldwin (2006), Flam and Nordstrom (2003) and Fernandes (2006). The results show that EU effects and RTAs effects of higher exports between partners can be identified with the help of gravity model. While EU effect for the most of 17 sectors is the largest in magnitude, RTAs effect is greater in case of deeper integration when RTAs include technical barriers to trade and sanitary and phyto-sanitary measures harmonization.

1. INTRODUCTION

The regional economic integration initiatives are very active field of international policy cooperation. According to WTO regional trade agreements are groupings that abolish or reduce barriers on trade within the group. The recent study of WTO World Trade Report "The WTO and preferential trade agreements: From co-existence to coherence" (2011) presented the detailed examination of preferential trade agreements inside and beyond WTO, among them EU arrangements and US free trade agreements. The RTAs were structured by the various elements such as tariff elimination in trade of manufactures and agricultural products, harmonization of technical barriers and sanitary and phyto-sanitary, intellectual property rights enforcement, joint competition regulation, and many more. The popular argument is that various adds-in to RTAs tend to work much better for the expansion of trade than mere free trade regime (Baldwin (2006)).

The WTO study found positive impact of more advanced feature of existing RTAs on world trade. World Trade Report 2011 included the classification of deep RTAs with various features and contained the study of the impact of deep integration on trade with a focus on production networks. The gravity model estimated for 200 countries using data from 1980 to 2007 found that preferential trade agreements increase trade in parts and components by 35 per cent among country members. The greater the level of deeper integration, so as the more various features such as competition policy, non-tariff measures, intellectual property rights an agreement includes, the

greater countries trade with each other in parts and components. The study found that signing deep agreements leads to higher trade in production networks between member countries by almost 8 percentage points on average. At the same time the opposite was also found true: higher share of trade in parts in components in the total trade of countries increases the probability that deeper format of preferential agreement will be signed between those countries.

The authors of the WTO report made a point that there were fewer studies on the impact of deeper integration on trade. As positive impact of more sophisticated liberalization regimes on total trade between trading partners is already confirmed, the question arises whether this connection still holds when we look at the sectoral trade. Various standards and non-tariff measures are pertinent for the particular trade which can be better examined when we disaggregate trade flows between countries. Such at attempt is made in the current paper. The general hypothesis is that presence of standards harmonization feature in the agreement between countries must lead to greater exchange in the sector. Whether this true or not will be confirmed by the consequent empirical study.

Our research is going to contribute to the field by estimating the importance of regionalism among industrial and newly industrialized countries by looking at the sectoral trade and PTAs signed to cover this trade among countries participating in WIOD project. These include EU countries, NAFTA, BRIC countries and Australia, Japan, Mexico. Our aim is to identify the effects of “deeper” integration on the bilateral trade in sectors with the use of gravity model and Poisson estimation techniques. Similar studies have been already undertaken to identify euro trade effects that is discussed in the Baldwin’s 2006 paper.

2. REGIONALISM & GRAVITY

Regionalism has its own types and takes place at various levels. Types of regional trade agreements are distinguished by the intensity of cooperation and the different range of liberalization of trade in goods and services. WTO calls them: partial scope agreements (PSA, type of agreements that is allowed only for developing countries), a free trade areas (FTAs), customs union (customs union - CU) and economic integration agreement (EIA). Used in the context of trade agreements, the term "economic integration" means only the liberalization of trade in services on a preferential basis.

WTO statistics on RTAs based on notification requirements reports more than 400 agreements signed by WTO member states.

	Accessions	New RTAs	Grand total
FTA	2	220	222
CU	7	10	17
PSA	2	35	37
EIA	5	126	131
Grand total	**16**	**391**	**407**

Regionalism already covers all WTO member countries. Recently RTAs are increasingly bilateral and not accompanied by the creation of trading blocs. Half of them are now intercontinental. In addition, they more and more anticipate increasing economic integration, which is significantly beyond the scope of preferential liberalization of trade in goods.

Since the seminal work of Anderson (1979), gravity model has been the dominant tool in explaining the bilateral trade and investment flows between countries. The simplicity of the model is the advantage that has been supplemented by the corresponding theoretical justifications from the perspective of the Ricardian models, Heckscher-Olin models and increasing returns to scale models, e.g. Bergstrand (1990), Markusen and Wigle (1990) and Leamer (1992).

Regionalism is a popular subject for economic researchers. With the development of theories that led to the use of gravity models, these estimation methods have become a popular tool for modeling the impact of regionalism on trade. These studies have traditionally relied on the introduction of dummy variables for the various groups. They toured around the question of whether regional trade blocs are a natural feature of international trade. A review of these works are presented by Greenaway and Milner (2002, p. 574-583) and also in the World Trade Report (2011, p. 105).

R. Baldwin's research in international economic integration and production cooperation also stimulated this piece of research. Also WIOD project contribution to the field was substantial in terms of making available disaggregated trade and output data for industrialized countries. Sectoral and intraindustry trade have become quite significant in the recent decades. R. Baldwin, thus, distinguishes between traditional trade in goods and supply-chain trade between industrialized and industrializing countries. While tariffs mattered for the traditional trade regional trade agreements covering non-tariff measures and regulations become even more significant. As the economist put it "the key disciplines for supply-chain trade are thus tangible and intangible property rights and assurances on the free-flow of goods, services, capital, and people involved in international production networks" (Baldwin (2014), p. 281). According to the author trade development towards the supply-chain exchange is going to be handled by regional rather than multilateral integration and liberalization efforts. Thus, regionalism will gain more importance: "supply-chain disciplines will be harmonized by mega-regionals and megabilaterals that will, on current trajectory, exclude China and other large emerging economies" (Baldwin (2014), p. 280)

We will concentrate on the contributions to the analysis of sector-specific trade flows with the gravity model methodology. In this regard, Bergstrand (1989) employed gravity approach with theoretical justification to analyze sector disaggregated data. Bergstrand used exports between countries deflated by prices in the SITC classifications from 0 to 8. The range of independent variables included exporter national output and capital-labor ration, importer's income and income per capita, distance between countries, measure of importer's tariff rate, bilateral exchange rate and two complex price terms, adjacency dummy. Bergstrand utilized generalized gravity equation based on heteroskedastivity-consistent covariance matrix estimator of White. His empirical data of interest was 16 developed countries including USA, Canada and EU countries. The coefficients on joint EU, EFTA membership and EU-EFTA cooperation had positive and significant coefficients in most of the cases. Exporter and importer's wholesale price index and exchange rate didn't produce substantial results.

Simple OLS methodology was applied in the Lejour and Demooij (2004) paper to quantify EU effects of Turkey's external trade. Authors worked with cross-section of 38 countries for one particular

year – 2011 based on GTAP data. The sectoral breakdown of data was represented by 15 different industries. The gravity model included exports as dependent variable and GDP per capita, distance, export and import tariffs, corruption perception index as independent variables. The result was that in 12 out of 15 industries EU dummy had positive and significant coefficients, so in these sectors bilateral trade is found to be systematically higher if two countries are both EU members. The dummies for agriculture and food processing industry were found to be among the largest.

There are a number of contributions that dealt with the disaggregate bilateral trade flows with the purpose to analyze the impact of euro introduction on trade between countries. Flam and Nordstrom (2003) analyzed unilateral exports of 20 industrialized countries disaggregated at one-digit SITC sectors for the period 1995-2002, 9 industries altogether. Utilizing fixed-effects OLS economists found that sectors with Rose effects are those marked by non-homogeneous products - beverages and tobacco, chemical products, including pharmaceuticals, and products from manufacturing industries. Thus EU effects are concentrated in sectors with higher value added and with non-standardized products. The model specification of Flam and Nordstrom paper includes logs of GDPs of exporting and importing country, bilateral real exchange rates, average real exchange rates of third countries against importing countries, country pair dummies, year dummies, dummies for exports between EU countries, between EU member and non-EU members. The authors undertake robustness check by introducing changes in the length of pre-euro period, excluding countries and countries groups and excluding of explanatory variables. Consequently the results were found robust in terms of the first two cases. The estimated euro coefficients are sensitive in terms of magnitude to the exclusion of GDP and real exchange rates, but the high significance of the estimates remain.

Baldwin, Skudelny and Taglioni (2006) represent a significant piece of research on trade effects of the euro. They applied fixed OLS methodology to analyze imports deflated with the use of overall manufacturing producer price index to test connection with value-added by sector and gross production (OECD Structural Survey for Industry and Statistics), absolute forward premium, exchange rate volatility, also, dummy for both countries in EMU, dummy for one of the countries in EMU, dummy for joint EU membership. The paper checks for exporter and importer fixed effects along with industry fixed effects. The major result of the paper goes in line with Flam and Nordstrom finding - the impact of EMU seems to differ substantially across sectors. Baldwin et al. found relatively strong effects for the following sectors “Electricity, gas and water supply”, “Building and repairing of ships”, “Food products, beverages and tobacco”, “Rubber and plastics”, “Transport equipment”, “Office and computing machinery”, “Motor vehicles”. No specific effect for protected industries “Aircraft and spacecraft”, “Coke, refined petroleum products and nuclear fuel”, “Iron and steel”, “Mining and quarrying”, “Railroad equipment transport equipment” and “Agriculture, hunting, forestry and fishing” was identified. Similarly to Flam and Nordstrom (2003) Baldwin and others found that industries mostly related to Rose effect are those characterized by imperfect competition and increasing returns to scale.

Fernandes (2006) aimed to estimate effects of euro on real exports of 21 countries for 1988-2003 years at the disaggregated level. The economist examined 25 two-digit ISIC rev.3 sectors with the use of such estimation techniques as simple fixed effects OLS, difference- GMM estimator, system-GMM estimator. The independent variables included exporter and importer sectoral value-added, lagged exports, the measure of exchange-rate volatility, real exchange rate, country-pair fixed effect,

year dummies, exporter's and importer's dummies for intra-euro trade, dummy for trade from euro to non-euro country, dummy for trade from non-euro to euro country. Only some sectors were found to demonstrate significant euro trade effect. In general, industries with high level degree of product processing, such as several types of machinery and equipment, sophisticated professional instruments, etc. were influences by the euro. The effect varies on average between 7 and 22%. The author undertook robustness check by changing lag structure of the model and instrument matrix, exchange rate volatility measure and estimation period.

There are a number of studies that are making effort to estimate the tariff equivalent of non-trade barriers for the sectoral trade. For example, Park (2002) analyzed 7 services sectors for 57 countries in 1997 with the aim to identify tariff equivalent of barriers of trade in services. With the help of White estimator and such independent variables affecting bilateral trade flows as GDP, WPI, dummies for common language, belonging to Asia-Pacific, Latin America and Sub-Saharian Africa economist found the highest barriers to be in construction and business services traded among countries. Joint ECORUS (2009) project looks at 23 sectors of trade between EU and US aiming to identify non-tariff measures equivalent. Among other authors use EU preference margin, US preference margin and transatlantic margin as dependent variables. With simple OLS methodology they found additional costs for US exports to EU and for EU exports to the US due to NTMs.

Baldwin and Taglioni (2006) gave methods how to make gravity model results more adequate to the reality, among these - deflating trade figures back to the common year using US price index, using real GDP data, utilizing nation dummies correct for multilateral trade resistance term and time dummies will pick up other idiosyncratic year-specific shocks. Baldwin-Taglioni (2006) also suggested employing time-varying country dummies to remove correlations cross-country price term.

Frankel and Wei (1998) suggested using exporting nation's producer price indexes as a proxy for the bilateral export price index and use real GDP figures and time-dummies to take account of bilateral pair invariant time-specific effects.

Summarizing: it can be seen that the gravity models are still very important instrument in clinical effects of trade regionalism. Unfortunately, the results obtained are very different, though largely confirmed the occurrence of creation. There is a lack of studies that have clearly distinguish between effects depending on the type of agreement or changes in trade policy instruments.

3. Data and Methodology

We look at 40 countries, 17 years and 17 sectors in our study, together representing panel data set. The sectors that we are looking at are 17 agricultural and manufacturing sectors that are based on WIOD classification of economic activities (table 1)

Table 1

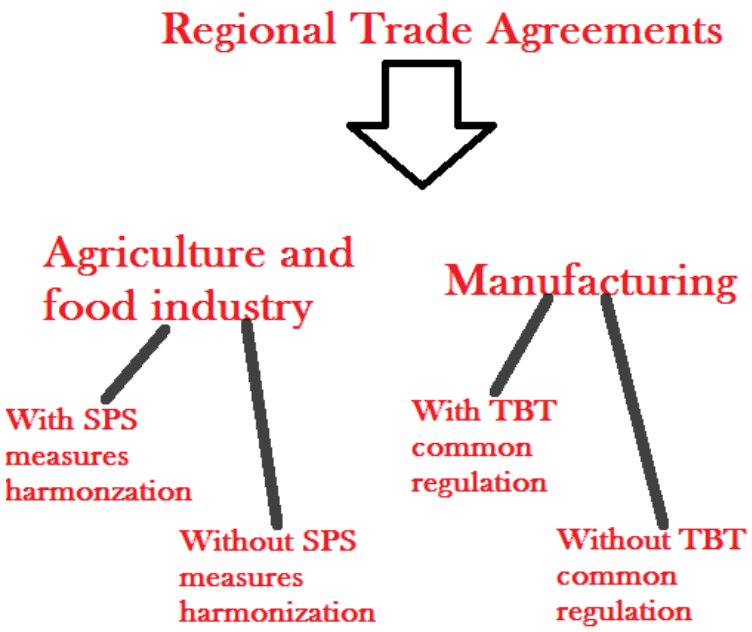
The data is available for years through 1995 to 2011. The source of bilateral trade is UN Comtrade database and World Bank WITS database. The tariff values also originate from WITS. The sectoral output data - value-added and demand are taken from the WIOD database available online.

Data on distance, contiguity and common language is supplied by CEPII. World Bank Indicators database is the source of real GDP per capita.

The trade flows and tariffs at 6-digit level were aggregated into 17 WIOD sectors and average tariffs by merging the data according to the correspondence table and summarized across the WIOD sectors (graph 1). The sectoral output and demand data was taken as it was from WIOD tables.

Graph 1 Merging HS 6-digit trade and tariff data into WIOD sectoral trade and tariffs analogue

Graph 2 PTA arrangements structure



The peculiarities of this empirical study is the use of sectoral indicators of the supply and demand side of the trade flow – sector-specific value-added- and supplication of Poisson methodology to infer the results. The gravity model inherits a lot from the above-mentioned empirical studies of Flam and Nordstrom (2003), Baldwin et al. (2006), Fernandes (2006).

The regression model analyses exports EXP_{ijkt} of reporter (i) to partner (j) in WIOD sector k in period t and includes a number of gravity model independent variables together with dummy responsible for RTAs concluded between countries (table 2):

$$EXP_{ijkt} = \beta_0 + \beta_1 VA_{ikt} + \beta_2 Demand_{jkt} + \beta_3 Tariff_{ijkt} + \beta_4 DGDPp_{ijt} + \beta_5 Cont_{ij} + \beta_6 d\_rgdpc + \beta_7 EU_{ijt} + \beta_8 FTAAwSPS_{ijt} + \beta_9 FTAIwTBT_{ijt} + \beta_{10} FTAAnSPS_{ijt} + \beta_{11} FTAInTBT_{ijt} + \beta_{12} Year_t + + \beta_{13} Countrypair_{ijk} + \varepsilon_{ijkt}$$

$Year_t$ is time dummy variable to take account of bilateral pair invariant tome-specific effects, $Countrypair_{ijk}$ - country pair and sector specific dummy variable, ε_{ijkt} - error term.

Table 2

Explanation expected sign and source of variables in the regression model

Variable	Explanation	Source	Expected sign
exp	Logarithm of value of exports of Reporter to Partner	WITS/Comtrade	
tariff	Logarithm of the Average tariff of the partner in the corresponding sector ln(1 + tariff/100)	WITS	Higher tariff in partner country is related to lower exports
VA_reporter	Logarithm of value added in the WIOD sector of the reporter	WIOD	Higher value added in the corresponding industry of exporter (supply side) corresponds to the higher exports
demandPar	Logarithm of the expression (Value added of the plus imports minus exports in the corresponding sector) of the importer	WIOD	Higher demand in the corresponding WIOD industry of importer is related to higher imports
contig	Dummy variable equal to 1 if countries are contiguous	CEPII	Adjacent countries are expected to trade more
ngdp_rep	Nominal GDP of exporter	World Bank	Higher GDP in the exporter is related to higher production and exports
ngdp_par	Nominal GDP of importer	World Bank	Higher GDP in the importer is related to higher demand and correspondingly to higher imports
d_rgdpc	Logarithm of absolute value of the difference between real GDP per capita of the exporter and importer (ln (abs|rgdpc_rep - rgdpc_par|))	World Bank	Similar in terms of capital-labor endowment countries are trading more
EU	Dummy variable equal to 1 if both countries belong to EU in the		Joint EU membership is expected to raise trade

	corresponding year		
FTAAwSPS	Dummy if both countries liberalized trade in agricultural products and harmonized SPS measures at the same time	WTO	FTA in agricultural products with SPS harmonization is exsptcted to raise trade in 1 and 3 sector
FTAIwTBT	Dummy if both countries liberalized trade in manufactures and affirmed rights and obligations on TBT, harmonized regulations and signed mutual recognition agreements	WTO	FTA in industrial products with TBT obligations is expected to raise trade in sectors 2, and 4 through 17
FTAAwSPS	Dummy variable equal to 1 if countries liberalized trade in agricultural products but don't have harmonization of SPS measures	WTO	FTA in agricultural products without SPS harmonization is expected to raise trade in 1 and 3 sector, but to a lesser extent than in the previous case
FTAIwTBT	Dummy variable equal to 1 if countries liberalized trade in manufactures but don't have harmonization of TBT regulations	WTO	FTA in industrial products with no TBT obligations is expected to raise trade in sectors 2, and 4 through 17, but to a lesser extent

Applying Poisson simple Poisson pseudo-maximum-likelihood method we escape the heteroskedasticity characteristic of gravity model log-linearized problem as argued in Silva and Tenreyro (2006) paper. When there is evidence of heteroskedasticity, the Poisson pseudo-maximum-likelihood estimator should be used as a substitute for the standard log linear model.

4. EMPIRICAL RESULTS

The study is conducted for the full set of WIOD countries and for the Visegrad countries. Among WIOD countries there are 27 current members of EU. Trade arrangements among them are deepened by various sets of technical standard harmonization policies, competition and government aid policies,

etc. Among them there are “New” member states that joined EU recently. The vivid group among them is the Visegrad countries – Poland, Hungary, Slovak Republic and Czech Republic.

Let’s first consider the results for 40 industrialized countries. The gravity model variables responsible for the size of the markets on the supply and demand side applied to the sectoral data produce significant coefficients (table A.1 in the Annex). In all sectors coefficients at the variable of value added in the exporter’s sector and demand in the sector of importer are statistically significant and positive suggesting that higher production in the sector does really increase exports, and larger demand in the corresponding sector of importer in also related to more imports (the relation doesn’t stand only for the sectors “Mining”, “Wood”, “Rubber”, “Electrical”).

Coefficient of tariff variable is negative and statistically significant except for the case of “Textiles”, “Leather”, “Non-metallic products”, “Electrical equipment” sector suggesting that in spite of various preferential regimes with different degree of “deepness” among countries in our dataset the tariffs still matter a lot. Higher tariff in WIOD sector lowers exports in the corresponding sector, the magnitude varies with the sector. The strongest effects are found in the “Wood”, “Coke”, “Transport equipment” and “Chemicals”.

The traditional variables of common language and distance fail to deliver substantial results with the expected sign, while adjacency dummy works well for the trade volume of the industrialized countries.

Difference in real GDP per capita reveals interesting results. Since the difference in real GDP per capita is taken in absolute terms its variety means similarity and dissimilarity in capital-labor endowment between partners. The coefficient at the variable is significantly different from zero for all sectors except “Mining”, “Pulp” and “Electricity”. In all cases of statistical significance the variable coefficient it is negative, suggesting that dissimilarity in capital-labor ration brings about lower trade between countries. Taking into account the fact that most countries in the sample are industrialized it makes sense.

Now turning to the factors that would matter the most for the current research – integration dummies, we should notice that the EU membership doesn’t have substantial effect on the trade in our sample (Table 1). Our study identified positive EU effects only for the sectors “Agriculture”, “Food”, “Textiles”, “Leather”, “Pulp&Paper”, “Chemicals”, “Rubber”, “Non-metallic products”, “Electricity”. Positive EU effects were not identified for the higher value-added product sectors, such as “Machinery”, “Electrical equipment”, “Transport equipment”, “Other Manufacturing”. Actually for most ICIR sectors the EU effect is substantially negative. This result is quite different from the estimations of Baldwin and others (2006).

RTAs, whether they include standards harmonization or not, are mostly trade increasing. Let us mention, that PTA dummies do not include free trade arrangements within EU. In our study PTA seems to be stronger than EU in stimulating positive trade effects if free trade includes technical barriers to trade regulation. PTA effects are found positive for the sectors which are characterized by imperfect competition and increasing returns to scale, from “Machinery” to “Other manufacturing”. Free trade without SPS or TBT harmonization or “shallow” integration doesn’t bring about more trade in ICIR sectors. Trade in transport equipment and other manufacturing is actually lower within regional trade arrangement if it is not “deepened” by the harmonization of technical standards.

For less sophisticated products "deep" free trade areas matters in case of trade in agricultural products, food, textiles, pup, rubber, non-metallic raw materials. Simple PTAs seem to matter for sectors with lower value-added, such as "Mining", "Textiles", "Leather", "Wood", "Pulp", "Coke", "Chemicals", "Rubber".

Table 1 The effects of EU and simple and "deep" PTAs on sectoral exports, 40 industrialized countries

	EU effect		Effect of FTA with standards harmonization		Effect of FTA without standards harmonization	
Agriculture	0,636	(7.07)**	0,805	(6.91)**	-0,555	(4.03)**
Mining	-0,191	-1,02	0,213	-1,52	2,385	(11.30)**
Food	0,626	(8.13)**	0,283	(3.06)**	-0,634	(4.15)**
Textiles	0,693	(7.18)**	0,928	(9.22)**	0,169	(2.05)*
Leather	0,437	(3.90)**	-0,388	(2.97)**	0,646	(6.97)**
Wood	-0,802	(4.04)**	0,185	-0,85	1,353	(5.86)**
Pulp&Paper	0,338	(3.28)**	0,993	(9.33)**	2,337	(11.30)**
Coke	-0,091	-0,68	0,252	-1,82	0,99	(4.83)**
Chemicals	0,41	(4.82)**	-0,061	-0,64	0,523	(3.23)**
Rubber	0,285	(2.01)*	1,014	(11.95)**	1,001	(7.93)**
Non-metallic	0,198	(2.53)*	0,301	(3.41)**	-0,426	(2.68)**
Basic metals	0,152	-1,92	0,527	(5.75)**	1,466	(6.36)**
Machinery	-0,222	(2.12)*	0,483	(5.50)**	-0,259	-1,66
Electrical	-0,024	-0,22	0,296	(2.32)*	-0,424	-1,48
Transport	-0,315	(2.01)*	0,324	(2.15)*	-2,216	(12.72)**
Manufacturing	-0,597	(5.23)**	0,307	(3.17)**	-0,608	(5.06)**
Electricity	1,937	(8.06)**	2,829	(7.88)**		

The results for the Visegrad countries (table 2) show more substantial EU effect than in case of the whole dataset of 40 industrialized countries which is positive for all sectors, except "Mining", "Coke", "Basic metals", "Electrical equipment". The strongest positive effects of EU integration are found for such sectors as "Agriculture ""Food", "Pulp and Paper", "Leather", "Rubber", "Machinery", "Electrical machinery". The EU trade arrangements have a pronounced effect on trade in higher-value

added products in Visegrad countries comparative to the situation for all 40 countries where EU effects are concentrated in basic sectors.

Apart for trade within EU, Visegrad countries have preferential trade arrangements with other industrialized countries, Mexico and Turkey for example. The trade effects of cooperation with the countries, that Visegrad countries have simple preferential trade agreements with, are comparable to the trade effects they have in trade with EU countries. All these PTAs include SPS or TBT regulation harmonization, so we can't argue for whether "deep" or simple PTA works better for Poland, Hungary, Slovak and Czech Republics. What we can observe is that the coefficient at FTA dummy is positive for "Chemicals", "Rubber", "Basic metals", "Machinery", "Electrical equipment", "Transport equipment", "Other manufacturing", higher value added products and sectors characterized by imperfect competition and increasing returns to scale. The PTAs effect is almost absent in the low value-added products sectors of Visegrad countries, the only positive effect is found in the sector "Textiles".

Table 2 The effects of EU and simple and "deep" PTAs on sectoral exports, Visegrad countries

	EU effect		FTA with standards harmonization		FTA without standards harmonization	
Agriculture	1,342	(13.24)**	-2,777	(5.34)**	0,224	-0,55
Mining	0,286	(3.17)**	-0,171	-0,37		
Food	1,329	(14.38)**	-1,289	(5.77)**	0,953	(3.23)**
Textiles	0,125	-1,6	0,7	(3.43)**		
Leather	1,223	(7.12)**	-0,989	(7.14)**		
Wood	0,874	(10.12)**	0,115	-0,49		
Pulp&Paper	1,58	(14.66)**	-0,054	-0,25		
Coke	1,063	(7.06)**	-0,755	-1,82		
Chemicals	1,132	(13.12)**	0,35	(2.04)*		
Rubber	1,687	(14.23)**	0,818	(4.67)**		
Non-metallic	0,868	(9.66)**	-0,075	-0,66		
Basic metals	1,046	(12.66)**	0,714	(4.15)**		
Machinery	1,315	(11.26)**	0,837	(6.28)**		
Electrical	1,77	(15.84)**	1,405	(10.51)**		

Transport	1,279	(10.49)**	1,403	(7.13)**		
Manufacturing	0,948	(8.07)**	0,871	(6.19)**		
Electricity	1,424	(4.56)**				

To undertake the robustness check by substituting sectoral output on the importer's and exporter's side by total GDP of the trading partners (table A.3 in the Annex). Supplementing sectoral output and demand for nominal GDP are producing similar results while EU and PTA effects are stronger.

5. REMARKS

This paper follows the research methodology employed for the euro effects identification studies and applies it to the 17 WIOD sectors and 40 industrial and newly industrialized countries for the recent decades – from 1995 to 2011 years. The sectoral trade fits into the gravity model logic in terms of market size, but transport costs factor lacks significance. As in the previous studies of Baldwin, Skudelny and Taglioni (2005), Flam and Nordstrom (2003), Fernandes (2006), Bergstrand (1989) et al. membership in the European Union and RTA arrangements bring additional trade to countries, but not to all sectors. But the largest effect was identified for sectors characterized by imperfect competition and increasing returns to scale. Contrary to the above-mentioned studies EU effects in sectoral trade were positive for low value added groups such as agriculture, food industry, textiles, leather, pulp and paper, chemicals, rubber, non-metallic products, electricity and gas. EU effects were not found substantially larger for ICIR (imperfect competition and increasing returns sectors contrary to the results of Baldwin et al. (2005) and Flam and Nordstrom (2003).

Visegrad countries, on the contrary, enjoy large and positive EU effects for ICIR sectors with higher value added products.

The study paid attention to non-EU RTA effect in trade between industrialized countries. RTA effect with "deeper" integration effect was found positive and significant for the sectors with high value added. On average countries that have signed preferential trade agreement with TBT harmonization do have higher trade in textiles, pulp and paper, rubber, basic metals, non-metallic products sectors, machinery, electrical equipment, transport equipment and other manufacturing industries suggesting that deeper integration is quite important for fostering trade between countries in certain sectors. At the same time simple RTA without addition harmonization features can increase trade in such sectors as textiles, leather, wood, pulp and paper, coke, chemicals, rubber and basic metals.

For Visegrad countries, on the contrary, positive EU and FTA with technical barriers regulation effects are attributed to higher value added products and sectors characterized by imperfect competition and increasing returns to scale.

In spite of the EU and RTA effects obtained in the study tariffs still matter for the bilateral trade flows suggesting that tariff barriers are still important in trade between industrialized countries.

6. BIBLIOGRAPHY

Anderson, James (1979). "The theoretical foundation for the gravity equation," American Economic Review 69, 106-116.

James E. Anderson & Eric van Wincoop (2001). "Gravity with Gravitas: A Solution to the Border Puzzle," NBER Working Papers 8079, National Bureau of Economic Research, Inc.

Bergstrand, Jeffrey (1989). "The Generalized Gravity Equation, Monopolistic Competition, and the Factor-Proportions Theory in International Trade," The Review of Economics and Statistics, MIT Press, vol. 71(1), pages 143-53.

Baldwin, Richard & Taglioni. Daria (2006). "Gravity for Dummies and Dummies for Gravity Equations," NBER Working Papers 12516, National Bureau of Economic Research, Inc.

Baldwin, Richard (2006). "The Euro Trade effects". ECB Working Paper #594

Baldwin, Richard (2014). "WTO 2.0: Governance of 21st century trade". Review of International Organizations. 9(2), 261-283.

Baldwin, Richard, Skudelny, Frauke, Taglioni, Daria. (2005). "Trade effects of the euro: evidence from sectoral data". ECB Working Paper #446

Bergstrand, J.H. (1990), "The Heckscher-Olin-Samuelson Model, the Linder hypothesis and the Determinants of Bilateral Intra-industry Trade," Economic Journal, 100, 1216-29.

Cieslik A. (2006). "International trade under monopolistic competition evidence from polish bilateral trade" data *www.etsg.org/ETSG2006/papers/cieslik.pdf*

Fernandes A. (2006) "Trade Dynamics and the Euro E¤ect: Sector and Country Estimates". University of Essex and IPVC. Unpublished

Flam, Harry & Nordstrom, Hakan (2003) "Trade Volume Effects of the Euro: Aggregate and Sector Estimates", Institute for International Economic Studies unpublished.

Frankel, Jeffrey A. & Rose, Andrew K. (2000). "Estimating the Effect of Currency Unions on Trade and Output," NBER Working Papers 7857, National Bureau of Economic Research, Inc.

Frankel, Jeffrey A. & Stein, Ernesto & Wei, Shang-Jin (1996). "Regional Trading Arrangements," Center for International and Development Economics Research, Working Paper Series qt5hf1z4rv, Center for International and Development Economics Research, Institute for Business and Economic Research, UC Berkeley.

ECORYS (2009) "Non-Tariff Measures in EU-US Trade and Investment – An Economic Analysis". Final Report. ECORUS. Reference: OJ 2007/S 180-219493

Greenaway, David & Milner, Chris, 2002. "Regionalism and Gravity," Scottish Journal of Political Economy, Scottish Economic Society, vol. 49(5), pages 574-85, December.

Francois J. (1999) Estimates of barriers to trade in services. Unpublished

Markusen, James R & Wigle, Randall M. (1990) "Explaining the Volume of North-South Leamer, Edward E. (1992). "Testing Trade Theory," NBER Working Papers 3957, National Bureau of Economic Research, Inc.

Trade," Economic Journal, Royal Economic Society, vol. 100(403), pages 1206-15, December.

Park, Soon-Chan (2002) “Measuring tariff equivalents in cross-border trade in services”. Korea Institute for International Economic Policy. Working Paper 02-15
WTO World Trade Report (2011). “The WTO and preferential trade agreements: From co-existence to coherence” <https://www.wto.org/english/res_e/publications_e/wtr11_e.htm>

ANNEX

Table A.1. The effects of PTAs on sectoral exports, 40 industrialized countries

WIOD sector	Agriculture	Mining	Food	Textiles	Leather	Wood	Pulp&Paper	Coke
tariff	-1.272	-7.06	-3.493	2.198	2.891	-12.662	-8.434	-18.979
	(2.01)*	(2.58)**	(6.44)**	(3.08)**	(4.60)**	(8.45)**	(7.26)**	(5.66)**
VAreporter	0.574	0.773	0.498	0.575	0.925	0.775	0.467	0.256
	(19.42)**	(24.38)**	(26.60)**	(14.61)**	(20.51)**	(9.05)**	(15.89)**	(5.51)**
demandPar	0.453	-0.046	0.331	0.182	0.057	-0.119	0.178	0.301
	(13.84)**	-1.45	(18.16)**	(5.73)**	(2.69)**	-1.29	(7.62)**	(7.02)**
contig	1.536	2.332	1.775	1.916	1.403	2.316	1.985	1.687
	(18.94)**	(15.68)**	(35.46)**	(19.04)**	(17.58)**	(17.99)**	(20.33)**	(18.10)**
d_rgdpc	-0.092	0.046	-0.115	-0.544	-0.256	-0.292	-0.034	-0.11
	(2.99)**	-0.65	(5.47)**	(12.43)**	(9.38)**	(9.07)**	-0.87	(2.52)*
EU	0.636	-0.191	0.626	0.693	0.437	-0.802	0.338	-0.091
	(7.07)**	-1.02	(8.13)**	(7.18)**	(3.90)**	(4.04)**	(3.28)**	-0.68
FTAAwSPS	0.805		0.283					
	(6.91)**		(3.06)**					
FTAAnSPS	-0.555		-0.634					
	(4.03)**		(4.15)**					
FTAIwTBT		0.213		0.928	-0.388	0.185	0.993	0.252
		-1.52		(9.22)**	(2.97)**	-0.85	(9.33)**	-1.82
FTAInTBT		2.385		0.169	0.646	1.353	2.337	0.99
		(11.30)**		(2.05)*	(6.97)**	(5.86)**	(11.30)**	(4.83)**
_cons	-6.132	2.184	-0.405	0.902	-3.247	3.709	3.586	6.21
	(5.96)**	(2.57)*	-0.75	-1.41	(4.53)**	(5.67)**	(6.05)**	(11.24)**
R^2	0.23	0.17	0.42	0.26	0.24	0.24	0.24	0.2
N	10,265	8,408	10,315	9,274	7,740	7,756	9,632	5,649
* $p<0.05$; ** $p<0.01$								

Table A.1. The effects of PTAs on sectoral exports (continued), 40 industrialized countries

WIOD sector	Chemicals	Rubber	Non-metallic	Basic metals	Machinery	Electrical	Transport	Manufacturing	Electricity
tariff	-9.392	-4.037	0.122	-6.537	-4.438	3.155	-12.914	-5.531	-29.535
	(9.20)**	(3.16)**	-0.2	(7.49)**	(4.12)**	(2.80)**	(8.41)**	(3.70)**	(4.95)**
VAreporter	0.59	0.696	0.67	0.466	0.693	0.774	0.609	0.53	0.159
	(25.02)**	(18.93)**	(18.13)**	(19.31)**	(15.23)**	(7.45)**	(12.12)**	(9.67)**	(2.65)**
demandPar	0.264	0.018	0.123	0.297	0.099	0.172	0.209	0.138	0.243
	(10.83)**	-0.44	(4.66)**	(12.98)**	(2.28)*	-1.92	(4.97)**	(2.97)**	(4.18)**
contig	1.338	2.114	2.012	1.935	1.587	1.652	2.003	2.325	1.225
	(22.71)**	(27.19)**	(33.31)**	(30.39)**	(23.54)**	(16.03)**	(23.74)**	(28.26)**	(6.98)**
d_rgdpc	0.092	-0.2	-0.274	-0.101	-0.115	-0.526	-0.144	-0.601	-0.054
	(4.10)**	(4.27)**	(9.32)**	(2.94)**	(3.41)**	(6.63)**	(4.52)**	(7.12)**	-0.47
EU	0.41	0.285	0.198	0.152	-0.222	-0.024	-0.315	-0.597	1.937
	(4.82)**	(2.01)*	(2.53)*	-1.92	(2.12)*	-0.22	(2.01)*	(5.23)**	(8.06)**
FTAAwSPS									
FTAAnSPS									
FTAIwTBT	-0.061	1.014	0.301	0.527	0.483	0.296	0.324	0.307	2.829
	-0.64	(11.95)**	(3.41)**	(5.75)**	(5.50)**	(2.32)*	(2.15)*	(3.17)**	(7.88)**
FTAInTBT	0.523	1.001	-0.426	1.466	-0.259	-0.424	-2.216	-0.608	
	(3.23)**	(7.93)**	(2.68)**	(6.36)**	-1.66	-1.48	(12.72)**	(5.06)**	
_cons	0.303	2.366	-0.22	1.69	1.743	-1.686	1.738	3.485	6.33
	-0.75	(2.91)**	-0.43	(3.40)**	(3.50)**	-1.64	(2.56)*	(3.53)**	(4.31)**
R^2	0.33	0.44	0.36	0.32	0.28	0.16	0.23	0.17	0.32
N	10,226	9,213	8,889	10,502	9,900	9,978	9,285	8,687	748
* p<0.05; ** p<0.01									

Table A.2. The effects of PTAs on sectoral exports, 4 Visegrad countries

WIOD sector	Agriculture	Mining	Food	Textiles	Leather	Wood	Pulp&Paper	Coke
tariff	2.291	-30.959	-1.876	-15.817	-8.282	-8.506	5.523	-5.953
	(5.01)**	(4.38)**	(4.03)**	(12.16)**	(6.75)**	(3.14)**	(3.03)**	-1.03
VAreporter	0.401	0.473	0.577	0.27	0.101	0.424	0.348	0.125
	(11.50)**	(13.79)**	(16.63)**	(7.00)**	(2.63)**	(10.49)**	(11.75)**	(3.54)**
demandPar	0.402	0.073	0.41	0.56	0.532	0.367	0.408	0.139
	(12.98)**	(2.17)*	(15.75)**	(18.60)**	(9.37)**	(14.14)**	(15.77)**	(2.58)**
contig	2.093	2.733	1.943	2.074	1.539	2.286	2.235	2.843
	(24.57)**	(29.33)**	(26.20)**	(26.35)**	(13.42)**	(30.68)**	(29.14)**	(23.59)**
d_rgdpc	-0.28	-0.503	-0.259	-0.562	-0.475	-0.703	-0.24	-0.092
	(7.05)**	(6.96)**	(6.17)**	(11.27)**	(11.15)**	(13.15)**	(5.87)**	-1.1
EU	1.342	0.286	1.329	0.125	1.223	0.874	1.58	1.063
	(13.24)**	(3.17)**	(14.38)**	-1.6	(7.12)**	(10.12)**	(14.66)**	(7.06)**
FTAAwSPS	-2.777		-1.289					
	(5.34)**		(5.77)**					
FTAAnSPS	0.224		0.953					
	-0.55		(3.23)**					
FTAIwTBT		-0.171		0.7	-0.989	0.115	-0.054	-0.755
		-0.37		(3.43)**	(7.14)**	-0.49	-0.25	-1.82
_cons	-2.666	3.688	-5.437	-1.013	2.076	-1.157	-0.88	9.989
	(2.87)**	(4.51)**	(5.71)**	-1.35	(2.11)*	-1.47	-1.23	(6.45)**
R^2	0.52	0.56	0.71	0.75	0.35	0.77	0.73	0.42
N	1,986	1,657	1,985	1,980	1,866	1,746	1,975	1,260

Table A.2. The effects of PTAs on sectoral exports (continued), 4 Visegrad countries

WIOD sector	Chemicals	Rubber	Non-metallic	Basic metals	Machinery	Electrical	Transport	Manufacturing	Electricity
tariff	-4.982	-6.552	-5.883	-11.541	-3.686	-5.729	-8.278	-9.99	-80.001
	(2.59)**	(3.05)**	(4.28)**	(6.93)**	(2.27)*	(3.20)**	(5.03)**	(4.16)**	(3.94)**
VAreporter	0.403	0.4	0.317	0.416	0.452	0.385	0.164	0.535	0.809
	(15.21)**	(11.40)**	(8.47)**	(12.20)**	(11.03)**	(11.29)**	(3.12)**	(10.60)**	(4.68)**
demandPar	0.402	0.542	0.524	0.492	0.551	0.56	0.528	0.496	0.241
	(15.84)**	(16.96)**	(17.18)**	(21.44)**	(17.29)**	(18.79)**	(13.07)**	(17.51)**	(2.06)*
contig	1.715	1.8	1.885	2.062	1.78	1.143	1.2	2.135	1.813
	(25.05)**	(24.26)**	(27.81)**	(33.99)**	(14.17)**	(12.79)**	(10.77)**	(24.32)**	(8.24)**
d_rgdpc	-0.032	-0.213	-0.289	-0.164	-0.404	-0.266	-0.07	-0.795	-0.029
	-0.88	(5.67)**	(7.63)**	(4.05)**	(7.43)**	(6.91)**	-1.38	(13.53)**	-0.19
EU	1.132	1.687	0.868	1.046	1.315	1.77	1.279	0.948	1.424
	(13.12)**	(14.23)**	(9.66)**	(12.66)**	(11.26)**	(15.84)**	(10.49)**	(8.07)**	(4.56)**
FTAAwSPS									
FTAAnSPS									
FTAIwTBT	0.35	0.818	-0.075	0.714	0.837	1.405	1.403	0.871	-4.425
	(2.04)*	(4.67)**	-0.66	(4.15)**	(6.28)**	(10.51)**	(7.13)**	(6.19)**	(10.18)**
_cons	-0.424	-3.999	-2.093	-2.815	-5.042	-3.163	2.794	-5.946	-8.32
	-0.56	(5.57)**	(2.71)**	(3.94)**	(4.85)**	(3.83)**	(2.88)**	(6.67)**	(2.06)*
R^2	0.59	0.78	0.65	0.83	0.41	0.65	0.31	0.79	0.27
N	2,031	1,997	1,994	2,030	1,988	1,893	1,624	1,856	236

* $p<0.05$; ** $p<0.01$

Table A.3. The effects of PTAs on sectoral exports, 40 industrialized countries, nominal GDP as the proxy for the market size

	Agriculture	Mining	Food	Textiles	Leather	Wood	Pulp&Paper	Coke
tariff	2.409	-6.925	0.138	4.07	5.535	-8.615	-3.608	-15.953
	(10.30)**	(2.71)**	-0.46	(4.94)**	(6.59)**	(5.77)**	(5.48)**	(5.59)**
ngdp_rep	0.702	0.439	0.655	0.893	1.054	0.395	0.587	0.533
	(32.42)**	(24.93)**	(52.09)**	(25.38)**	(25.98)**	(13.93)**	(30.44)**	(30.95)**
ngdp_par	0.788	0.73	0.747	0.835	1.026	0.896	0.86	0.7
	(32.45)**	(17.72)**	(59.42)**	(28.54)**	(23.30)**	(27.66)**	(37.15)**	(23.41)**
contig	1.359	2.007	1.231	1.054	0.679	1.932	1.417	1.712
	(26.09)**	(19.03)**	(31.84)**	(17.33)**	(8.78)**	(23.95)**	(25.44)**	(22.53)**
d_rgdpc	-0.078	-0.043	-0.087	-0.819	-0.957	-0.204	0.147	0.01
	(3.08)**	-0.79	(5.48)**	(27.46)**	(20.91)**	(4.33)**	(4.91)**	-0.33
EU	1.02	-0.61	1.58	1.61	1.956	0.183	1.177	0.31
	(19.77)**	(4.97)**	(34.11)**	(14.08)**	(14.74)**	(2.06)*	(24.26)**	(3.45)**
FTAAwSPS	0.907		0.838					
	(12.83)**		(15.14)**					
FTAAnSPS	0.477		0.28					
	(4.34)**		(2.75)**					
FTAIwTBT		0.298		1.124	-0.34	0.925	1.328	0.183
		(2.19)*		(11.99)**	(2.83)**	(7.40)**	(15.61)**	-1.64
FTAInTBT		2.288		-0.048	-0.984	0.894	1.066	0.812
		(12.23)**		-0.11	(2.13)*	(7.48)**	(5.25)**	(5.02)**
_cons	-22.924	-12.91	-19.917	-29.865	-41.15	-18.049	-21.725	-15.205
	(20.07)**	(10.87)**	(33.15)**	(16.95)**	(18.70)**	(14.16)**	(28.41)**	(14.32)**
R^2	0.49	0.32	0.61	0.7	0.7	0.37	0.59	0.32
N	15,123	13,818	15,997	16,391	15,305	14,949	16,041	11,462

* $p<0.05$; ** $p<0.01$

Table A.3. The effects of PTAs on sectoral exports (continued), 40 industrialized countries, nominal GDP as the proxy for the market size

	Chemicals	Rubber	Non-metallic	Basic metals	Machinery	Electrical	Transport	Manufacturing	Electricity
tariff	-7.225	3.391	5.572	-0.665	2.219	10.087	-3.437	8.321	-34.433
	(9.16)**	(2.92)**	(8.21)**	-1.02	(2.97)**	(10.58)**	(5.38)**	(7.73)**	(3.65)**
ngdp_rep	0.759	0.895	0.806	0.69	0.914	0.996	0.91	1.058	0.313
	(49.52)**	(29.69)**	(41.90)**	(43.18)**	(52.81)**	(32.70)**	(38.81)**	(30.26)**	(7.55)**
ngdp_par	0.827	0.86	0.858	0.842	0.972	1.05	1.13	1.182	0.34
	(53.87)**	(27.69)**	(42.69)**	(47.10)**	(44.29)**	(30.91)**	(36.35)**	(29.32)**	(7.48)**
contig	0.943	1.319	1.407	1.47	0.952	0.817	1.153	1.114	1.038
	(21.99)**	(27.17)**	(31.22)**	(38.42)**	(21.24)**	(12.57)**	(18.94)**	(15.66)**	(7.90)**
d_rgdpc	0.25	-0.263	-0.374	-0.074	-0.016	-0.393	0.085	-0.872	-0.069
	(15.09)**	(5.34)**	(12.97)**	(2.56)*	-0.56	(10.02)**	(4.40)**	(21.29)**	-0.63
EU	1.1	1.456	1.226	0.886	0.99	1.138	1.212	1.58	0.569
	(21.66)**	(16.02)**	(20.73)**	(18.80)**	(21.50)**	(14.12)**	(18.69)**	(12.89)**	(2.29)*
FTAAwSPS									
FTAAnSPS									
FTAIwTBT	0.329	1.144	0.627	0.741	0.669	0.884	1.236	0.815	1.297
	(5.19)**	(16.63)**	(12.18)**	(13.32)**	(12.29)**	(10.74)**	(14.83)**	(8.95)**	(4.34)**
FTAInTBT	0.18	0.42	-0.007	0.897	0.241	0.073	-0.605	-0.891	
	-1.48	(2.90)**	-0.02	(5.77)**	-0.82	-0.24	-1.81	(2.40)*	
_cons	-23.728	-30.547	-28.655	-22.81	-32.608	-36.679	-36.567	-44.72	-0.475
	(45.71)**	(18.45)**	(28.13)**	(27.62)**	(32.48)**	(21.72)**	(29.23)**	(22.34)**	-0.32
R^2	0.59	0.56	0.62	0.67	0.62	0.63	0.61	0.77	0.42
N	16,473	16,204	15,584	16,266	16,277	16,425	15,777	16,102	1,050