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THE ROLE OF RULES OF ORIGIN IN EUROPEAN FREE TRADE AGREEMENTS: EVIDENCE FROM CROATIAN MANUFACTURING TRADE

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ABSTRACT

This paper explores the changes in trade activity of Croatian firms involved in manufacturing that are attributable to Croatian regional economic integration processes in the 2000-2012 period. During this period, Croatia signed two important free trade agreements: the Stabilization and Association Agreement (SAA) with the European Union (EU) in 2001 and Central European Free Trade Agreement 2006 (CEFTA). We control for the role of rules of origin in regional trade agreements in view of the fact that Croatia began applying the protocols on the rules of origin which provide for diagonal cumulation (DC) between those CEFTA members involved in the Stabilization and Association Process (SAP) and the EU. The results obtained through the industry-level gravity model, using Croatian trade data in the pre-accession period indicate that SAA had a significant impact on trade creation for both Croatian export and import, while the impact of CEFTA is found to be significantly positive only if the diagonal cumulation of rules of origin is taken into account. Moreover, the results confirm that the cumulation system of rules of origin has heterogeneous impact on trade in final and intermediate goods.

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KEY WORDS: Stabilization and Association Agreement, CEFTA, Croatia, rules of origin, diagonal cumulation system, economic crisis, gravity model

POVZETEK

Članek preučuje spremembe v trgovinskih tokovih hrvaških podjetij, spodbujene z regionalnimi ekonomskimi integracijski procesi Hrvaške v obdobju 2000 – 2012. V tem obdobju je Hrvaška podpisala dva pomembna sporazuma o prosti trgovini in sicer stabilizacijsko-pridružitveni sporazum (Stabilization and Association Agreement – SAA) z Evropsko unijo (EU) leta 2001 in leta 2006 trgovinski sporazum CEFTA (Central European Free Trade Agreement). V članku bova proučevala vlogo pravil o poreklu v regionalnih trgovinskih sporazumih glede na dejstvo, da je Hrvaška začela izvajati protokole o pravilih o poreklu, ki zagotavljajo diagonalno kumulacijo (DC) med članicami CEFTA, ki sodelujejo v stabilizacijsko-pridružitvenem procesu (SAP), in EU. Rezultati gravitacijskega modela na panožnih podatkih kažejo, da je imel SAA velik vpliv na ustvarjanje trga za hrvaški izvoz in uvoz, med tem ko je imel CEFTA sporazum pozitiven vpliv zgolj v primeru izvajanja sistema diagonalne kumulacije pravil o poreklu. Rezultati tudi potrjujejo, da ima sistem kumulacije pravil o poreklu blaga različen vpliv na trgovanje s končnimi in vmesnimi proizvodi.

KLJUČNE BESEDE: Stabilizacijsko-pridružitveni sporazum, CEFTA, Hrvaška, pravila o poreklu, sistem diagonalne kumulacije pravil o poreklu, gospodarska kriza, gravitacijski model

INTRODUCTION

The formation of regional trade agreements (RTAs) has been undoubtedly the most popular form of reciprocal trade liberalization in the past two decades. According to the World Trade Organisation,[3] the number of active RTAs raised from around 120 in force in 1995 to 413 agreements by the end of 2015. Transition economies are active participants in the regionalism movement; they are involved in 47 out of 95 RTAs that entered into force

[3] https://www.wto.org/english/tratop_e/region_e/region_e.htm, accessed in January 2016.

from 1995 to 2005 (Crawford and Fiorentiono, 2005). The Croatian regional integration processes in the pre-EU accession period are characterized by two important RTAs: Stabilization and Association Agreement (SAA) between the EU and the Republic of Croatia (2001) and Central European Free Trade Agreement (CEFTA 2006). CEFTA 2006 is a successor of CEFTA, which was originally created by Poland, Hungary, Czech Republic and Slovakia in 1992. The main goal of CEFTA was to foster regional economic ties between its members to facilitate EU integration. In line with this, CEFTA 2006 was signed by Albania, Bosnia and Herzegovina, Croatia, Moldova, Serbia, Montenegro and Kosovo, which all have EU aspirations (Croatia joined the EU in 2013; Official Journal of the European Union, L 112, 2012).

In this paper we aim to test the effects of regional economic integrations, in our case SAA and CEFTA, on the development of Croatian trade with special emphasis on the role of the rules of origin. The rules of origin are vital part of any free trade agreement as they define which products shall benefit from agreed preferences. Preferential rates of duty, i.e. reduced rates or zero rates, may only be claimed on imports of goods with the preferential origin from the partners in the RTA. Preferential origin is conferred on goods from particular countries when they have fulfilled certain criteria, usually demanding that goods undergo certain level of working or processing or to be wholly obtained goods. The main justification for rules of origin is to prevent trade deflection, whereby products from non-participating countries destined for one of the partners' market are redirected through other partners in the trade agreements (Brenton and Manchin, 2003). Additionally, the conditions for obtaining the preferential origin and, thus, to benefit from preferential access to the partner countries market are determined by the system of cumulation of rules of origin. Cumulation allows producers to import inputs from a specific country or group of countries without undermining the origin of the final product. There are different systems of cumulation; however the most common are the bilateral and the diagonal systems of cumulation. While bilateral cumulation takes place between two partner countries, the diagonal cumulation operates between more than two countries, provided they have

RTAs containing identical origin rules and provisions for cumulation between them (Augier, Gasiorek and Lai-Tong, 2005). Diagonal cumulation of rules of origin is, hence, an instrument to further enhance trade amongst participating countries.[4]

The majority of literature in this field argues that the lack of cumulation of rules of origin may act as a constraint on trade between non-cumulating as opposed to cumulating nations, e.g. Brenton and Manchin (2003). Empirical studies for the Pan-European-Mediterranean, or the "PanEuroMed" system of cumulation between the EU, EFTA and Mediterranean countries provide evidence on the significant importance of the rules of origin, and in particular of the cumulation system for estimated effects of RTAs. The Sussex European Institute (2003) found that the trade flows between partner countries which did not allow diagonal cumulation of origin with the European Economic Area (EU-+EFTA) were up to 40 – 45% lower than those between partner countries which allowed diagonal cumulation. Similarly Augier, Gasiorek and Lai-Tong (2005) confirmed that the rules of origin do indeed restrict trade, and that cumulation of such rules could increase trade by around 50%.

Up until 2009, EU trading arrangements with Western Balkan Countries (WBCs), i.e. the Stabilisation and Association Agreements (SAAs) and autonomous trade preferences, were characterised by the lack of diagonal cumulation. With the announcement of the Commission in March 2009,[5] diagonal cumulation of origin between the EU, WBCs and Turkey started being im-

4 Additionally to bilateral and diagonal, the EU also applies full cumulation principle, for instance between the European Economic Area (EEA) partners in the context of the pan-European cumulation origin rules or on the basis of some of the protocols with Tunisia, Morocco and Algeria. Full cumulation means that all operations carried out in the participating countries are taken into account when assessing the final origin. It does not require that the goods be originating in one of the partner countries before being exported for further working or processing in other partners but it does require that all the working or processing necessary to confer origin is carried out on the product.

5 The announcement of the Commission concerning preferential agreements providing for diagonal cumulation of origin between the Community, Western Balkan countries and Turkey was published in the 'C' series of the Official Journal of the European Union on 17th of March 2009 (2009/C 62/07) and represents the basis for initializing the implementation of the diagonal cumulation system in trade between the Community, Western Balkan countries and Turkey. (http://www.cs.mfcr.cz/NR/rdonlyres/F31ED165-545F-407C-A638-622BE1B8AE11/0/balkan_oznameni_en.pdf).

plemented. Croatia started to implement diagonal cumulation protocols between CEFTA members involved in the Stabilisation and Association Process (SAP) and the EU as late as in 2011. Due to its delayed implementation of the diagonal cumulation system, Croatia serves as a suitable example for the study of the role of rules of origin in the free trade agreements.

In comparison to the diagonal cumulation system, the bilateral system is more restrictive in terms of firm behaviour, especially in terms of firms' decisions on sourcing inputs. In case of a bilateral cumulation in EU trading arrangements, a producer of final goods from e.g. Croatia, which has been sourcing intermediates from non-EU countries (for instance, from other WBCs) has to weigh up possible cost savings gained from importing inputs from non-EU countries and the savings gained from preferential access to the EU market. According to Augier, Gasiorek and Lai-Tong (2005), the possible outcomes in such a situation may be: (i) the final producers may choose not to change the source of supply, and thus do not meet the origin requirement and do not have preferential treatment in the EU or (ii) they may decide to change the supplier by either sourcing a greater proportion domestically (trade suppression effect), or sourcing a greater proportion from the EU (trade diversion effect). Both trade suppression and trade diversion have a negative impact on the national welfare of the countries from the WB region, because these effects imply redirection to less efficient supply sources than in case of a diagonal cumulation system.

The system of cumulation of rules of origin, therefore, bears implications for the structure of suppliers providing intermediate goods, and thereby also affects trade and production patterns. We expect that the effects of the SAA and CEFTA on the development of mutual production links between the firms from the WB region oriented towards supplying EU markets have been less evident prior to the implementation of the provision for diagonal cumulation system than after it as inputs from other WB countries were treated as "external" imports. Furthermore, we argue that the implementation of the diagonal cumulation of the rules of origin has, in terms of network trade patterns, reflected

itself differently for the intermediate and for the final group of products.

In our research we test the trade creating effect caused by SAA and CEFTA agreements on Croatian trade in manufactures and explore the role of the cumulation system of the rules of origin contained in these agreements. We are interested to see whether the diagonal cumulation of origin between CEFTA members involved in the Stabilisation and Association Process (SAP) on one side and the EU members, on the other, additionally boosts exports of the Croatian manufacturing sector. To test the prediction that the impact of the cumulation system on trade is heterogeneous in terms of final and intermediate goods, we conduct separate analyses for trade in intermediates, consumption goods and capital goods as defined by the Broad Economic Categories (BEC) classification.

In our empirical analysis we use the trade gravity model. The gravity equation for international trade analysis was introduced by Tinbergen in 1962 and has later become a standard tool in the analysis of bilateral trade flows due to its excellent explicative power. The gravity trade model is generally used for ex-post estimation of the impacts different trade policies and trade distortions have on bilateral trade (Anderson and van Wincoop, 2004). An expanded version of the model, the augmented gravity model, emerged with the primary aim of capturing effects of ever-wider set of trade policy options.

The studies of free trade agreements (FTA) effects based on the gravity model predominantly use country level data that include dummies for virtually every FTA that has been signed since 1960s (e.g. Frankel, Stein and Wie, 1996; Baier and Bergstrand, 2007; Magee, 2008; Vicard, 2009; Eicher, Henn and Papageorgiou, 2012; Baier et al., 2014). In general, these studies confirm that FTAs impact trade creation among partner countries, while the evidence on trade diversion effects is more mixed. Reviewing a large set of empirical studies and employing a meta-analysis approach, Cipollina and Salvatici (2010) establish a robust, positive FTA effect of over 30% increase in trade, which continues increasing in the last years, marked by the dominance of deep and comprehensive agreements.

Gravity model studies from 2000-on, apart from country-level data, started performing econometric analysis using industry-, firm- and transaction-level data. When it comes to gravity model estimations using industry level data, Chen and Novy (2011) find a substantial degree of heterogeneity across industries in terms of the elasticity of substitution and the degree of trade integration (degree of trade integration is industry specific). Moreover, they find that cross-country trade integration is lower for new EU member states (EU-10) while cross-border trade significantly depends on transportation costs. Using industry level trade data for South Korea, Sohn (2005) finds that the Asia-Pacific Economic Cooperation significantly impacts Korea's trade volume.

In this paper we estimate the augmented gravity model using industry level data on Croatian bilateral trade with 39 major trade partner countries in the 2000 - 2012 period. Apart from regional integration, the second part of this period is characterized by the 2008 financial crisis which led to European sovereign debt crisis. A sharp drop in economic activity was particularly noticed in Croatia, where, in the period from 2008 to 2012, manufacturing sector lost more than 50.000 jobs (around 17% of the total workforce in manufacturing) and the number of firms decreased by 2.650 (around 11% of all firms in manufacturing) (Croatia Bureau of Statistics – CBS, 2015).

The rest of the paper is structured as follows: the second chapter gives an overview of Croatian pre-accession trade developments; the third chapter describes the data used in empirical analysis, derives gravity model specifications, and discusses methodological issues of gravity model estimations; the fourth chapter presents and discusses obtained results, and the final chapter concludes and gives guidelines for future research.

OVERVIEW OF CROATIAN MANUFACTURING TRADE PATTERNS

The manufacturing sector is an important part of the Croatian economy that has experienced a discernible downward trend from 2000 (Table 1). A similar trend is also evident at the EU level. However, it should be noted that unlike others', Germa-

ny's gross added value remained fairly constant throughout the non-crisis period.

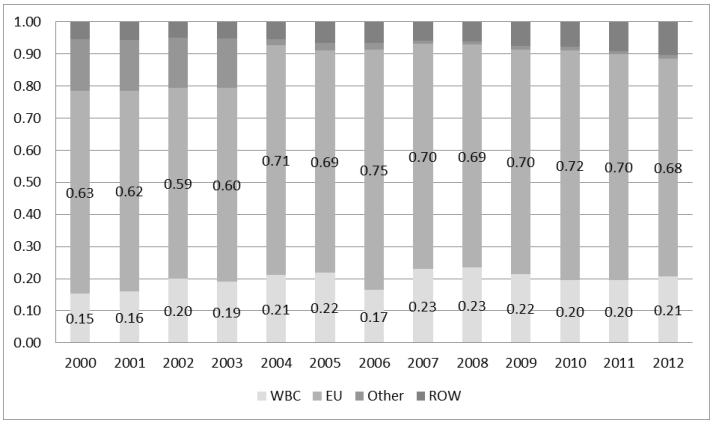
Table 1: Gross added value of the manufacturing sector for selected countries/ group of countries, from 2000 to 2012 (as a % of GDP)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
EU28	16.8	16.4	15.9	15.5	15.3	15	14.9	14.9	14.5	13.3	13.8	14.1	13.8
EU15	16.8	16.4	15.8	15.4	15.1	14.8	14.7	14.6	14.2	13	13.5	13.7	13.5
Eurozone	17.4	17.1	16.6	16.2	16	15.7	15.7	15.7	15.1	13.7	14.4	14.6	14.5
Germany	20.6	20.4	19.8	19.9	20.1	20.2	20.8	20.9	20.1	17.7	19.8	20.4	20.3
Croatia	14.8	14.7	14.4	13.9	13.8	13.2	12.9	12.9	12.9	12.5	12.1	12.4	12.3

Source: Eurostat, 2015

Throughout the observed period, the manufacturing sector was significantly export-oriented. Manufacturing products represent more than three quarters of Croatian merchandise exports and around 40% of its imports. Out of the total value of manufacturing sector production in 2012, 46% was exported. This is a substantial increase from 2008, when 32% of the value was exported (CBS, 2015), even though this was the year in which the total value of manufacturing production was at its peak which has not been surpassed.

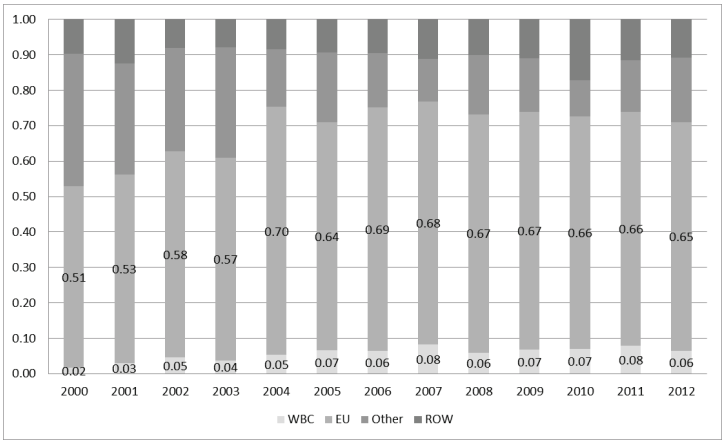
Figure 1: Regional structure of Croatian export of manufacturing products (2000-2012)[6]



Source: Authors' calculations using data from the Croatian Bureau of Statistics, 2014

[6] The acronyms in Figures 1 to 6 stand for: WBC – Western Balkans countries (Albania, Bosnia and Herzegovina, Croatia, Montenegro, Serbia); EU – European Union countries; Other – European countries that are neither WBC or EU; ROW – Rest of the World countries included in our sample (see subchapter 3.1)

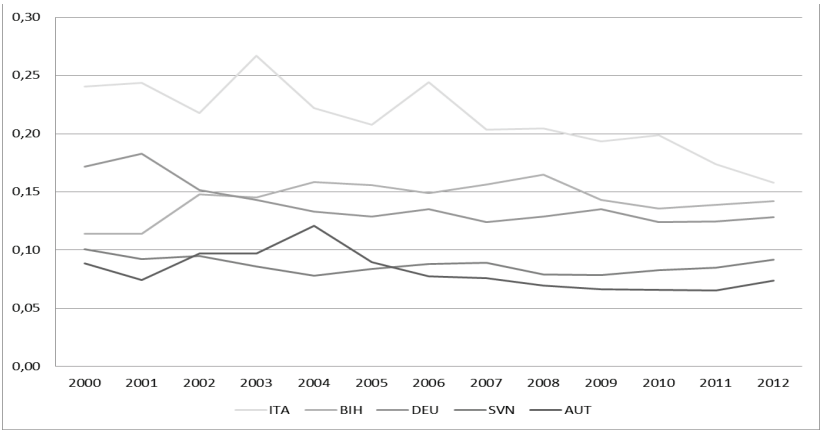
Figure 2: Regional dispersion of Croatian import of manufacturing products (2000-2012)



Source: Authors' calculations using data from the Croatian Bureau of Statistics, 2014

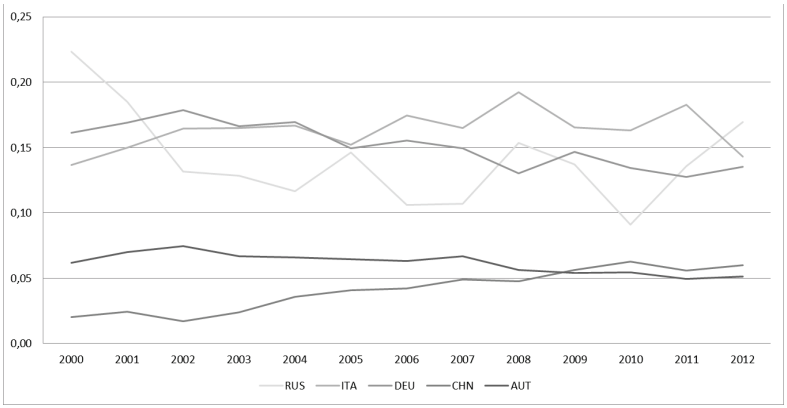
The geographical orientation of both exports and imports did not changed significantly throughout the 2000-2012 period (Figures 1 and 2). The EU is Croatia's major trading partner, as 68% of its exports was destined to the EU in 2012, and 64% of imports came from EU members. In view of the regional structure of trade, it should be noted that the share of the top 5 export destinations has decreased in the observed period (Figure 3), and that there is a growing trend of imports from China (Figure 4). Moreover, the imports of WBC gained on importance during the 2000-2007 period.

Figure 3: Croatian manufacturing exports to the top 5 export markets (2000-2012)



Source: Authors' calculations using data from the Croatian Bureau of Statistics, 2014

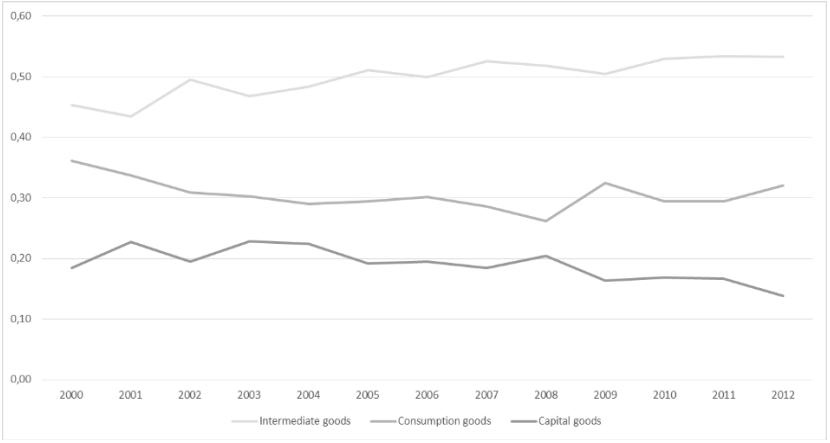
Figure 4: Croatian manufacturing imports from the top 5 import markets (2000-2012)



Source: Authors' calculations using data from the Croatian Bureau of Statistics, 2014

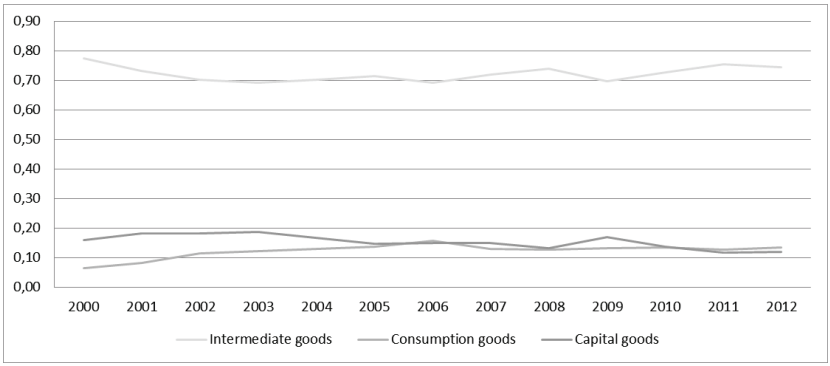
Croatian manufacturing sector is heavily oriented towards trade in intermediates (Figures 5 and 6) - more than 50% of manufacturing exports and more than 70% of imports are intermediates. The share of capital goods is relatively low and diminishing, which is not encouraging, knowing that trade in capital goods is a potential channel through which firms/industries can increase their competitiveness (through technology spill-overs) as noted by Eaton and Kortum (2001).

Figure 5: Structure of Croatian export of manufacturing products according to the BEC classification, from 2000 to 2012



Source: Authors' calculations using data from the Croatian Bureau of Statistics, 2014

Figure 6: Structure of Croatian import of manufacturing products according to the BEC classification (2000-2012)



Source: Authors' calculations using data from the Croatian Bureau of Statistics, 2014

METHODOLOGY AND DATA

This chapter presents the data and methodology used to explain the role of RTAs in the trade patterns of the Croatian manufacturing sector during the observed period.

First, we describe our database, and then proceed by explaining the model, and addressing some methodological issues.

Data

The data used in the analysis is obtained from the Croatian Bureau of Statistics. It includes industry-level data (NACE level 2) on export and import of manufacturing products for Croatian firms from 2000 to 2012. The sample includes bilateral trade flows between Croatian the manufacturing sector (division 10 to 33) and 39 countries and represents more than 90% of total export from Croatia during the observed period (EU-27, CEFTA countries, the Unites States, Turkey, China, Switzerland, South Korea, Japan). Furthermore, industry-level trade flows were grouped into three BEC product categories: intermediates, consumption and capital goods. The data on the nominal GDP of destination/origin countries were taken from Eurostat. The dummy variables for free trade agreements (SAA and CEFTA) and the application of the protocols on rules of origin providing diagonal cumulation

(DC) between Croatia and other CEFTA countries with EU were based according to official journal data.

Gravity model specification

The gravity model was first developed as an empirical model of bilateral trade flows. It has later on been continually methodologically updated, since the original model lacked micro-foundations and was not consistent with the prevailing theories of that time (e.g. Heckscher-Ohlin theory). First, Linnemann (1966), developed the augmented gravity model which included population as a measure of country size. Then other papers started including different right hand side variables (RHS) such as per capita income, common language, common currency, historical ties (like colonial links, wars, etc.). The primary aim of each specification of the gravity model was to capture supply and demand structures of the exporter and importer, respectively. In 1985, Bergstrand introduced price indexes and exchange rate variables into the gravity equation, and in 1990, monopolistic competition, assuming that countries specialize in specific product varieties. One the most important methodological contributions came from Anderson and van Wincoop (2003), which will be addressed later on (see equation [2]).

From the econometric point of view, standard estimation of cross-sectional data that prevailed in 1990s, was substituted for panel data analysis using fixed effects (Cheng & Wall, 2005). Apart from the fact that panel data become more available, this change resulted in the possibility to control for heterogeneity between trading pairs and to allow for unobserved and/or misspecified factors that explain trade flows (see term Ω_{ijt} in equation [1]).

The gravity equation in multiplicative form is formulated as follows:

$$X_{ijt} = GS_{it}M_{jt}\Omega_{ijt} \quad , \quad [1]$$

where X_{ijt} is the monetary value of exports/imports/total trade from country "i" (or, alternatively, firm or industry) to country "j" in time "t". Sit includes exporter-specific factors (usually gross

domestic product), effectively representing the supply of exports (in general equilibrium context of the gravity model), whereas M_{jt} importer-specific factors (again, gross domestic product), effectively presenting the demand for imports of the destination market "j" in time "t". The last term, Ω_{ijt}, denotes the ease of access to market "j" for exporter "i". Equation [1] could be considered as a naive form of gravity equation. The more recent approach is to include fixed effects for exporter and importer, which are, in case of panel data, time varying, e.g. exporter-year and importer-year specific effects.

We follow the approach of Anderson and van Wincoop (2003) and include multilateral resistance terms (MRT) which take into consideration the trade resistance between countries. However, as their original approach is technically demanding and is very rarely followed empirically, we use country-year fixed effects to account for MRT. The main idea is that bilateral trade flows between trading partners "i" and "j" depend on multilateral resistance, i.e. they are dependent of all other trading partners of these two countries. Their formulation of the gravity equation, which is the basis for almost all subsequent papers using gravity models in order to explain bilateral trade flows, is as follows:

$$X_{ijt} = \frac{Y_{it}Y_{jt}}{Y_t}\left(\frac{t_{ijt}}{\pi_{it}P_{jt}}\right)^{1-\sigma}, \quad [2]$$

where Y_{it} and Y_{jt} stand for particular countries' GDP and Y_t for the world aggregate GDP, while t_{ijt} stands for the tariff equivalent of overall trade costs. Elasticity of substitution between goods is represented with σ, while π_{it} and P_{jt} represent multilateral resistance terms (in other words – exporter and importer ease of market access). In practice, importer and exporter fixed effects (dummy variables) are used to capture multilateral resistance terms. Since we dispose of panel data, we use country-year dummies in order to avoid the "gold medal mistake" in estimating the gravity model, as suggested by Baldwin and Taglioni (2006). Since one side of our dyadic relationships is always fixed (Croatia as an exporter or an importer), we use only time varying fixed effects of the trading partners, i.e. time varying country dummies.

As a results, our gravity model specification at industry level is the following:

$$x_{kjt} = \alpha_0 + \beta_1 gdp_{jt} + \beta_2 dist_j + \beta_3 contig_j + \beta_4 saa_{jt} + \beta_5 cefta_{jt} + \beta_6 diag\_cumulation_{jt} + \beta_7 cefta_{jt}\ X\ diag\_cumulation_{jt} + \sum \beta_{8.kt} dindustry_k\ X\ dyear_t + \sum \beta_{9.jt} dcountry_j\ X\ dyear_t + \varepsilon_{kjt}$$

[3]

where values for all continuous variables are expressed in logs and where x_{kjt} stands for exports (imports) of an industry division "k" (NACE divisions 10 to 33) to (from) country "j" in year "t". The notation for the other variables is as follows: gdp_{jt} stands for the nominal GDP of the trading partner, $dist_j$ stands for the distance between Croatia's capital city and the capitals of partner countries, while $contig_j$ stands for contiguity and its value is 1 if the partner country borders by land with Croatia and 0 if it does not. The variables saa_{jt} and $cefta_{jt}$ are dummy variables with the value of 1 if these agreements are in force for Croatia and 0 if not. The two free trade agreements (FTAs) are used as proxies for variable trade costs, and therefore we expect positive signs for saa_{jt} and $cefta_{jt}$ coefficients. The variable $diag\_cumulation_{jt}$ is also a dummy variable that controls for the diagonal cumulation system of rules of origin among Croatia, WBCs and the EU. In the case of export gravity model specifications in [3], the cumulation dummy variable takes value 1 when the partner country has a free trade agreement with the EU and when there is no diagonal cumulation allowed between Croatia and the respective partner country. Otherwise, the value equals 0. In fact, we test for the potential trade diverting effects caused by the lack of diagonal cumulation of rules of origin between Croatia, WBCs and the EU.

In the case of import gravity model specification of (3) cumulation dummy variable takes the value 1 when Croatia has free trade agreement with the EU but cannot cumulate with the partner country. Furthermore, by including an interaction term between $cefta_{jt}$ and $diag\_cumulation_{jt}$ ($cefta_{jt} \times diag\_cumulation_{jt}$) we test whether eventual trade creating effects caused by the CEFTA agreement are reinforced when diagonal cumulation system of

rules of origin between Croatia, WBCs (CEFTA members) and the EU is implemented.

The adoption of protocols enabling diagonal cumulation should additionally positively affect exports, since theoretical predictions suggest that one's inclusion into the system of diagonal cumulation leads to a trade creation, resulting from the switch from less efficient domestic sources towards imports from cumulating nations, e.g. in our case we expect that other CEFTA members will increase their demand for Croatian imports. The diagonal cumulation should also contribute to trade reorientation, fostering the trade with other partners included in the diagonal cumulation system. Hence, we expect a negative coefficient for the interaction term $cefta_{jt} \times diag\_cumulation_{jt}$, as potential trade creation effects are reduced due to the lack of diagonal cumulation, i.e. when the $cefta_{jt} \times diag\_cumulation_{jt}$ dummy variables takes the value 1.

In our main setting under [3], we control for time varying partner country effects, as well as for time varying industry effects ($\Sigma\, dindustry_k \times dyear_t$ *and* $\Sigma\, dcountry_j \times dyear_t$ respectively).

Since all continuous variables are in logs, the estimated coefficients can be interpreted as elasticities. The coefficients for the dummies need to be transformed in order to be interpreted as elasticities using the following transformation: $(e^a - 1)$, where "a" is the estimated coefficient for the dummy variable. The transformed term needs to be multiplied by 100 in order to get the percentage change.

Methodological issues

The panel data setting allows us to apply the fixed effects (FEM) and random effects (REM) models and to control for economic and other country-pair-specific factors that do not change over time. The Hausman test is most commonly used to test which of the estimates is more suitable (Clark and Linzer, 2015). High values of the Hausman χ^2 statistics reject the null hypothesis, i.e. that individual specific effects are not correlated with ex-

planatory variables, which is one of the assumptions of REM (see Table 2). Low values of the Hausman's statistics thus favour REM. Since the Hausman's test is valid only under homoscedasticity, we applied the test of over-identifying restrictions to see which of the two estimations is more suitable (results of the test of overidentifying restrictions are available upon request). The logic behind to test is the following: (*i*) the FEM uses orthogonality conditions where the regressors (X_{it}) are uncorrelated with the idiosyncratic error term – e_{it}, therefore, the expected value of $X_{it} \cdot e_{it}$ equals zero; (ii) the REM uses additional (over-identifying restrictions) orthogonality conditions where the regressors are uncorrelated with the group-specific-time-invariant error term - u_i, therefore the expected value of $X_{it} \cdot u_i$ equals zero.

Table 2: Results of the Hausman test for the model under [3]

	All goods (exports)	All goods (imports)
Degrees of freedom	**430**	**432**
χ^2 statistics	**1521.13**	**3143.63**
p-value	**0.000**	**0.000**

Source: Authors' estimations

Upon performing both tests in Stata 13 statistical package (following the artificial regression approach described by Arellano (1993) and Woolridge (2002)), we opted for FEM. Therefore, our model is structured as follows:

$$y_{it} = \alpha + x_{it}\beta_k + z_i\delta + u_i + \varepsilon_{it} \quad [4]$$

where the individual-specific (and time-invariant) effect (u_i) is potentially correlated with regressors. Due to the demeaning, time-invariant variables (z_i) such as distance and contiguity are removed as well as the time-invariant characteristics. In order to obtain δ coefficients, we regress residuals, obtained after applying FEM, on distance and contiguity. The term ε_{it} stands for idiosyncratic error term.

The next issue that arises in our estimation is the problem of endogeneity. Contrary to exogenous variables, endogenous vari-

ables are systematically affected by the changes in other variables within the model. In particular, among the gravity equation variables, the RTA and cumulation dummies are subject to increased scrutiny from the econometric point of view, which is based on the fact that RTAs are likely to occur among countries that are historically, geographically or politically linked and have strong trade relations (Baier & Bergstrand, 2007; Kepaptsoglou et al. 2010). To reduce the risk of endogeneity in our specifications, the RTA and cumulation variables are entered in the model in their lagged forms. Furthermore, the estimations under [2] are obtained through the clustering on the panel variable *nkd_iso*, i.e. industry division and trading partner), and are therefore robust to cross-sectional heteroscedasticity and serial correlation.

When looking at the potential interaction effects between CEFTA and the cumulation dummy, we employ both the pooled ordinary least squares (OLS) and the fixed effects (FE) estimations to see if the correlation between independent variables and the unobserved effect impacts our estimations ($x_{it}\beta_k$ and u_i in equation [3], respectively). Generally, if they are correlated $[cov(x_{it}\beta_k, u_i) \neq 0]$, the estimation of β_k with the OLS estimator will be biased. This bias will be negative if the correlation is negative and vice versa. In our case, the correlation is positive, i.e. there is an upward bias in estimated coefficients.

RESULTS OF THE EMPIRICAL ANALYSIS AND DISCUSSION

The coefficients obtained by estimating equation [3] represent the elasticity of average exports across industry divisions with respect to the change in one of the RHS variables while holding other RHS variables constant. The results of the FE estimations are presented in Table 3, while the results of the estimations of the time-invariant variable coefficients, obtained after regressing FE residuals on distance and contiguity dummy variables are shown in Table 4.

The coefficients of standard explanatory variables of the gravity equation have the expected sign and are highly significant for all manufacturing goods exported and imported (without differ-

entiating across different product groups) and are presented in Tables 3 and 4. According to the results, manufacturing exports and imports across industries are significantly affected by increase in partners(s) Gross Domestic Product (GDP). Furthermore, export flows exhibit negative elasticity to distance. Namely, a one-percent longer distance from Croatia is, on average, associated with more than a two-percent drop in bilateral exports, with all other variables held fixed. The dependence of import flows on distance is around one percent (Table 4). The sign and size of the contiguity variable coefficient is as expected – the coefficient is larger for exports than for imports since Croatia's top export markets are geographically more concentrated than import markets. Furthermore, Croatia mainly exports labour intensive industry products to countries in the region that are on a lower level of economic development then those countries Croatia imports from.

Our results confirm that the impact of the SAA on Croatian trade is positive and significant. The trade creation effect is stronger for manufacturing imports (Croatian import increased by 87% on average while the value of exports increased by 47%). Contrary to SAA effect, we fail to find evidence of the trade creating effect of CEFTA membership; the estimated coefficient is found to be insignificant (see specifications (1) and (4) in Table 3). However, when accounting for rules of origin and their cumulation in specifications (2), (3), (5) and (6), the coefficient of the created interaction variable between CEFTA and the diagonal cumulation variable proves to be significant and negative especially in view of import specifications. This indicates that diagonal cumulation between Croatia, WBC and EU strengthens the trade creation effect achieved by CEFTA. Therefore, the lack of diagonal cumulation hinders expected positive impacts. Our results show, especially when it comes to imports, that the cumulation of the rules of origin between Croatia, other WBCs and the EU is crucial to reaping the benefits of CEFTA. One of the explanations for this may be in that diagonal cumulation stimulated Croatian firms to build regional production networks, i.e. to import inputs from the WB region, and to export final products to European markets.

Table 3 Gravity model results for all manufacturing goods exported and imported at industry level, 2000-2012, POLS and FE estimator

	Exports FE (1)	Exports POLS (2)	Exports FE (3)	Imports FE (4)	Imports POLS (5)	Imports FE (6)
GDP	1.787***			1.569***		
	(0.419)			(0.223)		
saa (-1)	0.383*	1.840***	1.022***	0.625***	2.111***	0.819**
	(0.214)	(0.473)	(0.292)	(0.232)	(0.692)	(0.320)
cefta (-1)	-0.0509	2.115**	-0.115	0.647	6.166***	1.559**
	(0.601)	(1.039)	(0.735)	(0.654)	(1.434)	(0.762)
diag_ cumulation (-1)		1.173*	1.380***		0.648	0.257
		(0.695)	(0.429)		(0.634)	(0.290)
cefta *X* diag_ cumulation		-2.140*	-1.223		-5.353***	-1.426**
		(1.092)	(1.132)		(1.620)	(0.602)
Constant	-33.32***	12.40***	12.20***	-28.01***	15.63***	12.56***
	(10.79)	(0.763)	(0.166)	(5.814)	(0.701)	(0.158)
Country-time FE	YES	YES	YES	YES	YES	YES
Industry FE	NO	YES	NO	NO	YES	NO
Observations	8,780	8,780	8,780	9,322	9,322	9,322
R-squared	0.155	0.551	0.157	0.207	0.587	0.207
Number of nkd_iso	883		883	905		905

Source: Authors' estimations

Notes: we use different definitions of cumulation variable for exports and imports, as discussed in subchapter 3.2.
Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 4: Estimates of the time-invariant variables - gravity regression results for all manufacturing goods exported and imported at industry level, 2000-2012, POLS estimator

	(1) FE residuals Exports	(2) FE residuals Imports
Distance	**-2.502*****	**-1.945*****
	(0.121)	**(0.0876)**
Contiguity	**2.665*****	**1.681*****
	(0.428)	**(0.245)**
Constant	**16.79*****	**13.29*****
	(0.878)	**(0.624)**
Observations	**8,780**	**9,322**
R-squared	**0.459**	**0.549**

Source: Authors' estimations

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

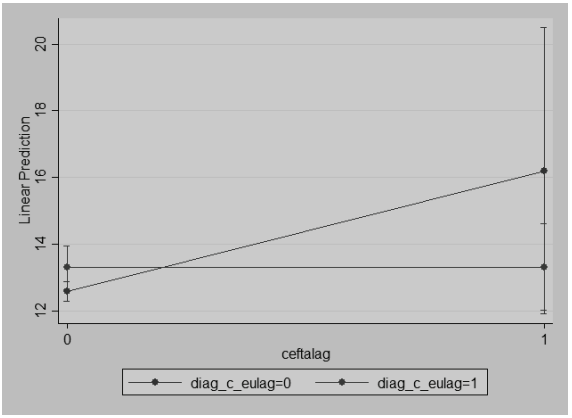
To test the above explanation we run gravity models separately across three different BEC product categories: intermediates, consumer goods and capital goods (Table 5). While the impact of CEFTA on exports proves to be insignificant for all three categories of goods, the heterogeneous impact of the rules of origin across different product groups is confirmed for import flows. The coefficient of the interaction term between CEFTA and the cumulation dummy is found to be significant and negative for imports of intermediate and capital goods, which indicates that the lack of diagonal cumulation prior to 2011 prevented Croatian firms to fully exploit the supply-chain trade creating potential of the CEFTA agreement.

We thus argue that implementation of the diagonal cumulation of the rules of origin has a different impact on trade patterns across product groups. The trade patterns for the import of intermediates and capital goods are found to be more sensitive to diagonal cumulation. Diagonal cumulation affects increases trade flows by almost 100%[7] on average for imports of intermediates and capital goods. Graphical presentation of the effect of the

[7] $(e^{-3.6} - 1) \cdot 100$

CEFTA-cumulation interaction term on import of intermediates is shown in Figure 7. The slope of the steeper line is equal to -3.6 and it represents the value of import trade flow changes when the value of lagged CEFTA variable is one while the value of the lagged cumulation dummy is equals zero.

Figure 7: Predictive margins of the interaction term



Source: Authors' graphical presentation of the results in Table 5, column 4

When interpreting results, one needs to keep in mind the severity of the global financial crisis in 2008 which hit the real sector as well. International trade collapse happened only a year after the CEFTA agreement was fully in force (Behrens, Corcos, and Mion, 2013). From that point on, a continuous decline of the manufacturing sector in terms of production level is noted. The effects of the crisis are picked up by time-varying country fixed effects in our specifications, which tend to be negative in the crisis years suggesting that negative macroeconomic surroundings caused by the crisis have dampened the effects of regional trade liberalization caused by CEFTA

All in all, the SAA can be singled out as the most important agreement that affected Croatian trade flows at industry level during the observed period. Moreover, the Croatian import of manufacturing goods from EU member states increased two times more than its export which contributed to the decline in the manufacturing sector's share of value added in GDP. It should be noted that the coefficient estimates for the SAA variable are

within one standard deviation from the mean value of the RTA coefficient estimate as reported in Head & Mayer (2013).[8]

Table 5: Gravity model results for manufacturing goods exported and imported at industry level (BEC classification of product groups), 2000-2012, FE estimator

	(1) lnexp BEC1	(2) lnexp BEC2	(3) lnexp BEC3	(4) lnimp BEC1	(5) lnimp BEC2	(6) lnimp BEC3
saa (-1)	0.807**	1.175***	0.0870	1.267***	0.699**	1.009***
	(0.315)	(0.283)	(0.369)	(0.316)	(0.320)	(0.308)
cefta (-1)	0.0497	-0.235	0.234	3.617***	0.0273	2.732**
	(0.730)	(0.615)	(0.967)	(1.146)	(0.766)	(1.083)
diag_cumulation (-1)	0.448	0.787**	0.462	0.713***	0.0722	0.653**
	(0.450)	(0.377)	(0.491)	(0.268)	(0.268)	(0.277)
cefta X diag_cumulation	-0.360	-0.0194	0.00806	-3.591***	0.119	-3.379***
	(0.560)	(0.559)	(0.717)	(0.728)	(0.628)	(0.961)
Constant	10.36***	11.25***	11.48***	10.66***	11.32***	11.57***
	(0.714)	(0.886)	(0.676)	(0.585)	(1.214)	(0.798)
Country-time FE	YES	YES	YES	YES	YES	YES
Industry-time FE	YES	YES	YES	YES	YES	YES
Observations	7,895	5,880	4,696	8,916	7,187	6,704
R-squared	0.217	0.259	0.275	0.264	0.229	0.247
Number of nkd_iso	862	777	645	876	774	738

Source: Authors' estimations

Note: we used different definitions of cumulation variable for exports and imports, as discussed in subchapter 3.1. BEC1 = Intermediate goods; BEC2 = Consumption goods; BEC3 = Capital goods. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

[8] As reported by Head & Mayer (2013) the mean value for the RTA coefficient is 0.36 for the structural model and 0.59 for all types of gravity models. In this paper we used the structural gravity model, that is widely accepted in theory and well documented in empirical research. Basically, the structural gravity model is a gravity model that includes any of the country/industry/firm/product dummies (depending of the availability of data) for cross-section data analysis or the same dummies with included time variation (e.g. time varying country dummies) for the case of panel data analysis.

CONCLUSION

The manufacturing sector is a driving force of Croatian foreign trade. Almost 50% of all manufacturing production is destined for export, notwithstanding the fact that total level of production in 2012 is lower than it was in 2008, when little more than 30% of production was exported. The results based on gravity model estimations confirm that the Stabilization and Association Agreement between Croatia and the EU bears positive and significant trade impacts for both the manufacturing exports and the manufacturing imports while the effects of CEFTA 2006 are found to be positive only when supported by the diagonal cumulation of rules of origin. This is in line with the theoretical assumptions that the introduction of a system of diagonal cumulation of origin between the European Union, the Western Balkan countries participating in the Stabilisation and Association Process and Turkey lowers trade costs and enhances trade performance of, in our case, Croatia. Moreover, the diagonal cumulation of rules of origin is found significant only for the imports of intermediates and capital goods. This is in line with our predictions, that a switch from bilateral to diagonal cumulation has stronger impact on the trade in intermediates than in consumption goods. These results might indicate that Croatia, as the most developed country among WB countries, is becoming a production hub for the finalization of products produced in regional production chains that are then exported to the EU. However, the robustness of this conclusion needs to be further tested on a longer time span.

Finally, this paper serves as another proof of the importance of cumulation rules in free trade agreements, especially diagonal cumulation (or regional cumulation), where enabling of cumulation has implication on trade flows and subsequently on the levels of domestic (regional) production. Moreover, the results of the paper suggest that the role of cumulation of rules of origin is particular noticeable for the trade in intermediates which represent principal and increasing share of the global (reginal) trade. Besides the production sharing provisions cumulation system seems to be crucial element in the RTAs supporting the integration of the firms in the global and regional value chains.

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