REGIONAL VALUE CHAINS IN THE CROATIA'S NEIGHBOURING COUNTRIES AS ECONOMIC DRIVERS

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Abstract

Regional value chains (RVCs) are an important indicator of regional trade, economic integration and development. Due to regionalization of production, instead of globalisation of production, more and more production is taking place in RVCs. We used the UNCTAD-Eora database to obtain the values of the basic RVC indicator: domestic value added (DVA) included in a country's exports. We analyse the regional value chains in Croatia and its neighbouring countries: Bosnia and Herzegovina, Hungary, Montenegro, Serbia and Slovenia. We performed a Panel Estimated Generalised Least Squares analysis with weights for cross-sectional fixed effects, weights for cross-sectional EGLS, covariance method for white cross-sectional coefficients and correction for degrees of freedom to obtain a more efficient estimation of coefficients and to correct for heteroscedasticity or autocorrelation in the residuals. The results of the panel EGLS show a statistically significant relationship between the change in value added (VA) of neighbouring Croatian countries and the change in Croatian VA (R2=0.73, p 0.0001). The results suggest that Croatia's linkages with neighbouring countries in RVCs are statistically significant, even though the extent of these linkages is of very small magnitude.

Key words: regional value chain, economic development, economic integration, regional trade, value added.

1. INTRODUCTION

A value chain refers to all the activities a company undertakes to bring a product or service to the final consumer. Technological advances, costs, access to resources and markets, and trade policy reforms have facilitated the geographic fragmentation of production processes around the world based on comparative advantage. Global trade and production are organized around "global value chains" (GVCs). Regional trade and production are organized around "regional value chains" (RVCs). With the proliferation of regional trade agreements and common currency areas reducing financial transaction costs, regional economic linkages have also become much stronger. The gravity theory of trade emphasizes the size and the distance between trading partners as the guiding forces of trade. Tariff, economic, and monetary unions decrease the transaction costs and strengthen the trade ties. The obvious question arises: are Croatia's immediate neighbours, who are not members of the EU, more or less integrated into regional value chains (with Croatia) than neighbours who are members of the EU? This is just one of the questions we try to answer. The scientific questions we try to answer are the following. First, is the Croatian DVA included in the exports of its proximate neighbours? Second, do Croatian neighbours' exports to Croatia have a statistically significant causal effect on Croatian DVA further on in the RVC?

2. LITERATURE REVIEW

Since various stages of production are now regularly carried out in different countries, inputs cross borders several times. As a result, traditional trade statistics are becoming less reliable as a measure of the value added of a given country (Koopman et al. 2010). For an explanation of a supply chain, see Koopman et al. (2012). A value chain is a network of value added sources and destinations. Each producer in a supply chain buys inputs and then creates value that is reflected in the costs of the next stage of production. The value added at each stage is equal to the value paid to the factors of production in the exporting country. Since all official trade statistics are calculated in gross values, which include both intermediate and final goods, the value of intermediate goods that cross international borders more than once is counted twice (Koopman et al. 2012).

The basic concepts required to calculate trade in value added using input-output tables, including the basic structure of an input-output table and the matrix algebra used to calculate the trade statistics in value added provided by the Eora Multi-Region Input-Output database (MRIO), are explained in an IMF working paper by Aslam et al. (2017). Within global value chains and international production networks, not only final goods but also intermediate goods (parts and components) and, increasingly in recent years, services are traded internationally. Input-output tables can better describe current globalisation as they provide information on the use of goods instead of the rather arbitrary classification schemes that divide goods into intermediate goods and other categories (De Backer & Yamano, 2007). International specialization is an important source of increased efficiency and competitiveness of firms. Intermediate goods account for more than half of global imports of manufactured goods, and intermediate goods account for more than 70% of global imports of services (OECD 2013, 2013a, 2013b). The value chain is a systematic approach to analysing a firm's competitive advantage by analysing the vertical production structure of the firm, developed by Michael E. Porter in his book Competitive Advantage (1985). Regional factors have become increasingly important in explaining business cycles, especially where intra-regional trade has grown rapidly. Intra-regional economic unions and regional economic and customs unions are conducive to the formation of RVCs. Other reasons for the formation of RVCs include the need for production near resources, with RVCs forming around production resources where transportation costs within the RVC are large, and the need for production or final assembly near consumers, with RVCs forming near large consumer agglomerations. Most often we have a combination of both. In the IMF Working Paper 13/19, Regionalization vs. Globalization, Hideaki Hirata, M. Ayhan Kose and Christopher Otrok analyse the importance of regional factors in explaining business cycles. They find that the relative importance of global factors has declined in favour of regional factors. In short, the recent era of globalization has brought about the emergence of regional business cycles and a gradual but steady transition to an era of regionalization. Regions have developed economically and technologically and are able to produce almost everything on a regional scale. It seems that economic growth and economic development favor regional production due to transaction, transportation, tax and other costs.

According to Kalemli-Ozcan et al. (2001), the benefits of industrial specialization with uninsured production risk may entail a welfare loss that outweighs the benefits. The main mechanism for spreading risk across regions and countries is geographic diversification of production sources. The gains from diversification must be weighed against the losses from foregone economies of scale. When markets are well integrated, regions can hedge against idiosyncratic shocks and exploit comparative advantages arising from technological differences, factor endowments, or economies of scale. Kalemli-Ozcan et al. (2001) also point to a large difference in industrial specialization of regions within "federations" versus countries. This is consistent with some earlier research by Hufbauer and Chilas (1974) and Krugman (1991). They interpreted this as the result of the existence of trade barriers that prevent economic integration and specialization (Kalemli-Ozcan et al., 2001). Production processes increasingly involve vertical specialization. Using OECD and emerging market input-output tables, Hummels et al. (2001) estimate that vertical specialization accounts for up to 30% of world exports and has increased by up to 40% over the past 25 years from 1975-2000. The fact that multiple barriers to trade exist when goods cross multiple borders during the production process is the key insight into why vertical specialization is increasing. Even small reductions in tariffs and transportation costs can lead to widespread vertical specialization, substantial trade growth, and significant trade gains (Hummels et al., 2001).

3. DATA AND METHODS

Our data consists of a cross-section of 6 countries: Croatia, Bosnia and Herzegovina, Hungary, Montenegro, Serbia and Slovenia. These countries were selected as Croatia plus neighbouring countries with a land border. Large Croatian trading partners such as Italy, Germany and France were excluded as they would overwhelm the test results by their sheer economic size and they do not form the local regional value chain but are the backbone of the EU value chain. The time series consists of 20 years, starting with the years 2000-2019. The data in the table are organised so that the value in the column representing a country $X_{i,t}$, e.g. Hungary, in 2000 corresponds to a value in the row $Y_{i,t}$, e.g. Croatia, also in 2000, which represents Croatia's exports to Hungary in 2000. Basically, this is an input-output table. The diagonal line, which shows the same country as both an exporting and importing country, represents the values of re-imports or domestic final uses of domestic production and exports.

In our study, we will use both static and dynamic panel methods (Baltagi, 2008 and Wooldridge, 2010). Due to the non-stationarity of the data, all data are first-differenced and thus measure changes in value. The issue, then, is whether and to what extent Croatia's productive capacity in trade, represented by its value added, Granger "causes" the productive capacity of its neighbouring countries (Bosnia and Herzegovina, Hungary, Montenegro, Serbia, and Slovenia).

Clive Granger's (1969) approach to the question of whether x causes y is to see how much of the current y can be explained by past values of x, and then to see whether adding lagged values of x, as well as lagged values of y, can improve the explanation. Y is said to be granger-caused by x if x contributes to the prediction of y, or if the coefficients of lagged x are statistically significant.

If we get a statistically significant result, regardless of its magnitude, we can conclude that the countries are dynamically integrated and that some of the changes in one country have an impact on the changes in the other country. This is the dynamic component of the test. The static component of the test is that we only look at the value of the coefficient (parameter) that represents each country. The larger the value, the larger the effect. We expect from larger countries to have larger parameter values. In choosing the Granger "causality test", we have opted for the Dumitrescu-Hurlin (2012) version of Granger's (1969) non-causal panel data models because of its individual treatment of the intersect.

First, we treat the panel data as one large stacked data set and then perform the Granger "causality test" in the usual way, except that we do not include the data from one cross-section in the lagged values of the data from the next cross-section. This method assumes that all coefficients are the same across all cross-sections.

To choose an appropriate panel data test, we test the nominal values of the cross sections for stationarity. The tests used are the Levin, Lin & Chu and Breitung t-stat test with the null hypothesis assuming common unit root processes; and Im, Pesaran and Shin W-stat; Augmented Dickey Fuller - Fisher Chi -square; and the PP - Fisher Chi -square with the null hypothesis assuming individual unit root processes. After the initial differencing of the data, we test again to ensure that stationarity of the cross-sectional time series is achieved. The next step in a panel data analysis is to ask whether there are fixed effects due to various idiosyncrasies. The usual test is the Hausman test, which is performed using the Random Effects equation and compared with the results of the Fixed Effects equation.

Finally, for coefficient estimation, we performed a Panel Estimated Generalised Least Squares analysis with cross-sectional fixed effects weights, cross-sectional GLS weights, the covariance method for white cross-sectional coefficients, and a degree of freedom correction to obtain a more efficient estimate of the coefficients and to correct for heteroscedasticity or autocorrelation in the residuals. To achieve a priori complete stationarity, all variables were differenced.

4. RESULTS AND DISCUSSION

The rejection of the random effects model by the Hausman test implies the use of a fixed cross-section for idiosyncratic effects and constants. The results of the panel EGLS show a statistically significant relationship between the change in value added of neighbouring Croatian countries and the change in Croatian value added (R^2=0.73, $p<0.0001$). The results suggest a statistically significant linkage of the Croatian economy with the RVCs of the neighbouring countries, although the extent of this linkage is probably very small compared to Croatia's main trading partners, such as Germany, Italy, Austria and France, due to the small size of these economies. The panel EGLS of changes in Bosnia and Herzegovina (VA) show the strongest influence of Croatia, Slovenia and Hungary in exactly that order, without any statistically significant influence of Serbia or Montenegro, implying that there is no viable value chain integration between Bosnia and Herzegovina and the latter two countries, which have their own RVC integration. Table 1 shows the results of a simple Granger non-causality test with individual coefficients following Dumitrescu and Hurlin. We chose this method because of its obvious idiosyncrasies and the differences in fixed effects between the countries analysed. The best values in terms of statistical significance and the W-statistic in a Granger non-causality test at normal level were obtained with a time lag of 2 years.

Table 1. Pairwise Dumitrescu Hurlin Panel Causality Tests

Null Hypothesis:	W-Stat.	Zbar-Stat.	Prob.
CROATIA does not homogeneously cause B&H	1.71693	-0.55764	0.5771
B&H does not homogeneously cause CROATIA	3.24582	0.76069	0.4468
HUNGARY does not homogeneously cause B&H	1.30205	-0.91537	0.3600
B&H does not homogeneously cause HUNGARY	1.96916	-0.34014	0.7337
MONTENEGRO does not homogeneously cause B&H	1.73965	-0.53805	0.5905
B&H does not homogeneously cause MONTENEGRO	4.94482	2.22568	0.0260 **
SERBIA does not homogeneously cause B&H	2.29676	-0.05767	0.9540
B&H does not homogeneously cause SERBIA	11.9157	8.23651	$2 \cdot 10^{-16}$ ***
SLOVENIA does not homogeneously cause B&H	1.13296	-1.06118	0.2886
B&H does not homogeneously cause SLOVENIA	1.59526	-0.66255	0.5076
HUNGARY does not homogeneously cause CROATIA	0.99795	-1.17759	0.2390
CROATIA does not homogeneously cause HUNGARY	1.41666	-0.81655	0.4142

MONTENEGRO does not homogeneously cause CROATIA	1.46868	-0.77170	0.4403
CROATIA does not homogeneously cause MONTENEGRO	4.33861	1.70297	0.0886 *
SERBIA does not homogeneously cause CROATIA	1.08971	-1.09847	0.2720
CROATIA does not homogeneously cause SERBIA	12.9594	9.13644	0.0000 ***
SLOVENIA does not homogeneously cause CROATIA	2.60529	0.20837	0.8349
CROATIA does not homogeneously cause SLOVENIA	2.11583	-0.21368	0.8308
MONTENEGRO does not homogeneously cause HUNGARY	2.74547	0.32924	0.7420
HUNGARY does not homogeneously cause MONTENEGRO	5.33965	2.56613	0.0103 **
SERBIA does not homogeneously cause HUNGARY	1.97543	-0.33474	0.7378
HUNGARY does not homogeneously cause SERBIA	11.8063	8.14214	$4 \cdot 10^{-16}$ ***
SLOVENIA does not homogeneously cause HUNGARY	4.95114	2.23114	0.0257 **
HUNGARY does not homogeneously cause SLOVENIA	5.81489	2.97592	0.0029 ***
SERBIA does not homogeneously cause MONTENEGRO	10.8766	7.34046	$2 \cdot 10^{-13}$ ***
MONTENEGRO does not homogeneously cause SERBIA	9.21249	5.90558	$4 \cdot 10^{-9}$ ***
SLOVENIA does not homogeneously cause MONTENEGRO	5.98472	3.12236	0.0018 ***
MONTENEGRO does not homogeneously cause SLOVENIA	3.15669	0.68383	0.4941
SLOVENIA does not homogeneously cause SERBIA	14.3358	10.3232	0.0000 ***
SERBIA does not homogeneously cause SLOVENIA	2.01517	-0.30047	0.7638

Sample: 2000 2019. Lags: 2. Calculation: E-views 9.0. Results significant at 10% = *. Results significant at 5% = **. Results significant at 1% = ***.

The results show the expected relationships among the analysed countries, with the larger economies leading (being the source of causation) and the smaller countries lagging behind, i.e. being caused by the larger ones (Table 1). The analysis in Table 1 shows the results between non-stationary variables and therefore has potentially spurious correlation. In other words, the coefficients may be the result of time series with non-stationary levels or trends, i.e. unit roots. Therefore, we perform tests for stationarity in level and trend. The tests used are: Levin, Lin & Chu t-test; Breitung t-statistic for general unit root processes; and Im, Pesaran and Shin W-statistic; Augmented Dickey Fuller - Fisher Chi -squared; and Phillips-Perron-Fisher Chi -squared test for individual unit root processes (Table 2).

Table 2. Panel unit root tests (summary of p-values)

	Country					
Method	**BiH**	**Croatia**	**Hungary**	**Monteneg**	**Serbia**	**Slovenia**
Null: Unit root (assumes common unit root process)						
Levin, Lin & Chu t	0.8862	0.2601	0.7894	0.9538	0.9342	0.5410
Breitung t-stat	0.3916	0.4710	0.7493	0.6274	0.1704	0.5881
Null: Unit root (assumes individual unit root process)						
Im, Pesaran and Shin	0.9828	0.8763	0.9977	0.9979	0.9467	0.9725
ADF - Fisher Chi-square	0.9932	0.9484	0.9995	0.9999	0.9921	0.9974
PP - Fisher Chi-square	0.2643	0.3336	0.8540	1.0000	0.9969	0.6367

Data source: UNCTAD-Eora database. Calculation: E-views 9.0. Sample: 2000 2019. Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

The Panel unit root test in table 2 indicates that all variables are non-stationary, both in terms of common, as well as in terms of individual unit processes. Thus, it is necessary to difference the time series in order to achieve full-stationarity (table 3).

Table 3. Panel unit root tests (summary of p-values)

	Country					
Method	**BiH**	**Croatia**	**Hungary**	**Monteneg**	**Serbia**	**Slovenia**
Null: Unit root (assumes common unit root process)						
Levin, Lin & Chu t	0.0000	0.0001	0.0000	0.0001	0.0128	0.0000
Breitung t-stat	0.0000	0.0000	0.0000	0.0008	0.0005	0.0000
Null: Unit root (assumes individual unit root process)						
Im, Pesaran and Shin	0.0000	0.0000	0.0000	0.0340	0.1509	0.0000
ADF - Fisher Chi-square	0.0000	0.0000	0.0000	0.0521	0.2429	0.0000
PP - Fisher Chi-square	0.0000	0.0000	0.0000	0.0000	0.0007	0.0000

Data source: UNCTAD-Eora database. Calculation: E-views 9.0. Sample: 2000 2019. Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

After the first differentiation of the individual time series, we test again for stationarity. Assuming common unit root processes, all countries are now stationary. At the level of individual unit root processes, all countries except Serbia are stationary, and Montenegro is stationary at the p 0.1 level. Even Serbia is stationary according to the Phillips-Perron-Fisher Chi -squared test. We repeat the pairwise Dumitrescu Hurlin Panel Causality test, but this time with differentiated variables (Table 4). It is important to note that the chosen lag is 2 years, which is quite a long period for a typical business cycle. In this way, we capture not only the business cycle but also the short-run investment cycle. Nevertheless, the results are not satisfactory and need further testing (Table 4).

Table 4. Pairwise Dumitrescu Hurlin Panel Causality Tests with differenced variables

Null Hypothesis:	W-Stat.	Zbar-Stat.	Prob.
D(CROATIA) does not homogeneously cause D(B&H)	0.93993	-0.28464	0.7759
D(B&H) does not homogeneously cause D(CROATIA)	1.00712	-0.19523	0.8452
D(HUNGARY) does not homogeneously cause D(B&H)	1.21712	0.08419	0.9329
D(B&H) does not homogeneously cause D(HUNGARY)	1.99092	1.11380	0.2654
D(MONTENEGRO) does not homogeneously cause D(B&H)	1.47758	0.43075	0.6666
D(B&H) does not homogeneously cause D(MONTENEGRO)	2.37895	1.63011	0.1031
D(SERBIA) does not homogeneously cause D(B&H)	1.79991	0.85965	0.3900
D(B&H) does not homogeneously cause D(SERBIA)	2.96982	2.41632	0.0157 **
D(SLOVENIA) does not homogeneously cause D(B&H)	1.17011	0.02164	0.9827
D(B&H) does not homogeneously cause D(SLOVENIA)	1.43071	0.36839	0.7126
D(HUNGARY) does not homogeneously cause D(CROATIA)	0.39119	-1.01478	0.3102
D(CROATIA) does not homogeneously cause D(HUNGARY)	0.73660	-0.55518	0.5788
D(MONTENEGRO) does not homogeneously cause D(CROATIA)	0.88077	-0.36335	0.7163
D(CROATIA) does not homogeneously cause D(MONTENEGRO)	1.58137	0.56885	0.5695
D(SERBIA) does not homogeneously cause D(CROATIA)	0.46955	-0.91052	0.3626
D(CROATIA) does not homogeneously cause D(SERBIA)	3.33527	2.90258	0.0037 ***
D(SLOVENIA) does not homogeneously cause D(CROATIA)	2.02721	1.16210	0.2452
D(CROATIA) does not homogeneously cause D(SLOVENIA)	1.13719	-0.02216	0.9823
D(MONTENEGRO) does not homogeneously cause D(HUNGARY)	0.99014	-0.21783	0.8276
D(HUNGARY) does not homogeneously cause D(MONTENEGRO)	1.53520	0.50743	0.6119
D(SERBIA) does not homogeneously cause D(HUNGARY)	0.65518	-0.66352	0.5070
D(HUNGARY) does not homogeneously cause D(SERBIA)	3.01928	2.48213	0.0131 **
D(SLOVENIA) does not homogeneously cause D(HUNGARY)	2.69775	2.05431	0.0399 **
D(HUNGARY) does not homogeneously cause D(SLOVENIA)	2.37963	1.63101	0.1029
D(SERBIA) does not homogeneously cause D(MONTENEGRO)	2.79804	2.18775	0.0287 **
D(MONTENEGRO) does not homogeneously cause D(SERBIA)	1.73748	0.77658	0.4374
D(SLOVENIA) does not homogeneously cause D(MONTENEGRO)	1.80983	0.87285	0.3827
D(MONTENEGRO) does not homogeneously cause D(SLOVENIA)	1.29952	0.19384	0.8463
D(SLOVENIA) does not homogeneously cause D(SERBIA)	3.04756	2.51976	0.0117 **
D(SERBIA) does not homogeneously cause D(SLOVENIA)	0.39896	-1.00445	0.3152

Data source: UNCTAD-Eora database. Calculation: E-views 9.0. Sample: 2000 2019. Lags: 2. Results significant at 10% = *. Results significant at 5% = **. Results significant at 1% = ***. D(COUNTRY) designates first difference.

The results of the tests in Table 4 are now much more robust, but several of the Granger causalities present in Table 1 are clearly rejected here. Those that remain are causality conjectures between Bosnia & Herzegovina and Serbia; Croatia and Serbia; Hungary and Serbia; Slovenia and Hungary; Slovenia and Serbia; and Serbia and Montenegro (Table 4).

We now focus specifically on Croatia and the presumption that its value added within the regional value chain is caused by its 5 neighbouring countries. Croatia has a significant degree of interdependence with its neighbouring countries, as shown in Table 5, which presents the change in Croatia's value added in exports from the value added in imports from the 5 neighbouring countries.

The Hausman test (Hausman, 2005) undoubtedly rejected the cross-section random effects as a more suitable model (Chi-square = 23.3068; p-value=0.0003). Thus, we chose the Panel Estimated Generalized Least Squares analysis with cross-section fixed-effects weights, cross-section GLS weights, White cross-section coefficient covariance method, and degrees of freedom correction in order to get a more efficient estimation of coefficients, and to correct for heteroscedasticity or autocorrelation in residuals.

Table 5. Panel EGLS (Cross-section fixed effects weighted)

Dependent Variable: D(CROATIA)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	61262.24	255.7612	239.5291	0.0000
D(B&H)	0.063654	0.007889	8.069107	0.0000
D(HUNGARY)	0.001972	0.000179	11.01721	0.0000
D(MONTENEGRO)	0.000496	$8.41 \cdot 10^{-5}$	5.896151	0.0000
D(SERBIA)	0.000685	$4.10 \cdot 10^{-5}$	16.73699	0.0000
D(SLOVENIA)	0.013174	0.001413	9.323753	0.0000
R-squared	0.734984	Mean dependent var		89593.54
Adjusted R-squared	0.709254	S.D. dependent var		327654.9
S.E. of regression	183047.7	Sum squared resid		$3.45 \cdot 10^{12}$
F-statistic	28.56556	Durbin-Watson stat		2.538002
Prob(F-statistic)	0.000000			

Data source: UNCTAD-Eora database. Calculation: E-views 9.0. Sample: 2001-2019.
Periods included: 19. Cross-sections included: 6. Total panel observations: 114.
Linear estimation after one-step weighting matrix. White cross-section standard errors.

The results of the EGLS fixed effects panel estimation suggest a good integration of the Croatian economy with its neighbours (R^2=0.73, p<0.001) in terms of the impact of changes in the value of foreign exports on Croatian re-exports in the regional value chain that includes these 5 neighbouring countries. The coefficient of determination of 0.73 means that the changes in VA exports of the selected countries determine 73% of the changes in VA Croatian re-exports. If we consider only Croatia's two EU neighbours: Hungary and Slovenia, they explain about 52% of the newly created total Croatian RVC (R^2=0.53, p<0.001). This is not only statically relevant, but has mainly a dynamic significance, as all data are first-differenced. Thus, 52% of the change in Croatian RVC is explained by Hungary and Slovenia. The reasons for this are at least twofold. First, the sheer size of these economies. Second, the fact that these countries are members of the EU: a much larger RVC.
The same test performed for Bosnia and Herzegovina showed that only 3 of the 5 countries are statistically significant: Croatia, Hungary and Slovenia (Table 6).

Table 6. Panel EGLS (Cross-section fixed effects weighted)

Dependent Variable: D(BOSNIA & HERZEGOVINA)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	12886.43	136.1730	94.63281	0.0000
D(CROATIA)	0.010430	0.001694	6.156726	0.0000
D(HUNGARY)	0.000250	0.000125	2.003513	0.0477
D(SLOVENIA)	0.003735	0.000493	7.569846	0.0000
R-squared	0.551806	Mean dependent var		41027.95
Adjusted R-squared	0.517658	S.D. dependent var		125926.6
S.E. of regression	91237.02	Sum squared resid		$8.74 \cdot 10^{11}$
F-statistic	16.15920	Durbin-Watson stat		2.568587
Prob(F-statistic)	0.000000			

Data source: UNCTAD-Eora database. Calculation: E-views 9.0. Sample: 2001-2019.
Periods included: 19. Cross-sections included: 6. Total panel observations: 114.
Linear estimation after one-step weighting matrix. White cross-section standard errors.

The integration of the Bosnian value chain into the Hungarian one is on the edge of statistical significance with p=0.0477 (Table 6). A panel EGLS of the changes in the VA of Bosnia and Herzegovina shows the strongest influence of Croatia, Slovenia and Hungary in exactly that order, with no statistically significant influence of Serbia or Montenegro, implying that there is no strong value chain integration between Bosnia and Herzegovina and the latter two countries, which have their own RVC integration. The latter conjecture is tested separately (Table 7).

Table 7. Panel EGLS (Cross-section fixed effects weighted)

Dependent Variable: D(SERBIA)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1156.063	9.637171	119.9588	0.0000
D(MONTENEGRO)	0.003824	0.000894	4.276194	0.0000
D(B&H)	0.000303	$6.45 \cdot 10^{-5}$	4.692214	0.0000
D(HUNGARY)	$1.77 \cdot 10^{-5}$	$7.23 \cdot 10^{-6}$	2.446010	0.0161
D(SLOVENIA)	$4.20 \cdot 10^{-5}$	$1.81 \cdot 10^{-5}$	2.314069	0.0226
R-squared	0.349008	Mean dependent var		2368.802
Adjusted R-squared	0.292672	S.D. dependent var		11366.61
S.E. of regression	9590.736	Sum squared resid		$9.57 \cdot 10^{9}$
F-statistic	6.195124	Durbin-Watson stat		1.369836
Prob(F-statistic)	0.000001			2368.802

Data source: UNCTAD-Eora database. Calculation: E-views 9.0. Sample: 2001-2019.
Periods included: 19. Cross-sections included: 6. Total panel observations: 114.
Linear estimation after one-step weighting matrix. White cross-section standard errors.

Table 7 shows a relatively strong RVC integration between Serbia and Montenegro regarding Serbian value added in the exports of these countries, and considering the small size of the Montenegrin economy. The integration of Serbia's RVCs with the ones of Hungary and Slovenia is only measurable at the 10^{-5} order of magnitude. The Serbian RVC with Croatia is not statistically significant.

5. RESEARCH LIMITATIONS AND PROSPECTIVES

The major limitation of this research is the focus on exports and re-exports within the value chain. We would like to extend our research to specific sectors and industries and their regional value chains in the near future. This research shows from the missing variables that the region is strongly influenced by the largest trading partners, which were not considered in this study. Although the influence of neighbouring countries is strong in terms of the impact of change on change, the overall influence represented by the totals is rather small. The influence of RVCs with EU neighbouring countries is the strongest: Hungary and Slovenia explain 53% of total Croatian RVCs in terms of re-exported value added.

6. CONCLUSION

The results of the statistical analysis, consisting of the Pairwise Dumitrescu Hurlin Panel Granger non-causality tests with differentiated variables, show some pull effects of the more developed countries within this regional value chain over the less developed countries. The panel EGLS shows a statistically significant relationship between the change in value added (VA) of neighbouring Croatian countries and the change in Croatian VA ($R^2=0.73$, $p<0.0001$). The results suggest that the Croatian economy is integrated in terms of causing mutual changes in RVCs with its neighbouring countries, even if the extent of this integration is very low in terms of levels. Nevertheless, we can answer the research questions from our introduction. First, the Croatian DVA is included in the exports of its proximate neighbours except for Serbia and Montenegro, where this is not statistically significant. Second, its neighbours' exports statistically significantly contribute to the Croatian DVA. The EU membership certainly does not have a negative bearing on the formation of RVCs, as 52% of the total Croatian RVCs are explained by the relations with the other two EU member countries: Hungary and Slovenia.

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