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Time-varying parameters approach to sustainability of international trade flows: the case of Croatia and Serbia compared

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ABSTRACT

The empirical literature that relies on conventional cointegration approaches fails to support the existence of cointegration between exports and imports in some countries. This article moves a step ahead and contributes to existing literature to overcome the issue of the unexplained relationship between exports and imports. The research samples consist of quarterly data over the periods 2000q1–2017q2 and 2004q1–2017q2 for the Croatian and the Serbian cases, respectively. The results illustrated that the state-space model with time-varying parameters (T.V.P.) is well suited to establish the relationship between exports and imports when the standard cointegrating relationship does not hold.

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1. Introduction

In the last 25 years Croatia and Serbia have experienced trade and financial liberalisation followed by persistent trade deficit. Haltmaier (2014) found a reduction in global current account deficit after the financial crisis which began in 2007. However, the sustainability of the current account has remained the most challenging macroeconomic issue for the majority of European post-transition countries (Ismaili-Muharremi, 2015). Serbia is still experiencing the deficit in its current account while the current account deficit in Croatia persisted until recently. Croatia joined the European Union (E.U.) in 2013. The merchandise trade between Croatia and other E.U. member countries was found unsustainable (Bošnjak, Bilas, & Novak, 2019) and well explained by the Heckscher-Ohlin trade theorem, while Croatia appeared as the labour abundant country (Bilas & Bošnjak, 2015b). Boljanović (2012) analyzed the current account deficit in Serbia and pointed out that industrial production in Serbia heavily depends on imported goods financed by inflow of foreign capital. Kovačević (2018) examined the structural and cyclical components of the current account of Serbia and found the structural part was the main driver of the current account

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deficit. Furthermore, the cyclical components modestly reduced the Serbia's current account deficit in the post-crisis period. In case of persistent current account deficit in a country, the macroeconomic policies of the country towards current account adjustment can be considered as ineffective. Persistent current account deficit in a country implies violation of budget constraints increase of foreign debt of the country. Under pressure from sizable external debt in a country, interest rates in that country may rise while resulting in constraints to economic growth and harmful effects on the welfare of citizens. Based on Husted (1992), the research examines the violation of international budget constraints over time for the cases of Croatia and Serbia. The violation of international budget constraints is the indicator of health for the economy as whole. Furthermore, the long-run relationship between exports and imports yields important implications for the effectiveness of macroeconomic policies. Widely used conventional approaches, such as Engle and Granger's (1987) and Johansen and Juselius' (1990) cointegration approach, fail to support the cointegration relationship between exports and imports in some cases. This article moves a step ahead to explain the relationship between imports and exports in the cases of Croatia and Serbia where linear cointegration between aggregate imports and exports cannot be established. Unlike previous studies, this article follows the state-space model with time-varying parameters (T.V.P.) approach and test the hypothesis of current account sustainability in cases of Croatia and Serbia. Eventually, the article illustrates the comparison of the vulnerabilities in external positions for these two countries.

The rests of this article is organised as follows: Section 2 briefly summarises the theoretical foundation and existing relevant literature. Section 3 presents the research data and methodology, while Section 4 provides research results and discussion, the final section provides an overview of our main findings.

2. Theoretical foundation and brief literature overview

Following the intertemporal solvency framework of Hakkio and Rush (1991) and Husted (1992), extensive literature emerged and employed various econometric approaches to examine the sustainability of international trade flows. The baseline theoretical framework for examining the sustainability of current accounts assumes that the amount a small open economy borrows in international markets equals the present value of the future surpluses in international trade. Therefore, deficits occurred in the present period can be repaid by future surpluses. Consequently, the empirical literature dedicated to examine current account sustainability examines the long-run relationship between imports and exports. The first and most frequent econometric approaches to examining sustainability of international trade flows are Engle and Granger's (1987) and Johansen and Juselius' (1990) cointegration approach that assume existence of linear cointegrating relationship between exports and imports. Ahmed and Rogers (1995) employed Engle and Granger's (1987) cointegration approach and Stock and Watson's (1993) dynamic ordinary least squares (O.L.S.) procedure to estimate the cointegrating vectors and found strong evidence of the government and external present value constraints being satisfied in the case

of both the U.S. and U.K. Arize (2002) employed Johansen's cointegration approach and found cointegrating relationship between exports and imports for for 35 out of 50 countries in the sample. Following both the approaches, Dumitriu et al. (2009) found unsustainable trade flows of Romania. The empirical literature failed to support the long-run relationship between export and import in all countries and Babatunde (2014) pointed out that the reasons were the nature of the estimation methodology, the model specification, and selectivity bias. However, a linear cointegration approach requires variables to be stationary at the same level and that might be an obstacle to establish a linear cointegrating relationship between exports and imports. To overcome this obstacle, Soylu (2018) employed the Autoregressive Distributed Lag (A.R.D.L.) boundary test approach from Pesaran et al. (2001) that uses unrestricted error correction model and gives statistically more reliable results. The results revealed that current account balance in Eastern Europe region was related to a sustainable fiscal balance and economic growth. Recently some papers have emerged that take into account the possible nonlinear nature of the relationship between exports and imports. Topalli and Dogan (2016) employed the Markov-switching approach and analysed the current account sustainability of the Turkish economy between 1990 and 2014. The results revealed the weak sustainability of the Turkish economy, and showed it to be even weaker during the economic contraction. Khadaroo (2016) used self-exciting threshold autoregressive (S.E.T.A.R.) approach on a seasonally adjusted series and found that the Mauritian economy converges two current account equilibriums, either namely a deficit of 9% or a surplus of 2.5%. İyidoğan and Turan (2018) employed linear and nonlinear approach for the cases of Hungary, Poland, Czech Republic and Turkey over the period 1998q1–2014q2. The results indicated unsustainable current account dynamics for Turkey, Poland and Czech Republic while for the case of Hungary the results were conflicting. Gnimassoun and Coulibaly (2014) employed panel co-integration techniques to examine the sustainability of current accounts in sub-Saharan Africa over the 1980–2011 period and found current accounts are globally sustainable. Current account sustainability is found to be lower for countries with a fixed exchange rate regime or those belonging to a monetary union. Hassan et al. (2016) used a panel data model over the period from 1995 to 2014 to examine current account sustainability in the Middle East and Africa countries and found the weak sustainability with the value of sustainability coefficient was less than 1. Following various panel unit root tests and a sequential panel selection method, Lanzafame,(2014) examined the sustainability of current accounts for 27 advanced economies annual data over the 1980–2008 period and found strong evidence in favour of nonlinear, but stationary current account patterns only for seven countries. The remaining 20 appear to be non-stationary and thus unsustainable. Shastri et al. (2018) followed the panel co-integration test by Westerlund (2007) and supported the long-run relationship between exports and imports for five major South Asian economies, namely, India, Pakistan, Bangladesh, Sri Lanka and Nepal over the period 1985–2016. The slope coefficient based on G.M.-F.M.O.L.S., G.M.-D.O.L.S. and C.C.E.M.G. turned out to be less than unity indicating the weak sustainability of currents accounts for the studied countries. Bošnjak et al. (2019)

followed a panel co-integration approach and found the merchandise trade between Croatia and other E.U. member countries unsustainable. Cuestas (2013) employed unit root tests and a fractional integration approach to examine the sustainability of the current accounts of a group of central and eastern European countries and found the ratio of the current account to gross domestic product as a stationary and mean-reverting process. Furthermore, in some countries the shocks tend to have long-lasting effects. Del Barrio Castro et al. (2015) employed periodic integration and cointegration to examine the sustainability of the current account for a group of O.E.C.D. countries and found a long-run relationship for the majority of the countries. Following the literature, the research results always rely on commonly-used time series methods like cointegration that require testing for stationarity. As originally noted by Elliott (1998) the cointegration methods are sensitive to deviations from the pure unit-root assumption since unit root tests cannot easily distinguish between a unit root and close alternatives. Using the state-space model with a T.V.P. approach, this article overcame the challenges related to the bias of a unit root test and provided accurate and more robust country-specific estimates of the relationship between exports and imports. Furthermore, the relationship between exports and imports might change when countries liberalise trade and participate more in the global trade, change its institutional framework or change its trade policy. Therefore, the state-space model with a T.V.P. approach might be the right one to establish the real relationship between exports and imports, while providing insightful information regarding the nature of the relationship. Conclusively, this article moves a step forward to establish the relationship between aggregate exports and imports where it cannot be established using conventional econometric approaches.

3. Research data and methodology

The research data sample consists of quarterly time-series data over the period 2000q1–2017q2 and 2004q1–2017q2 for the cases of Croatia and Serbia, respectively. The data on imports and exports in constant prices were retrieved from the National Bureaus of statistics. All of the variables under consideration were X-13 A.R.I.M.A. seasonally adjusted and are transformed to (natural) logarithms so the estimated coefficients can be interpreted as elasticities. The observed series are illustrated in Figures A1–A3. Bošnjak et al. (2019), using disaggregated panel data on merchandise trade, established the cointegration between Croatia and other E.U. member countries. However, the cointegrated relationship between aggregate imports and exports cannot be established in the cases of Croatia or Serbia.[1] As already stated, the methodological approach in this article differs from most of the earlier empirical studies directed towards current account sustainability and employs a state-space model with T.V.P.s instead of the commonly used time series approaches. Modelling the sustainability of international trade flows within the T.V.P. framework allows us insights into the evolution of the relationship with the time. A suggested by Arize (2002) adopting imports as the dependent variable yields better results than the Husted (1992) framework, which utilised exports as a dependent variable. Following Harvey

(1991), a general form of the state-space model is presented in observation (1) and transition Equation (2).

$$Y_t = X_t\beta_t + \varepsilon_t, \qquad \varepsilon_t \sim IIDN(0, \sigma^2) \tag{1}$$

$$\beta_t = \theta + \Gamma\beta_{t-1} + \nu_t, \qquad \nu_t \sim IIDN(0, Q), \;\; E(e_t V_s) = 0 \tag{2}$$

where:

Y_t – 1x1 vector presenting observed dependent variable,
X_t – kx1 vector presenting observed explanatory variables,
β_t – kx1 vector presenting unobserved variables,
Γ – kxk matrix of constant parameters,
ε_t – error term in observation Equation (1),
ν_t – error term in transition Equation (1) and
Q – the diagonal variance-covariance matrix.

Kalman (1960) provided the algorithm to obtain filtered and smoothed estimates of unobserved time-varying coefficients (β_t) recursively. The prediction equation is given in Equation (3) and the covariance matrix is given in Equation (4).

$$\hat{\beta}_{(t|t-1)} = T\hat{\beta}_{t-1} \tag{3}$$

$$P_{(t|t-1)} = TP_{t-1}T' + Q_t \tag{4}$$

Eventually, the estimates were updated recursively following Equations (5) and (6):

$$\hat{\beta}_t = \beta_{(t|t-1)} + P_{(t|t-1)}X(Y_t - X'\hat{\beta}_{(t|t-1)})(XP_{(t|t-1)}X + H_t) \tag{5}$$

$$P_t = P_{(t|t-1)} - P_{(t|t-1)}X'X\frac{P'_{(t|t-1)}}{(X'P_{(t|t-1)}X + H_t)} \tag{6}$$

A T.V.P. model within state-space model consists of an observation or measurement equation and a transition or state equation. Thus, the sustainability of trade flows in the cases of Croatia and Serbia can be specified in logarithmic form given by Equations (7)–(9):

$$\ln(M_t) = \alpha_t + \beta_{1,t}\ln(X_t) + \beta_{2,t}\mathrm{EU} + \varepsilon_t, \quad \varepsilon_t \sim IIDN(0, \sigma^2) \tag{7}$$

$$\alpha_t = \alpha_{t-1} + \nu_{0,t}, \quad \nu_{0,t} \sim IIDN(0, \sigma^2_{\nu 0}) \tag{8}$$

$$\beta_{1,t} = \beta_{1,t-1} + \nu_{1,t}, \quad \nu_{1,t} \sim IIDN(0, \sigma^2_{\nu 1}) \tag{9}$$

$$\beta_{2,t} = \beta_{2,t-1} + \nu_{2,t}, \quad \nu_{2,t} \sim IIDN(0, \sigma^2_{\nu 2}) \tag{10}$$

Where the observation equation is given by Equation (7) and state equations by Equations (8)–(10). State equations illustrate that the new state value is modelled as a

linear combination of the former state value and an error process. The observation equation presents the relationship between observed variables and unobserved transition or state variables. Dependent variable $\ln(M_t)$ is observed and presents imports(M_t) in (natural) logarithmic form, while explanatory variables are exports (X_t) in (natural) logarithmic form and dummy variable (E.U.) that indicate E.U. membership. The explanatory variables establish the relationship between the observable dependent variable and the unobservable time-varying coefficients. The terms α_t, β_{1t} and β_{2t} are unobserved time-varying coefficients to be estimated. ε_t and $v_{0,t}$ represent the error term in the measurement and state equations, respectively. The model in Equations (7)–(10) presents state-space form with initial conditions. The estimates of the state-space were obtained using the Kalman filter while the estimates of the parameters in the equations were obtained by maximising the Likelihood-function. The Kalman filter is a recursive procedure that needs to set plausible initial values. To do so, the parameters of the model were first estimated by means of O.L.S. and these parameters and fitted values of the state variables obtained from the O.L.S. estimation were specified as initial values. Eventually, the article follows the methodology presented in this section and provides the results for a country where linear cointegration between aggregate imports and exports holds. Hungary was selected as the example country since it is a neighbouring country to both of the considered countries and belongs to the European post-transition countries as well. The estimates for Hungary are provided based on a data sample of seasonally adjusted quarterly time-series in (natural) log levels on exports and imports from 1996q1 to 2017q1, retrieved from Statistical office of Hungary and illustrated in Figure A4.

4. Research results and discussions

Following the data sample and model specification described in the previous section of this article, the estimates for the case of Croatia were obtained and summarised in Table 1, while smoothed estimates are presented in Figures A5 and A6.

Following the estimated results for Croatia in Table 1, there is no significant change in imports due to Croatia's E.U. membership. The coefficient that established the relationship between aggregate imports as the dependent variable and aggregate exports as an independent one amounts to 0.52. The theory suggests that this coefficient should be close to unity. Therefore, international trade in the case of Croatia

Table 1. Estimation results (state-space model with T.V.P.) for the sustainability of international trade – the case of Croatia.

	Final state	Root MSE	z-statistic	p-value
α (Constant)	5,057485	1,497664	3,376916	0.0003665
ln(X)(Exports)	0,523583	0,140553	3,72518	0.0000976
EU (EU membership – dummy variable)	0,006158	0,034362	0,179207	0.4288876
Log likelihood: −169.8608			AIC: 353.7216	
Diagnostic tests:				
Ljung- Box Test statistic: 10.039			*p*-value: 0.6125	
Jarque Bera Test statistic: 0.40926			*p*-value: 0.815	
ARCH Test statistic: 9.7678			*p*-value: 0.6363	

Source: Author's estimates.

Table 2. Estimation results (state-space model with T.V.P) for the sustainability of international trade – the case of Serbia.

	Final state	Root MSE	*z*-statistic	*p*-value
α (Constant)	4.541904	1.192971	3.8072207	0.0000703
ln(*X*)(Exports)	0.6685096	0.08989227	7.4367862	0.0000000
Log likelihood: −106.2041			AIC: 226.4082	
Diagnostic tests:				
Ljung-Box Test statistic: 12.899			*p*-value: 0.3764	
Jarque Bera Test statistic: 0.2069			*p*-value: 0.3205	
ARCH Test statistic: 13.16			*p*-value: 0.3575	

Source: Author's estimates.

can hardly be considered as sustainable. Furthermore, the results in Table 1 indicate the sizable and significant constant term. As illustrated in Figure A5, the constant term varied over the time. Unlike the time-varying constant term, the relationship between imports and exports is stable and time-invariant as illustrated in Figure A6. The results clearly point out that the conventional cointegration approaches failed to support the existence of cointegration between imports and exports in Croatia due to sizable, significant and time-varying constant terms. Following the data sample and model specification described in the previous section of this article, the estimates for the case of Serbia were obtained and summarised in Table 2, while smoothed estimates are presented in Figures A7 and A8.

The results in Table 2 reveal the significant relationship between aggregate exports and imports in case of Serbia amounting 0.67. As well as in the case of Croatia the constant term is sizable and significant. Figure A7 illustrates the time-varying nature of the constant term, while the relationship between exports and imports is stable and time-invariant as illustrated in Figure A8. The results for the case of Serbia supports the conclusion from the case of Croatia that the conventional cointegration approaches failed to support the existence of cointegration between imports and exports due to sizable, significant and time-varying constant terms. Hence, the empirical evidence revealed that the conventional approaches failed to support existence of cointegration between imports and exports due to the imports drifting apart from exports in both of the considered cases. The imports can be under pressure from domestic demand and there is the need for measures to establish the control over excessive domestic demand in both countries. Since the problem persists, structural reforms are needed to reduce past divergences. Figures A1 and A2 illustrate the imports, exports and net exports development in case of Croatia while Figure A3 illustrates the imports, exports and net exports development in case of Serbia. Unlike the Croatia, Serbia is still experiencing the deficit in international trade and comparison of the cases indicates batter performance of international trade in case of Croatia. However, the estimated coefficient that links exports and imports is closer to unity in the case of Serbia comparing to case of Croatia. Therefore, following the theoretical foundation the international trade in case of Serbia is more sustainable. The constant term that is found to be time – varying in both cases is smaller in the case of Serbia. The explanation lies in the fact that tourism is a significant export driver in Croatia (Pavlic, Svilokos, & Tolic, 2015) and tourism exports can hardly be linked to imports. Similarly and based on the same inter-temporal budget approach, Lorde et al. (2013) found that Barbados' current account deficits were weakly sustainable as a result of tourism's contribution and pointed out the island's dependence

on the industry. Bilas and Bošnjak (2015a) pointed out the significant role of raw materials in exports of Croatia and the raw materials can hardly incorporate the importing products what can represent the other explanation of the weak link between exports and imports In Croatia. Bošnjak et al. (2018) employed Non-linear Auto-Regressive Distributed Lag (N.A.R.D.L) approach to examine determinants of current accounts in the case of Croatia, while Bošnjak (2019) used a state-space model with a T.V.P. approach to examine determinants of current accounts in the case of Serbia and Romania. The results suggest that current accounts in the case of Croatia and Serbia were under pressure from domestic demand. Furthermore, exporters in Croatia (Bošnjak et al., 2018) and in Serbia (Bošnjak, 2019) as well were constrained to access the necessary financial resources. Facilitating financial support to exporters and control over domestic demand were pointed out as appropriate policy measures for both countries. Following findings from this article, international trade in the case of Croatia and Serbia are weakly sustainable, pointing the need to strengthen the industry competitiveness of both countries. The macroeconomic policy in both countries can be considered as ineffective since in both cases the international budget constraints are violated. Mikulić and Lovrinčević (2018) analysed import content across economic sectors in Croatia and reported the highest imported content in domestic final demand while pointing out low import dependence in Croatian industry. Buturac et al. (2019) found export performance of the Croatian manufacturing industry substantially improved after accession of Croatia to EU. Therefore, the link between domestic demand for final goods and import demand might be stronger compared to a link between import demand and export supply in the cases of Croatia and Serbia. In case of import demand of a country being mainly driven by consumption of final goods, the stable and constant relationship between exports and imports can hardly be established.

Nonetheless, a cointegrating relationship between exports and imports was established following Johansen and Juselius' (1990) cointegration approach in most of the neighbouring countries. Franc and Peulić (2017) provided the results for the case of Slovenia, while Skoko and Zovko (2018) illustrated the case of Bosnia and Herzegovina. Following the cointegration approach from Johansen and Juselius (1990), the existence of cointegration was tested for Hungary and the results are summarised in Table 3.

The results in Table 3 clearly indicate the existence of a cointegrating relationship between exports and imports in the case of Hungary. However, to enable comparison between the results for Croatia in Table 1 and Serbia in Table 2, estimates for the case of Hungary were obtained using a state-space model with a state-space model with T.V.P. approach. The estimates are provided in Table 4 and illustrated in Figures A9 and A10.

Table 3. The contegration test results for case of Hungary.

Hypothesised No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	*p*-value
None *	0.210687	20.54514	15.49471	0.0079
At most 1	0.013861	1.144530	3.841466	0.2847
Hypothesised No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	*p*-value
None *	0.210687	19.40061	14.26460	0.0070
At most 1	0.013861	1.144530	3.841466	0.2847

Source: Author's estimates.

Table 4. Estimation results (state-space model with T.V.P.) for the sustainability of international trade – the case of Hungary.

	Final state	Root MSE	z-statistic	p-value
α (Constant)	0.3579	0.4956	0,722154964	0.4701992
ln(*X*)(Exports)	0.9708	0.03113	31,18535175	0.0000000
EU (EU membership – dummy variable)	−0.007400	0.01821	−0,40637012	0.6844707
Log likelihood: -259.6			AIC: 533.2	
Diagnostic tests:				
Ljung- Box Test statistic: 18.000			*p*-value: 0.100	
Jarque Bera Test statistic: 3.600			*p*-value: 0.200	
ARCH Test statistic: 12.000			*p*-value: 0.400	

Source: Author's estimates.

Following the estimated results in Table 4, there was significant relationship between aggregate exports and imports in the case of Hungary. Furthermore, the estimated coefficient for aggregate exports amount to 0.97. The effect of joining the E.U. is not found to be significant for the case of Hungary. The estimated constant term in Table 4 was not significant either. Therefore, the coefficient for exports is found to be close to unity indicating sustainable trade flows in case of Hungary. Since there was no significant constant term, there was no imports drifting apart from exports in case of Hungary. Hence, the estimates for case of Hungary differ from the estimates for case of Croatia and Serbia as well. The constant term in the cases of Croatia and Serbia was found to be sizable, significant and time-varying while in case of Hungary the constant term was not distinguishable from zero.

5. Conclusion

There are several conclusions that can be drawn from the research presented in this article. Firstly, the empirical literature that relies on conventional cointegration approaches fails to support the existence of cointegration between exports and imports in some countries. Contemporary literature tests alternative econometric approaches that will explain the relationship between imports and exports when linear cointegration cannot be established. While illustrating the cases of Croatia and Serbia, this article contributed accurate, robust and theoretically-consistent estimates from the state-space model with a T.V.P. approach. The stable and time-invariant relationship between exports and imports is established in Croatia, as well as Serbia, and international trade is found to be weakly sustainable in both cases. Time-varying constant term illustrated imports drifting apart from exports in both of the considered cases. The estimated coefficient that links exports and imports is closer to unity in the case of Serbia comparing to case of Croatia and following the theoretical foundation, the international trade in case of Serbia is found to be more sustainable. The nature of the relationship in the Croatian case can be attributed to the role of tourism and as well as to the high portion of raw materials in Croatian exports, that can hardly be linked to the importing products. The results unambiguously pointed out the need for structural reforms in both of the considered countries. To obtain the sustainability of trade flows the measures towards the control of domestic demand and facilitating financial support to exporters might be effective. Conclusively, the results in this article reveal that the state-space model with T.V.P.s is well suited to establish the relationship between exports and

imports when the standard cointegrating relationship does not hold. The article provided the estimates from the state-space model with T.V.P.s for the case of Hungary where the standard linear cointegration between exports and imports was established. The estimated results supported the suitability of the approach to examine the issue of a country's trade flows sustainability.

Note

1. Results are available upon request.

Disclosure statement

No potential conflict of interest was reported by the authors.

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Appendix

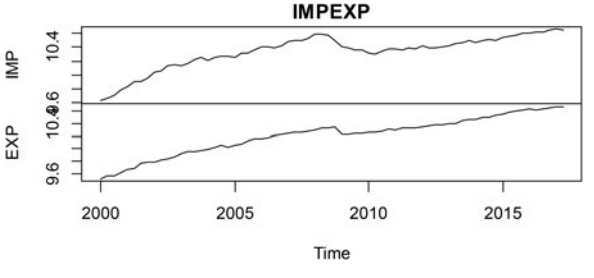

Figure A1. Exports and imports in (natural) log values – the case of Croatia. *Source*: Author's estimates.

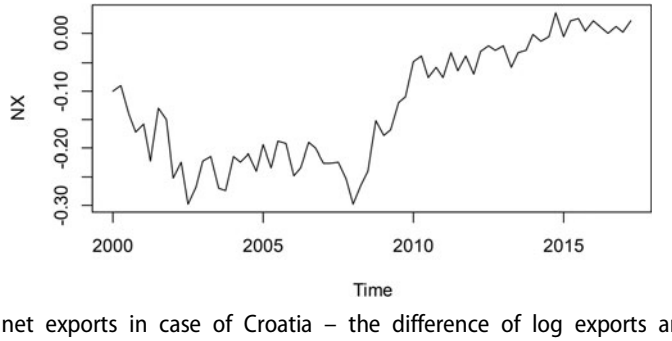

Figure A2. The net exports in case of Croatia – the difference of log exports and log imports. *Source*: Author's estimates.

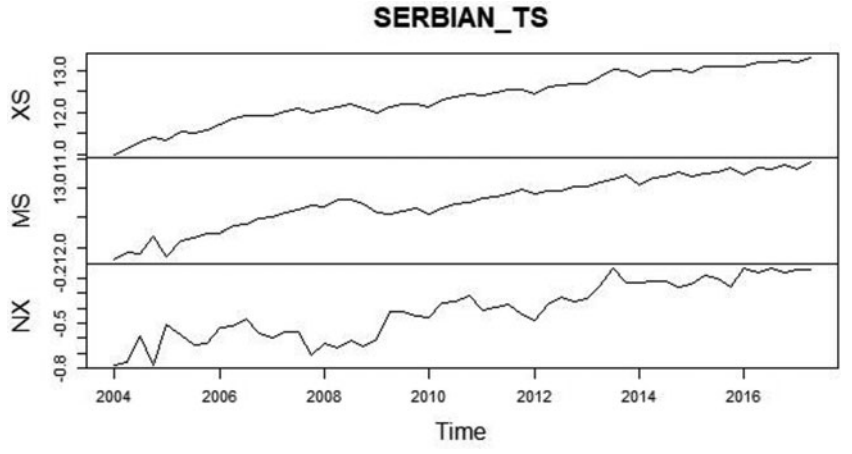

Figure A3. Exports, imports and net exports in (natural) log values – the case of Serbia. *Source*: Author's estimates.

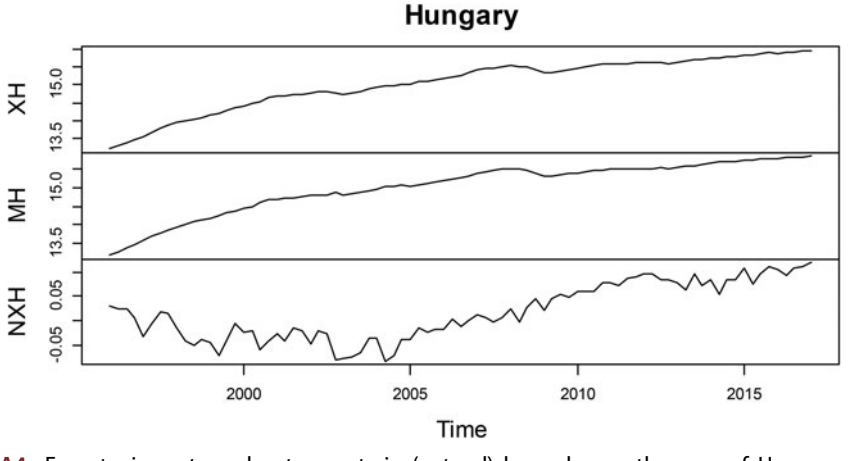

Figure A4. Exports, imports and net exports in (natural) log values – the case of Hungary. *Source*: Author's estimates.

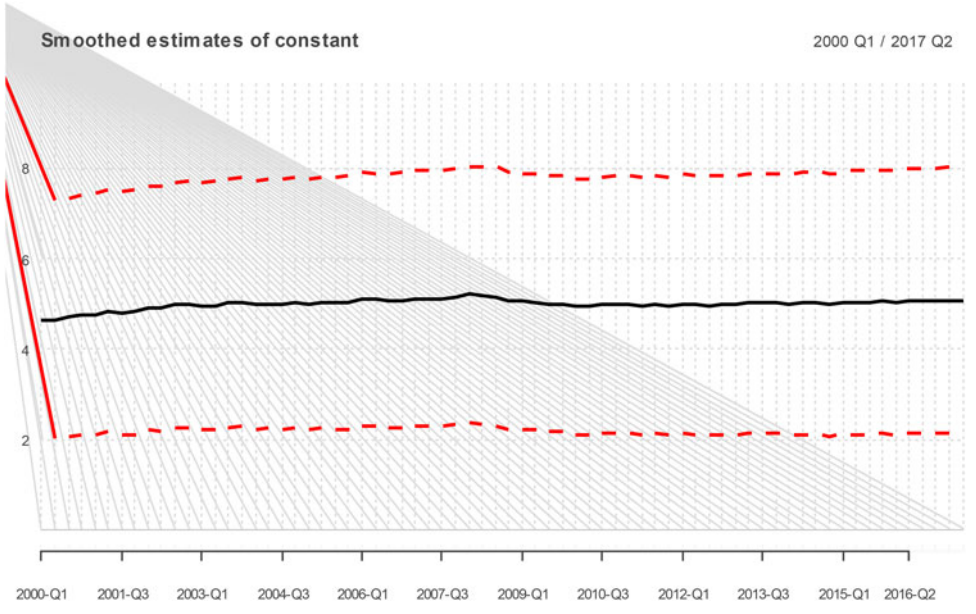

Figure A5. Smoothed estimates of constant in case of Croatia. *Source*: Author's estimates.

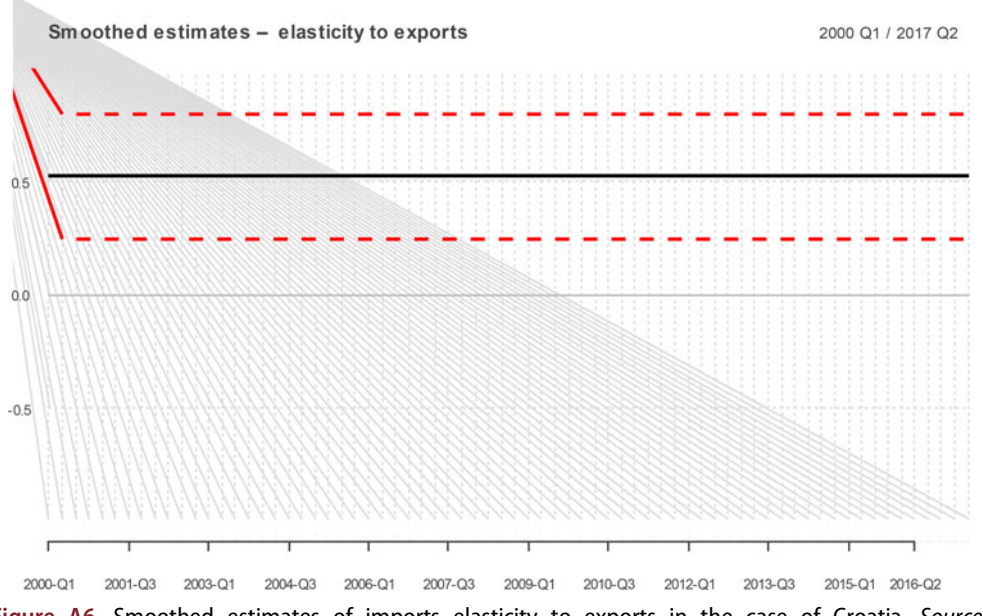

Figure A6. Smoothed estimates of imports elasticity to exports in the case of Croatia. *Source*: Author's estimates.

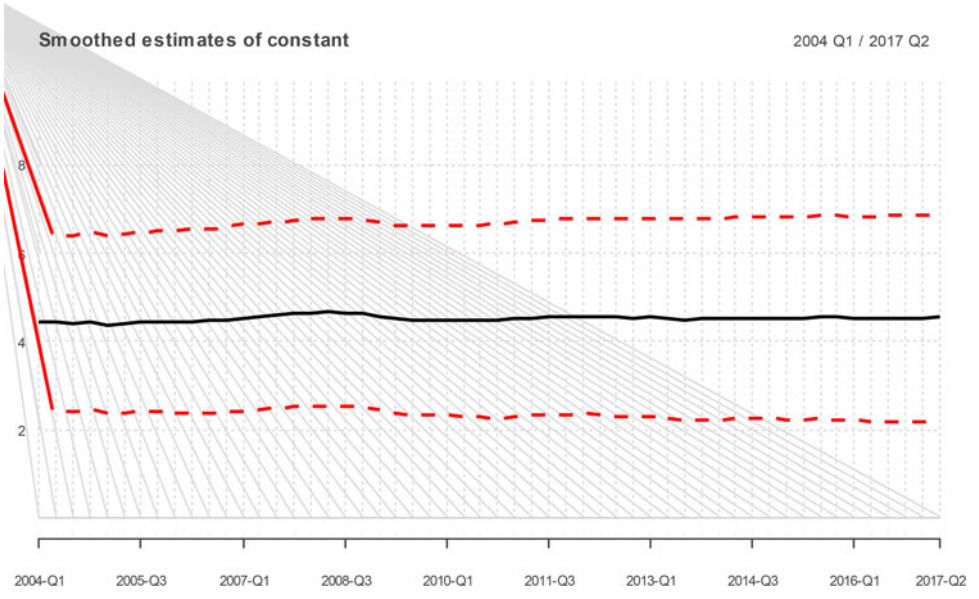

Figure A7. Smoothed estimates of constant in case of Serbia. *Source*: Author's estimates.

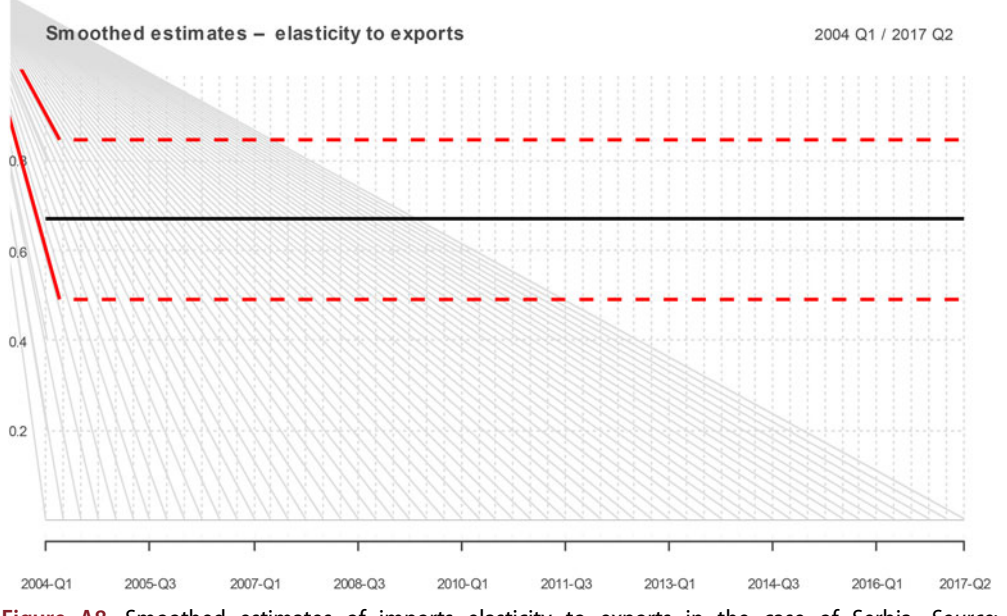

Figure A8. Smoothed estimates of imports elasticity to exports in the case of Serbia. *Source*: Author's estimates.

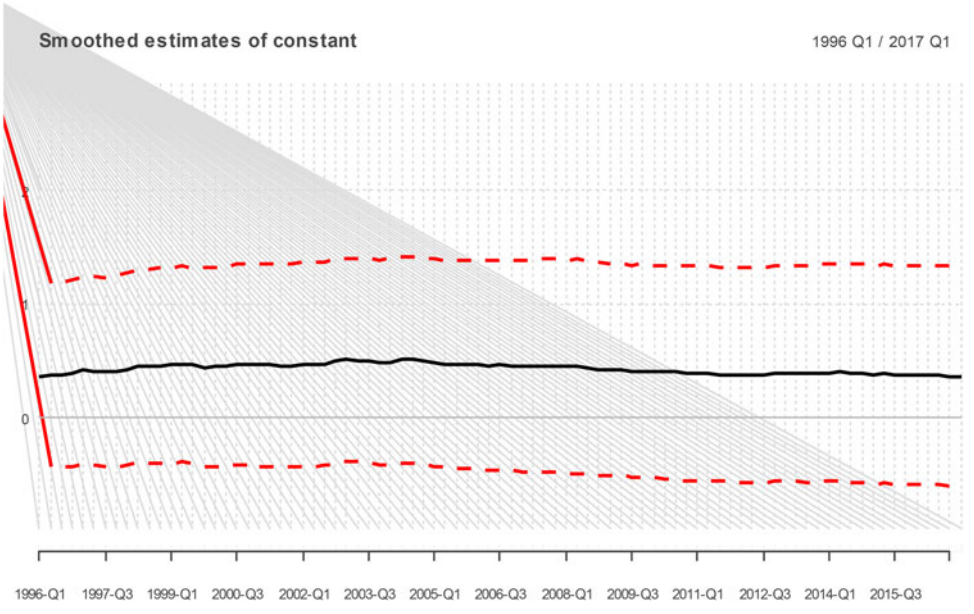

Figure A9. Smoothed estimates of constant in case of Hungary. *Source*: Author's estimates.

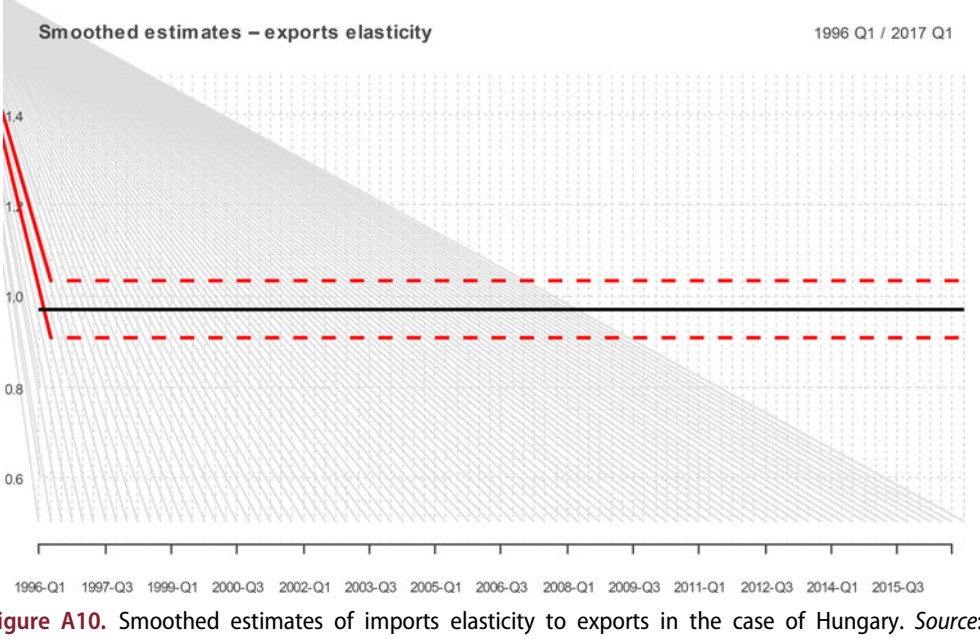

Figure A10. Smoothed estimates of imports elasticity to exports in the case of Hungary. *Source*: Author's estimates.