DETERMINANTS OF CURRENT ACCOUNT IN CASES OF SERBIA AND ROMANIA: TIME-VARYING PARAMETERS APPROACH

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Abstract

Following competing theories, the paper brings the determinants of the Serbian and Romanian current account dynamics with policy implications. The research sample consists of quarterly time series data over the period 2004q1–2017q2 and 2007q1-2017q4 for the cases of Serbian and the Romanian case, respectively. The estimates from the state space model with time-varying parameters (TVP) approach suggest that role of domestic demand is significant in both cases even though more prominent in case of Serbia. Marshall-Lerner conditions were fulfilled in case of Serbia while not in the Romanian case. The effects of money supply on the current account is found to be in line with the monetary approach in case of Romania while in the Serbian case the effect of an increase in the money supply is positive. Consequently, to resolve the issue of the current account deficit the research findings suggest the country- specific policy mix for each country.

Keywords: *Serbia; Romania; current account; time-varying parameters*

JEL classification: *C01; C05; C34; F1; F4.*

1. INTRODUCTION

Current account deficit has been a prominent phenomenon in European post-transition countries. Haltmaier (2014) pointed out the sizable reduction in global external imbalance followed by the financial crisis that stared in 2007. However, the current account persists in case of Serbia (Kovačević 2018) and Romania (Anghelache et al. 2014; Anghelache 2016) as well. Romania has been the European Union (EU) member country since 1 January 2007 while Serbia has started its accession process. These two countries are on a different stage of integration in the EU and both countries has experienced persistent current account deficit what makes these two cases interesting for the comparison in terms of its current account determinants. Theories of international economics offer several approaches to explain current account balance of payments while each points out different driver of its dynamics. The absorption approach explains the

change in current account by the changes in domestic demand and domestic output. Therefore, the current account will improve if output of goods and services increases by more than its absorption (Harberger 1950). The elasticity approach originally introduced by Marshall (1923), Robinson (1937) Lerner (1944) explains the current account as dependent on the elasticity of supply and demand for foreign exchange and foreign goods. The monetary approach pointed out the imbalances between the demand for and supply

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of money stock as the one that determines current account balance (Polak 1957). It is reasonable to assume that all these theories contribute to explain the dynamics in the Serbian and Romanian current account. However, the role of each single driver of current account may vary over time what motivates to employ a state space model with time-varying parameters (Harvey 1991) instead of the commonly used time series methods like co-integration approach. Therefore, the aim of the paper is twofold. Firstly, the paper aims to bring empirical tests of theoretical approaches to current account balance of payments while allowing the influence of each single determinant to vary over time. Secondly, the paper aims to provide country-specific determinants of current account for the cases of Serbia and Romania in lights of the competing theoretical approaches thus contributing to the literature on factors determinants of current account. Conclusively, the paper derives country-specific policy implications for each of the considered country.

The remainder of this paper is organized as follows: Section 2 briefly summarizes existing literature related to the topic under consideration and states the research hypothesis. Section 3 presents research data and methodology, while Section 4 empirical analysis. The final section provides an overview of the main findings of the research.

2. LITERATURE OVERVIEW

Empirical evidences from all over the globe support different nature of the relationship between current account and its determinants. Hung and Gamber (2010) examined the case of the US and pointed out that absorption approach outperformed the elasticity approach in explaining the US current account. Sastre (2018) examined the case of Spain and pointed out that currency devaluation would improve the balance of trade in the long- run. Ozgur and Memis (2017) found that the credit expansion and asset prices were closely associated in the eleven countries of Eurozone with chronic trade deficits over the period 1990-2011 whereas no significant correlation was observed for countries with trade surpluses. Unger (2017) found the flows of bank loans to the non-financial private sector and changes in competitiveness as the most important factor driving the build-up of current account imbalances in the deficit countries. Zhao et al. (2017) used panel data covering 108 countries for the period 1990-2011 and found strong evidence to show that when a country is at a lower financial development level, further advancements of its financial system will boost exports. Ekinci et al. (2015) pointed out that at

the early stages of financial development, acceleration in the credit growth might cause a larger deterioration in the current account balance. Kauko (2014) provided extensive empirical literature overview and concluded that during a build-up phase, banks borrow internationally to finance domestic lending, boosting the current account deficit and causing a real estate bubble. Gil-Pareja et al. (2017) examined the role of country's degree of economic development in the impact of banking crises on international trade. Using gravity model of trade on a data sample of 139 countries over the period 1975-2012, the obtained results revealed that middle income countries were generally the most negatively affected. Huang and Liu (2017) used a firm-level production data over the period of 2005-2009 from China as a data sample. The findings showed that firms who had better access to any finance were more likely to export and exported more. Vaubourg (2016) provided extensive review of the literature on the links between finance and international trade and found that sectors' or firms' external financial dependence appears to be a key determinant of export performance. Hence, contemporary literature from all over the globe covering large samples of different countries point out various current account determinants of a country with different nature of the relationship between current account of a country and its determinants. However, the countries considered in this paper belong to European post-communist countries. Therefore, the findings from these countries are of special importance to understand the linkages between current account and its determinants in the countries of interest.

One strand of literature point out that inflow of foreign capital is a main driver of current account deficit in the European post-communist countries (Bakker and Gulde 2010; Obadić et al. 2014). Ismaili-Muharremi (2015) analysed the current account of Western Balkan countries (Albania, Kosovo, Macedonia, Bosnia and Herzegovina, Serbia, Montenegro) and pointed out that the sustainability of the current account remains the most challenging macroeconomic issue for all these countries. Bošnjak et al. (2018a) found merchandise trade flows between Croatia and other EU member countries unsustainable. Consistently with results from Haltmaier (2014), Bošnjak et al. (2018) explained the Croatian path from deficit to current account surplus and pointed out the asymmetric responses of the Croatian current account to changes in domestic demand and money supply. Kovačević (2017) employed panel data approach and examined the relation between the current account balance and its determinants for a sample of 9 Southeast European (SEE) countries, namely Bulgaria, Croatia, Romania,

Moldova, Serbia, Bosnia and Herzegovina, Macedonia, Montenegro, and Albania. The results revealed that current account deficit persisted under pressure of real effective exchange rate while the net inflow of foreign direct investments (FDI) had a positive impact on the current account of the sample countries. Boljanović (2012) provided extensive overview of the current account deficit in Serbia and pointed out that industrial production in Serbia highly depends on imported goods while imported goods are mostly financed by inflow of foreign capital. Kovačević (2018) illustrated reduction in current account deficit of Serbia based on cyclical movements of the economy. Nonetheless, Serbia as well as Romania has recorded a constant current account deficit since the beginning of its trade liberalization and the persistent current account deficit always calls for caution.

The reviewed literature provide a comprehensive insights into various forms of the linkage between financial sector of the country and its international position and give sound arguments to the relationship in the Serbian and Romanian case. Bilas et al. (2017) provided the estimates for the case of Croatia, but linkage between financial sector and international position of post-socialist economies is generally under-examined. Serbia and Romania belong to the group of post-communist countries with underdeveloped financial market in terms that vast majority of financial intermediation goes through commercial banks and the most widespread financial product by far is a pure banking loan. Therefore, the representative measure of money supply in Serbia and other similar post-communist economies might be the loans to non-financial private sector. Conclusively, analytical framework to examine determinants of current account in case of Serbia and Romania is grounded on the theoretical approaches provided by Harberger (1950), Marshall (1923), Robinson (1937), Lerner (1944) and Polak (1957). In line with Harberger (1950), an increase in domestic demand of a country is expected to increase its imports over exports. Accordingly, it is hypothesized that the relationship between domestic demand and current account of a country was negative. Following Polak (1957), excess of money supply over money demand in a country may result as current account deficit of a country. As elaborated earlier in this paper, the variable representing loans to non-financial private sector was selected as a proxy of money supply in the considered countries. Therefore, it is assumed that the relationship between loans to non-financial private sector and current account of a country was negative. Marshall (1923), Robinson (1937) and Lerner (1944) derived conditions for a currency devaluation to improve current account of a country. Consequently, the paper hypothesized positive relationship between real exchange rate depreciation and current account balance and implicitly tested Marshall - Lerner conditions in cases of these two considered countries. Conclusively, the main hypothesis of the research is formulated and states that domestic demand, real effective exchange rate and the loans to non-financial private sector are the factors determinants of the Serbian and Romanian current account. The main hypothesis of the paper is tested using state space model with time-varying parameters (TVP) approach. However, as any model represents simplified picture of the reality there are always some limitations. The research does not take into account potential effects from foreign direct investments, remittance or other financial flows that might influence money supply and consequently current account balance of a country.

3. RESEARCH DATA AND METHODOLOGY

The research is based on the quarterly data on imports, exports, domestic demand, real effective exchange rate index and loans to private sector. Time span for the Serbian case ranges from the first quarter of 2004 to the second quarter of 2017 while for the Romanian case time span corresponds to the Romanian EU membership starting with the first quarter of 2007 up to the last quarter of 2017. The imports, exports and domestic demand series were retrieved from National Bureaus of statistics while real effective exchange rate index and loans to private sector were retrieved from National Bank of Serbian and Romania, respectively. The observed series and corresponding variables are summarized in Table 1.

All of the variables under consideration (Table1) are X-13 ARIMA seasonally adjusted and are transformed to (natural) logarithm so as to the estimated coefficients can be interpreted as elasticities. Descriptive statistics of variables in econometric model is provided in Table A1 and A2 in the Appendix for the case of Romania and Serbia, respectively. The methodological approach in this paper differs from the most of earlier empirical studies on determinants of current account. This study employs a state space model with time-varying parameter instead of the commonly used time series methods like co-integration approach. Modelling the current account determinants in TVP framework allows us to improve understanding of the magnitude and dynamics of current account responses to changes in the domestic demand, real effective exchange rate and money supply. Following Harvey (1991), a general form of the state space model is presented in observation (1) and transition equation (2).

Table 1: The observed series and corresponding variables

The observed series	Variables
Imports (Total imports of goods and services at constant prices)	M_t
Exports (Total exports of goods and services at constant prices)	X_t
Domestic demand (Households consumption expenditure, general government consumption expenditure and gross capital formation at constant prices)	D_t
Loans to private sector (loans to non-financial private sector)	$LTPS_t$
Real effective exchange rate index (2010=100)	$REER_t$

Source: Author

$$Y_t = X_t \beta_t + \varepsilon_t,$$

$$\varepsilon_t \sim IIDN(0, \sigma^2) \tag{1}$$

$$\beta_t = \theta + \Gamma \beta_{t-1} + v_t,$$

$$v_{1,t} \sim IIDN(0, Q), \ E(e_t V_s) = 0 \tag{2}$$

Where:

Y_t - 1x1 vector presenting observed dependent variable,

X_t - kx1 vector presenting observed explanatory variables,

β - kx1 vector presenting un observed variables

Γ - kxk matrix of constant parameters

ε - error term in observation equation (1),

v_t - error term in transition equation (1) and

Q - the diagonal variance-covariance matrix.

Kalman (1960) illustrated the procedure to obtain filtered and smoothed estimates of unobserved time-varying coefficients (β_t) recursively. The prediction equation is given in the equation (3) and the covariance matrix is given in the 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, estimates are updated recursively following equations (5) and (6).

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

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

A time-varying parameters (TVP) model within state-space model consists of a measurement or observation equation and a state or transition equation. Thus, the current account determinants of Serbia can be specified in logarithmic form given by the equations (7) to (11):

$$\ln(CA_t) = \alpha_t + \beta_{1,t}\ln(D_t) + \beta_{2,t}\ln(REER_t) +$$

$$\beta_3, t\ln(LTPS_t) + \varepsilon_t, \ \varepsilon_t \sim IIDN(0, \sigma^2) \tag{7}$$

$$\alpha_t = \alpha_{t-1} + v_{0,t}, \ v_{1,t} \sim IIDN(0, \sigma_{v0}^2) \tag{8}$$

$$\beta_{1,t} = \beta_{1,t-1} + v_{1,t}, \qquad v_{1,t} \sim IIDN(0, \sigma_{v1}^2) \tag{9}$$

$$\beta_{2,t} = \beta_{2,t-1} + v_{2,t}, \qquad v_{1,t} \sim IIDN(0, \sigma_{v2}^2) \tag{10}$$

$$\beta_{3,t} = \beta_{3,t-1} + v_{3,t}, \qquad v_{1,t} \sim IIDN(0, \sigma_{v3}^2) \tag{11}$$

Where the measurement equation is given by equation (7) and transition equations by equations (8), (9), (10) and (11). Transition 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 $\ln(CA_t)$ is observed and presents current account dynamics as the difference between exports (X_t) in natural log values and imports (M_t) in natural log values given by the equation (12):

$$\ln(CA_t) = \ln(X_t) - ln(M_t) \tag{12}$$

$\ln(D_t)$, $\ln(REER_t)$ and $\ln(LTPS_t)$ explanatory variables or observed exogenous variables that relate the observable dependent variable with the unobservable

Table 2: Estimation results (state space model with TVP) under competing approaches – Serbian case

	Final state	Root MSE	z-statistic	p-value
Constant	9.21	2.49	3.69	0.000
ln(D)	-1.48	0.22	-6.56	0.000
ln(REER)	0.33	0.21	1.54	0.060
ln(LTPS)	0.67	0.13	4.93	0.000
Log likelihood: -95.15		AIC:208.30		
Diagnostic tests:				
Ljung-Box Test statistic: 15.79		p-value: 0.200		
Jarque–Bera Test statistic: 0.67		p-value: 0.712		
ARCH Test statistic: 8.57		p-value: 0.739		

Source: Author

time-varying coefficients. The terms α_t, $\beta_{1,t}$, $\beta_{2,t}$ and $\beta_{3,t}$ 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), (8), (9), (10) and (11) 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 maximizing the Likelihood-function. Kalman filter is a recursive procedure that needs to set plausible initial values. To do so, the parameters of the model was first estimated by means of OLS and these parameters and fitted values of the state variables obtained from the OLS estimation was specified as initial values.

4. RESULTS AND DISCUSSION

Following the data sample and model specification described in the previous section of this paper, the estimates for the Serbian case were obtained and summarized in Table 2, while smoothed estimates are presented in Figures (1)-(4) in the Appendix.

Following the results in Table 2, Ljung-Box test statistic supported null hypothesis of no autocorrelation among residuals. Jarque–Bera test under null hypothesis assumes normal distribution of residuals and test statistic indicates acceptance of the null hypothesis. The results from ARCH test supported null hypothesis that assues homoscedastic variance of the residuals. Hence, diagnostic tests for the estimated model in Table 2 show no misspecification. The results in Table 2 reveal the sizable and significant elasticity of Serbian current account to changes in domestic demand pointing out the absorption approach as the most relevant to explain current account deficit in Serbia. Following absorption approach, surplus on current account requires aggregate expenditure to be smaller than domestic national income pointing out the role of fiscal policy. The effective policy measures in this case might be more than proportional decrease of aggregate expenditure comparing to national income. Slightly higher inflation target might increase exports while reducing imports and eventually cause aggregate expenditures to decrease. However, one should take into account relatively high unemployment rate in Serbia and fact that decrease of aggregate expenditure might have harmful effects on internal equilibrium. Therefore, this measure should be developed with caution. Following the results in Table 2, the Serbian balance of payments is responsive to change in the value of the Serbian currency devaluation, holding the significance level at 10%. The estimated elasticity accounts for the net effect of the change in real effective exchange rate indicating that devaluation improves the Serbian current account. However, large portion of banking deposits in Serbia is linked to foreign currency (mainly euro) what makes financial system in Serbia highly eouroized (Bošnjak et al. 2018b) and vulnerable to exchange rate fluctuations. Therefore, the fluctuation of Serbian currency is constrained. Furthermore, the results in Table 2 illustrate the more sizable and positive effect on the Serbian balance of payments arising from increase in loans to private sector comparing to Serbian currency devaluation. The response of the Serbian current account is not in line with monetary approach that assumes surplus in the current account in case the supply of money falls short of the demand for money. The empirical results in Table 2 indicate positive response of the Serbian current account to increase in loans to private sector. Therefore, in line with Huang and Liu (2017) the exporters in Serbia might be limited in access to financial resources. Therefore, relaxing the constraints of the Serbian exporters to access financial resources

might be the effective measure to improve Serbian current account.

Kovačević (2018) isolated the impact of structural and cyclical factors on Serbia's current account and found the structural factors as the major deficit drivers while cyclical factors slightly reduced the current account deficit in the post-crisis period. Therefore, Serbia's current account deficit is a structural rather than cyclical issue that needs to be resolved with a carefully designed policy mix. The effective control over domestic demand in Serbia might be established through the fiscal policy while the Serbian competitiveness might be improved by facilitating financial support to the Serbian exporters and modest depreciation of the Serbian currency. Bartlett and Prica (2017) pointed out the high level of public and external debt in Serbia as well as high indebtedness in other Western Balkan countries. Therefore, the desired policy mix in Serbia should incorporate the public debt management as the inevitable component. Following the data sample and model specification described in the previous section of this paper, the estimates for the Romanian case were obtained and provided in Table 3, while smoothed estimates are illustrated in Figures (5)-(8) in the Appendix.

Based on the results in Table 3, Ljung-Box test statistic supported null hypothesis indicating no autocorrelation among residuals. Jarque–Bera test statistic indicates acceptance of the null hypothesis that assumes normally distributed residuals. Null hypothesis of ARCH test assumes homoscedastic variance of the residuals and test statistic supported the null hypothesis. Therefore, diagnostic tests for the estimated model in Table 3 show no misspecification. Following the estimated results for the Romanian case in Table 3, the Romanian current account is less elastic to change in domestic demand, comparing to Serbian case. Furthermore and contrary to the Serbian case, the

real depreciation of Romanian currency appears to have negative effects on Romanian current account. Therefore, one can conclude implicitly that Marshall-Lerner condition is not fulfilled. Ban and Maftei (2014) pointed fiscal balance along with the exchange rate and trade openness as the drivers of current account deficit. The findings for the Romanian case in Table 3 are consistent with the monetary approach holding that the excess of money supply over money demand reflects the current account deficit. Since the Romania is integrated in the EU, it is reasonable to assume that the key point lies in the foreign component of the Romanian monetary base. Moreover, the literature review shows that over – extensive banks' lending might have the adverse effects on the current account and Romanian case supports that stand of literature. As well as in the Serbian case, the Romanian current account deficit is accompanied with the high-level external indebtedness, both sovereign and private (Zaman and Georgescu 2015). Eventually, desired policy mix on the path to the Romanian current account balance needs to be different comparing to the Serbian case. The most prominent drivers of the Romanian current account imbalance appear to arise out of monetary sector. Consequently, monetary policy measures are needed to establish control over money supply in Romania. Additionally, fiscal policy as well as public debt management should not be neglected.

5. CONCLUDING REMARKS

There are several conclusions that can be drawn out of the research presented in this paper. Firstly, time –varying specification of the state space model provided accurate, robust and theoretically consistent estimates of the Serbian and Romanian current account determinants. Secondly, as suggested by the

Table 3: Estimation results (state space model with TVP) under competing approaches – Romanian case

	Final state	**Root MSE**	**z-statistic**	**p-value**
Constant	16.11	3.15	5.10	2.00E-07
$\ln(D)$	-0.34	0.18	-1.92	0.027
$\ln(REER)$	-1.68	0.28	-6.02	8.46E-10
$\ln(LTPS)$	-0.20	0.12	-1.68	0.045
Log likelihood: -94.07			AIC: 206.15	
Diagnostic tests:				
Ljung-Box Test statistic: 8.63			p-value: 0.734	
Jarque–Bera Test statistic: 1.46			p-value: 0.480	
ARCHTest statistic: 15.33			p-value: 0.223	

Source: Author

results of the research presented in this paper and absorption approach to balance of payment, the Serbian current account is under strong pressure of the domestic demand. Furthermore and consistently with Keynesian theory, Serbian current account is elastic to changes in real exchange rate. However, the space for Serbian currency devaluation is limited due to the high level of euroization in the Serbian financial system. Thirdly, the sizable, positive and significant effect from loans to private sector to Serbian current account is found, indicating the need of the exporters for the additional financial resources. Eventually, based on the research results and theoretical foundations the policy mix to resolve the issue of Serbian current account deficit is drawn out. The effective policy mix should incorporate fiscal policy measures in order to hold the domestic demand in Serbia on its sustainable level. However, it is necessary to improve the competitiveness of the Serbian economy and allowing Serbian exporters to access necessary financial resources would be desirable part of the policy mix. Only modest depreciation of Serbian currency can be expected, since the higher level of depreciation might have harmful effects on the Serbian financial system and consequently on the Serbian economy as whole. Due to the high level of public and external debt in Serbia, public debt management should be an inevitable part of the desired policy mix to resolve the issue of Serbian current account deficit. Unlike the Serbian case, the Romanian current account is under pressure of money supply hence the Romanian current account deficit can be explained following monetary approach. Consequently, besides fiscal policy and public debt management policy mix needs to include the monetary policy measures directed towards efficient control of the money supply.

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Appendix

**Table A1:** Descriptive statistics of variables in log values – the case of Romania

	Current account (CA)	Domestic demand (D)	Loans to private sector (LTPS)	Real effective exchange rate (REER)
Min.	-0.55675	11.54	19.62	4.512
1st Qu.	-0.21416	11.80	20.35	4.548
Median	-0.11176	11.90	20.42	4.555
Mean	-0.15883	11.92	20.35	4.605
3rd Qu.	-0.03482	12.05	20.45	4.604
Max.	0.02140	12.26	20.50	4.850

Source: Author

Table A2: Descriptive statistics of variables in log values – the case of Serbia

	Current account (CA)	Domestic demand (D)	Loans to private sector (LTPS)	Real effective exchange rate (REER)
Min.	-0.7806	12.88	12.31	4.597
1st Qu.	-0.5793	13.41	13.46	4.743
Median	-0.4085	13.64	14.22	4.768
Mean	-0.4161	13.59	13.87	4.764
3rd Qu.	-0.2325	13.85	14.36	4.829
Max.	-0.1257	13.95	14.45	4.940

Source: Author

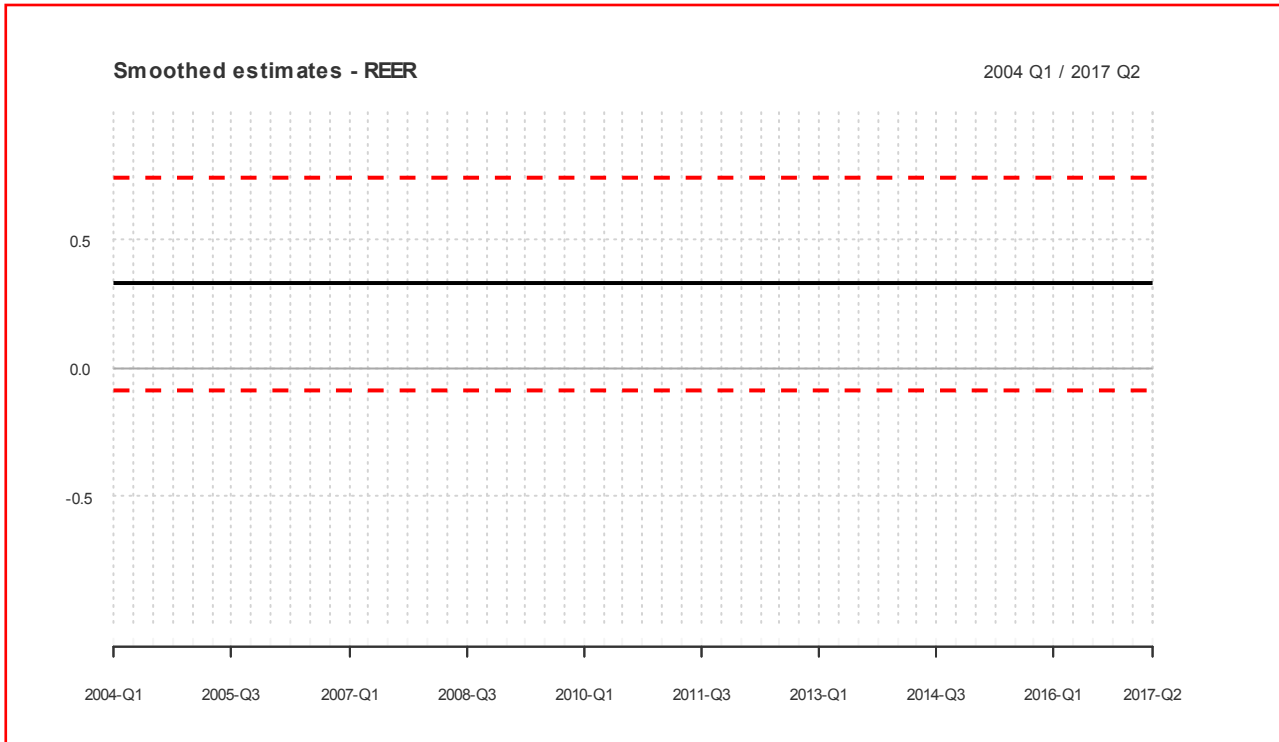**Figure 1:** Serbian case: estimates of constant (α)
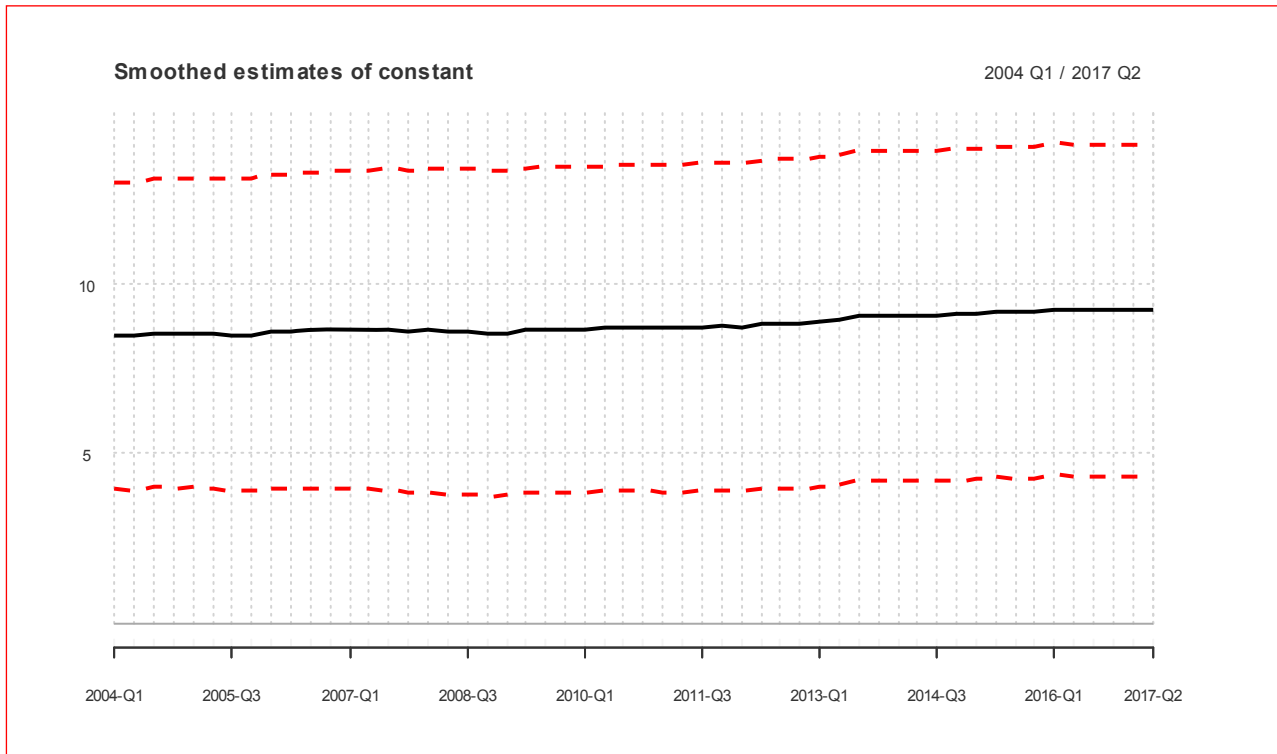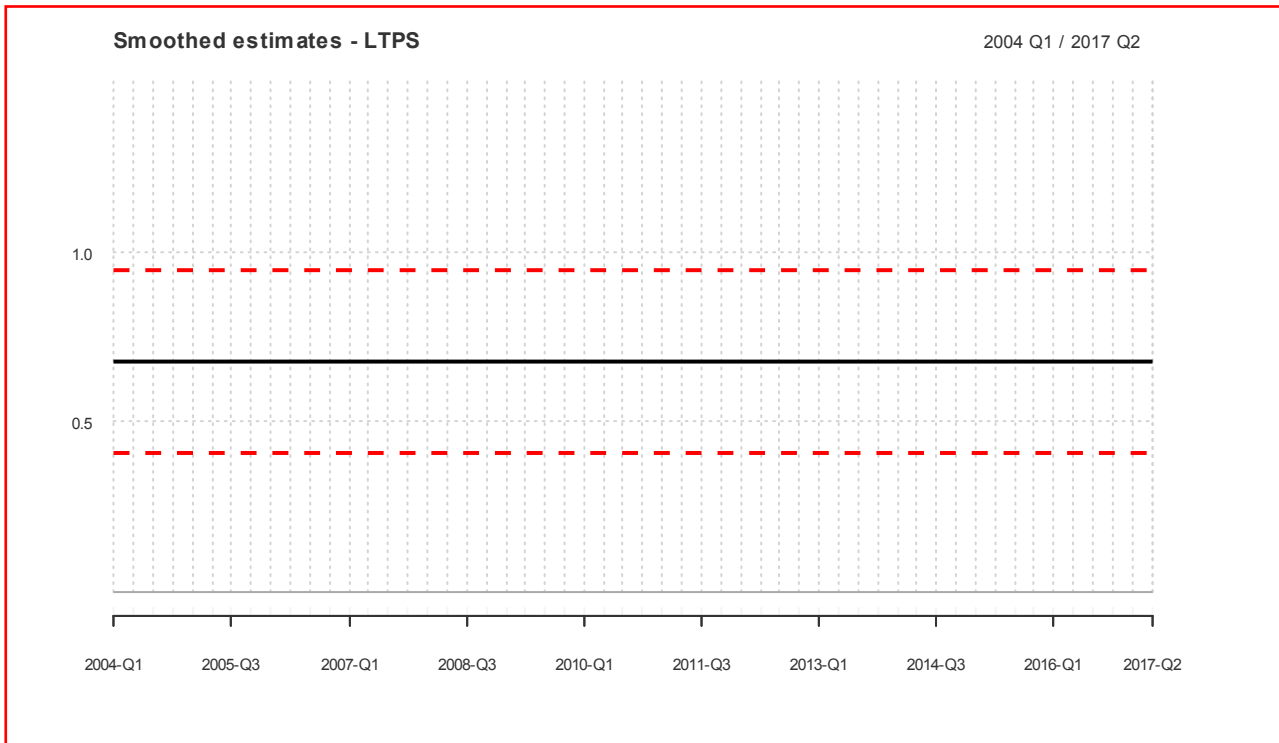

Source: Author

Figure 2: Serbian case: estimates of elasticity of current account on change in domestic demand (β1(t))
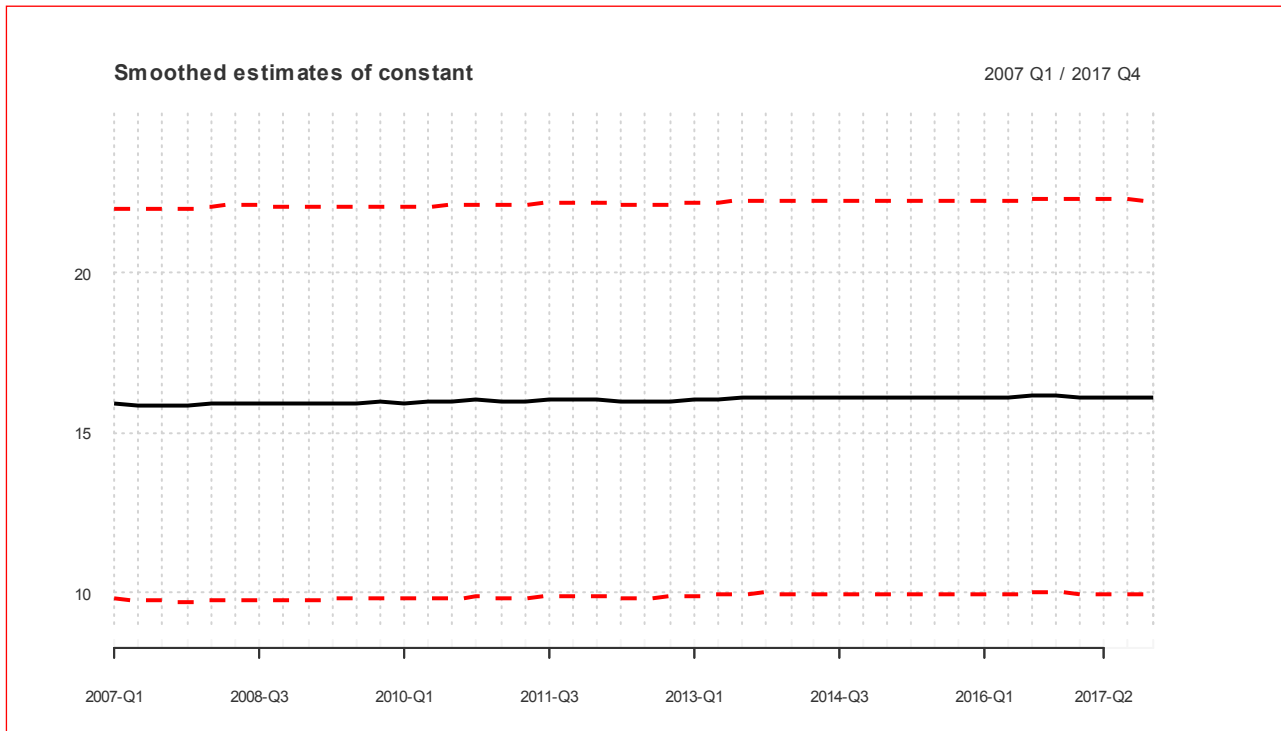

Source: Author

Figure 3: Serbian case: estimates of elasticity of current account on change in real effective exchange rate (β2(t))
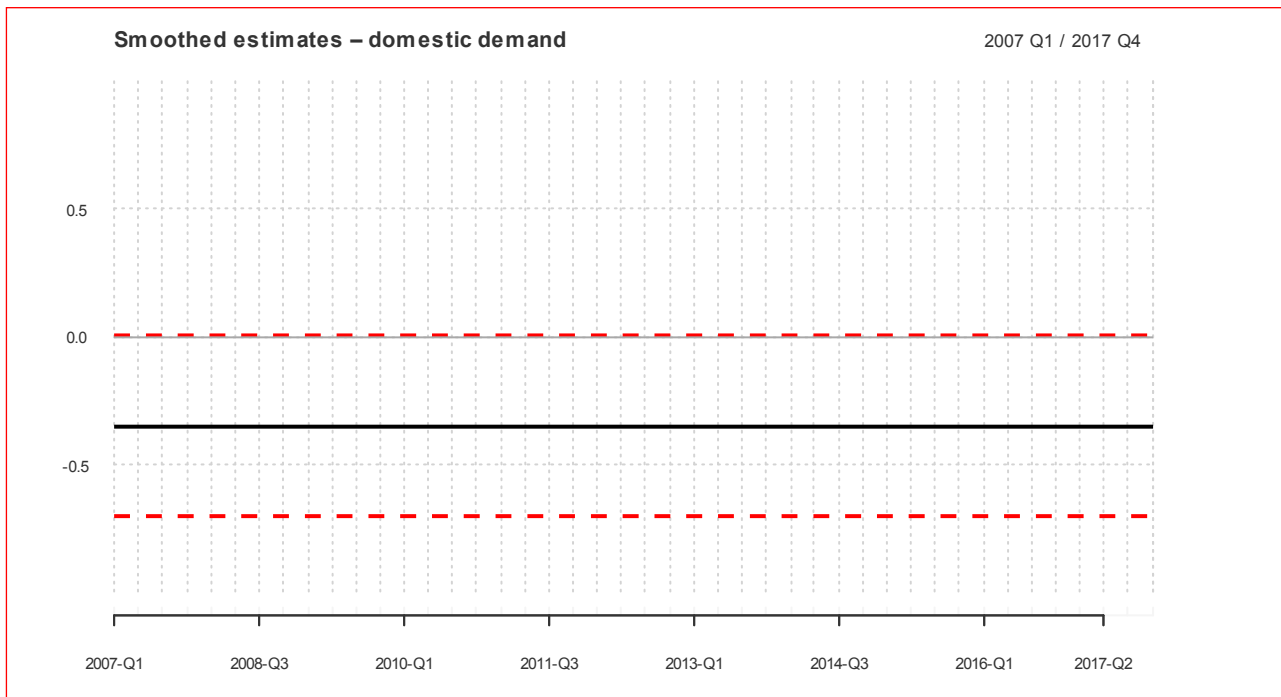

Source: Author

Figure 4: Serbian case: estimates of elasticity of current account on change in loans to non-financial private sector (β3(t))
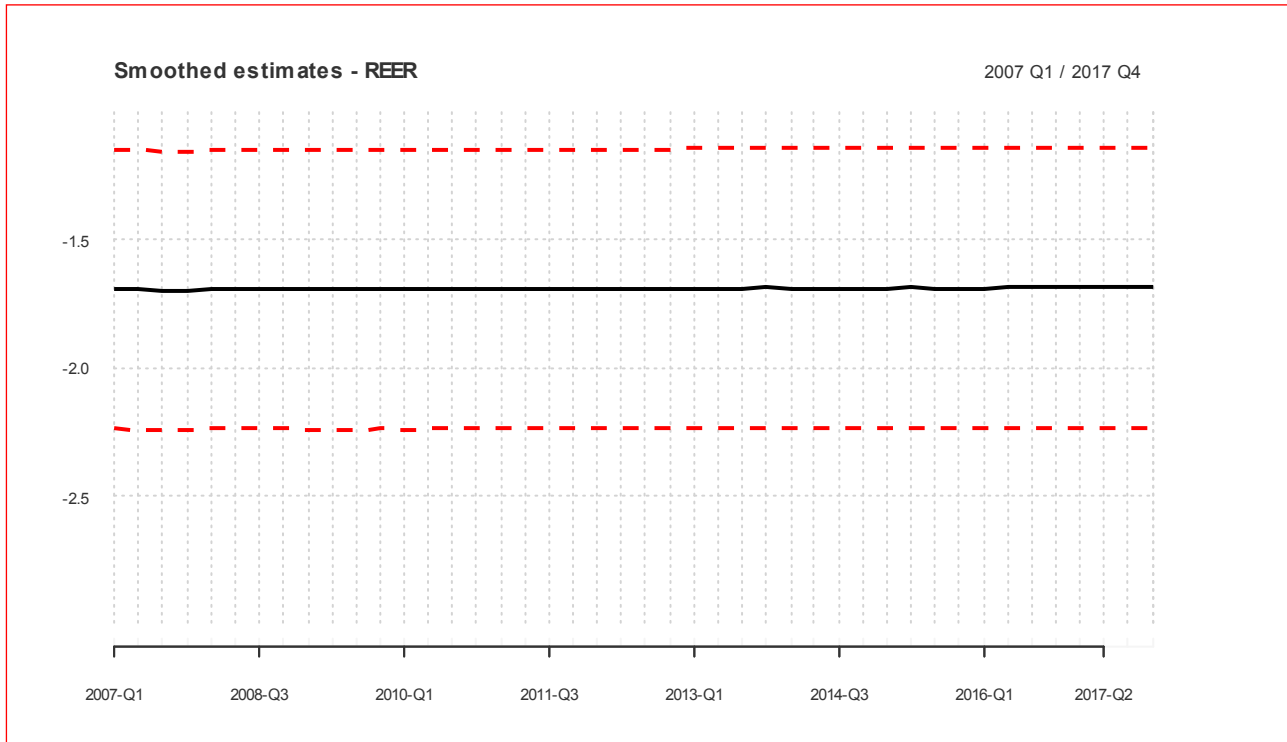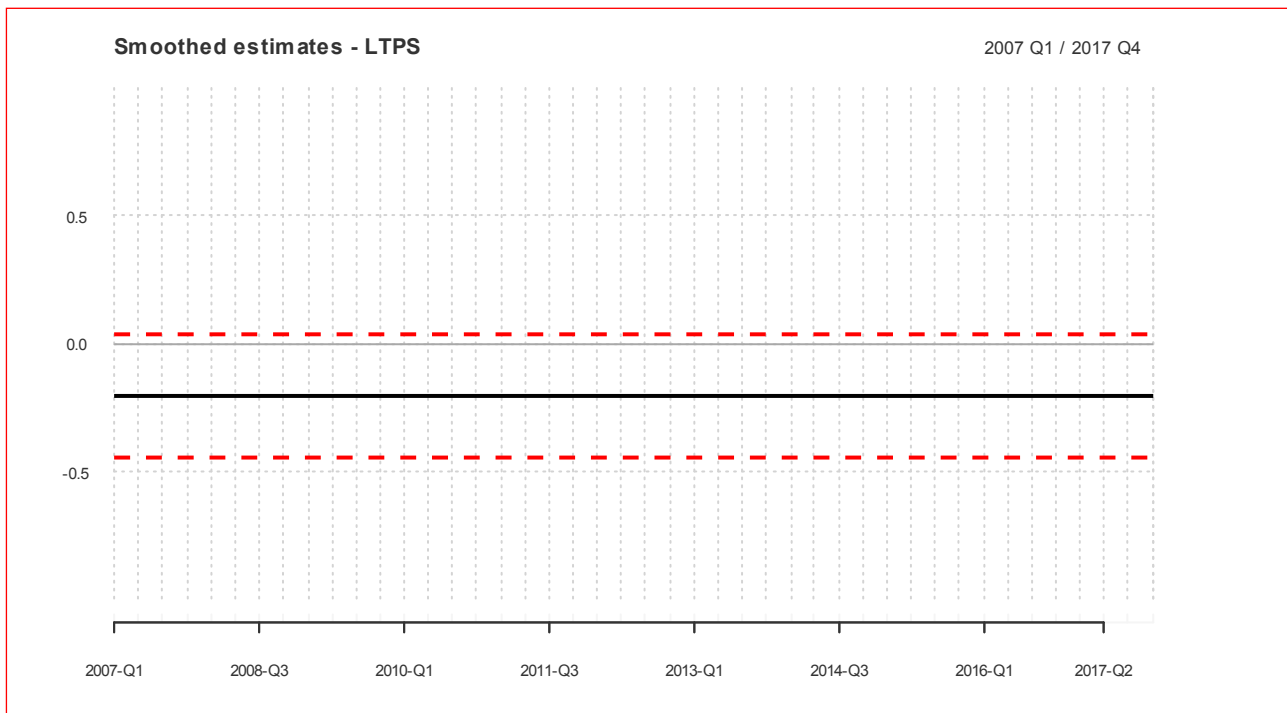

Source: Author

Figure 5: Romanian case: estimates of constant (α)

Source: Author

Figure 6: Romanian case: estimates of elasticity of current account on change in domestic demand (β1(t))

Source: Author

Figure 7: Romanian case: estimates of elasticity of current account on change in real effective exchange rate (β2(t))

Source: Author

Figure 8: Romanian case: estimates of elasticity of current account on change in loans to non-financial private sector (β3(t))

Source: Author