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Odnos uzročnosti između bilansa tekućeg i finansijskog računa zemalja Zapadnog Balkana – slučaj Srbije

Radovan Kovačević Ekonomski fakultet, Univerzitet u Beogradu
e-mail: radovank@ekof.bg.ac.rs

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Rezime: Zemlje Zapadnog Balkana (ZB) su registrovale porast deficita tekućeg računa (TR) i neto priliva kapitala u periodu pre izbijanja finansijske krize 2008. godine. Spoljni dug ovih zemalja je porastao. Cilj ovog rada je da istraži uzročnost između bilansa TR i finansijskog računa (FR) Srbije. Okvir za empirijsku analizu je vektorski autoregresioni (VAR) model i vektorski model sa korekcijom ravnotežne greške (VEC model). Primenom Johansenovog testa kointegracije utvrđeno je postojanje dugoročne uzročnosti između ove dve varijable. Ocenjeni dugoročni koeficijent uz varijablu FR kao nezavisnu promenljivu pokazuje da porast salda FR Srbije za 1% dovodi do povećanja deficita TR Srbije za 0,58%. Primenom testa Grejndžerove uzročnosti utvrđeno je da postoji uzročnost od FR prema TR, iz čega proističu preporuke za nosioce ekonomske politike. Ovi rezultati ukazuju na potrebu kontinuirane provere održivosti deficita TR Srbije, kao i potrebu nadgledanja nivoa prisustva stranog kapitala u privredi Srbije.

Ključne reči: tekući račun, finansijski račun, kointegracija, Grejndžerova uzročnost, VAR model, VEC model, Zapadni Balkan, Srbija

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Uvod

Zemlje ZB (Albanija, Bosna i Hercegovina, Crna Gora, Severna Makedonija, Srbija) beležile su rast neto priliva stranog kapitala, ali i rast deficita TR u razdoblju pre izbijanja globalne finansijske krize 2008. godine. Priliv kapitala je omogućio rast domaće tražnje zemalja ZB, što je doprinelo širenju deficita trgovinskog bilansa. Značajan deo neto priliva kapitala je usmeren na razvoj infrastrukture, kao važne pretpostavke za jačanje konkurentnosti privrede zemalja ZB. Međutim, pošto je rastao trgovinski deficit, nametnulo se pitanje efikasnosti stranog kapitala u podizanju izvozne konkurentnosti privrede. Trgovinski deficit i deficit TR porasli su do neodrživog nivoa pre izbijanja globalne finansijske krize. Ipak, u periodu posle krize došlo je do značajnog smanjivanja deficita TR, što je popravilo makroekonomske performanse ovih zemalja. Međutim, poslednjih godina je došlo do širenja deficita TR. Usled toga, pitanje njegove održivosti opet postaje aktuelno (Bartlett & Prica, 2017). To je i razumljivo ako se zna da je odnos spoljnog duga i izvoza kod većine zemalja ZB prilično visok, što je bitan pokazatelj njihove eksterne solventnosti. Spoljnotrgovinski trendovi u svim zemljama ZB su slični, mada postoje razlike u njihovoj međunarodnoj ekonomskoj poziciji (Kitova & Steinhauzer, 2018).

Položaj zemalja ZB na međunarodnom tržištu kapitala danas u velikoj meri zavisi od performansi njihovog platnog bilansa. Zemlje koje karakteriše deficit TR prinuđene su da u FR formiraju suficit pomoću koga se finansira ovaj deficit. Za svaku zemlju koja ima dugoročni deficit TR je značajno da oceni održivi nivo spoljnog duga u funkciji finansiranja ovog deficita (Bulut, 2011; Rosini & Zanghiery, 2009). Rasprostranjeno gledište u literaturi je da se deficit TR uglavnom formira kao posledica deficita trgovinskog bilansa (Cota et al., 2017), koji ujedno predstavlja transfer inostrane akumulacije u domaću zemlju. Pri tome je inostrana akumulacija dopuna male domaće štednje (Chinn & Prasad, 2003; Makin & Narayan, 2008). S obzirom na nedovoljnu domaću štednju, zemlje ZB se u investiranju oslanjaju na strana sredstva, pre svega na strane direktne investicije (SDI) (Popović & Erić, 2017). Očekuje se da se strana akumulacija pretvori u realne investicije, koje u budućnosti mogu da doprinesu povećanju izvoza i izvoznih prihoda. Svakako da i rastuće investiranje podrazumeva rast agregatne tražnje, koja se jednim delom zadovoljava iz uvoza, i vrši povratni pritisak na rast trgovinskog deficita i deficita TR. Priliv stranog kapitala, preko apresijacije deviznog kursa, vodi pogoršanju TR (Kim & Kim, 2011). Poslednjih godina, priliv SDI u zemlje ZB je porastao, mada on još uvek zaostaje za drugim zemljama u tranziciji (Estrin & Uvalić, 2014). Posredstvom SDI, zemlje se uključuju u globalne lance isporuke (eng. global value chains - GVCs), što doprinosi povećanju njihovog izvoza (Shimbov et al., 2019; Stöllinger, 2016; Srholec, 2007) i strukturnim promenama privrede (McMillan et al., 2014). Međutim, u zemljama koje su značajni domaćini za SDI, javlja se dodatni problem za njihov platni bilans. Naime, koliko god priliv SDI u početnim fazama rasterećuje platni bilans zemalja domaćina od pritiska za dodatno zaduživanje u inostranstvu, u kasnijim fazama (kad prestane reinvestiranje ostvarenog profita), raste pritisak u računu primarnog dohotka. Zemlje sa velikim neto prilivom SDI suočavaju se sa rastućim negativnim saldom računa primarnog dohotka, koji povećava deficit njihovog TR. Na kraju se opet nameće pitanje finansiranja ovog deficita.

Struktura priliva stranog kapitala i regulacija finansijskog tržišta takođe utiču na dugoročne performanse platnog bilansa (Moral-Benito & Roehn, 2016). Strani kapital u zemljama ZB ispoljava navedene uticaje na privrede ovih zemalja i njihov platni bilans. U ovom radu se ispituje međuzavisnost između bilansa TR i FR na primeru Srbije, kao reprezentativnoj zemlji sa područja ZB.

Preostali deo rada strukturiran je na sledeći način. U drugom delu se prezentira pregled literature na području međuodnosa između TR i FR. U trećem delu su izloženi istraživački ciljevi, metodologija istraživanja i opisani korišćeni podaci. U četvrtom delu se daju empirijski rezultati istraživanja i diskusija, dok su u poslednjem, petom delu, dati zaključci.

Pregled literature

Literatura koja obrađuje međusobne uticaje TR i FR uglavnom se razlikuje prema pravcu uslovljenosti (da li neravnoteža TR uslovljava neravnotežu FR ili obratno), kao i prema mehanizmima transmisije uticaja jedne na drugu pojavu. Razlike se uglavnom svode na inicijalni impuls koji doprinosi porastu agregatne tražnje, usled koga u otvorenoj privredi dolazi do smanjivanja suficita ili porasta deficita TR.

Pristalice gledišta po kome TR uslovljava kretanje FR smatraju da porast agregatne tražnje utiče na porast uvoza, a zatim dolazi do induciranog priliva kapitala radi pokrića novonastale neravnoteže. Kao argument navode mogućnost da ekspanzivna fiskalna politika podstakne rast potrošnje ili investicija, i da zbog toga nastupa poremećaj u FR. Ukoliko se ekspanzivna fiskalna politika sprovodi putem deficitnog finansiranja (budžetski deficit), onda država nastoji da se zaduži na tržištu kapitala (Bernheim, 1988). Ako se radi o zaduživanju u inostranstvu, to predstavlja, prema shvatanju ovih ekonomista, dokaz da je porast agregatne tražnje, uslovljen porastom budžetske potrošnje, zahtevao inostrano finansiranje. U tom slučaju se dolazi do zaključka da poremećaj TR uslovljava poremećaj FR. Sličan sled događaja može nastupiti usled ekspanzivne monetarne politike. Xie & Chen (2014) su istraživali međusobnu uzročnost između deficita TR i budžetskog deficita za 11 zemalja OECD, koristeći Grejndžerov test uzročnosti (Granger, 1969). Njihovi nalazi pokazuju da između ovih varijabli postoji dvosmerna uzročnost. Autori su došli do zaključka da budžetski deficit uslovljava rast domaćih kamatnih stopa, što za sobom povlači strani kapital, usled čega dolazi do apresijacije domaće valute, a zatim i do deficita TR (Salvatore, 2006). Grier & Ye (2009) su pokazali da su serije budžetskog deficita i TR stacionarne i uslovno heteroskedastične, i da na dugi rok ne poseduju zajedničku putanju. Takođe je otkriveno da kratkoročnu dinamiku karakteriše perzistentno pozitivan međuodnos između šokova budžetskog deficita i šokova deficita TR.

Urbanovski (2017) je ispitivao međuodnose između nominalnog deviznog kursa, TR i FR Češke Republike. Primenjena je kointegraciona analiza i model sa korekcijom ravnotežne greške (eng. vector error correction - VEC model), a dobijeni rezultati pokazuju da postoji Grejndžerova uzročnost od TR prema FR, ali i obratno. Autor je upozorio da preterana liberalizacija češkog finansijskog sistema može dovesti do velikog priliva kapitala, a time i do smanjivanja

suficita (ili produbljivanja deficita TR), što bi moglo izazvati valutnu krizu u toj zemlji. Yan (2005) je ispitivao međuodnos TR i FR za razvijene zemlje i došao do zaključka da promene u TR uzrokuju promene FR, odnosno da FR služi za finansiranje neravnoteže TR. Do sličnog zaključka je došao Tang (2014) na osnovu analize privrede SAD. Oeking & Zwick (2015) su analizirali dinamiku TR i dinamiku različitih vidova neto tokova kapitala (portfolio tokovi, direktne investicije i tokovi ostalih investicija) za odabrane OECD zemlje pomoću koncepta Grejndžerove uzročnosti. Osim toga, sproveli su testiranje radi provere da li se pravac Grejndžerove uzročnosti menja tokom konjunkturnog ciklusa. Rezultati testa su pokazali da postoji Grejndžerova uzročnost od promena TR ka promenama komponenti FR. Pored toga, uočeno je da se za kratkoročne tokove pravac uzročnosti menja u zavisnosti od faze konjunkturnog ciklusa: u vreme pada privredne aktivnosti finansijski tokovi finansiraju TR, dok u vreme oživljavanja privrede finansijski tokovi induciraju promene TR.

Druga grupa ekonomista smatra da porast priliva kapitala u zemlju dovodi do poremećaja TR. Oni zastupaju gledište po kojem rastući priliv kapitala dovodi do apresijacije domaće valute, što podstiče uvoz i vodi neravnoteži TR (Abell, 1990). Naročito se spominje da priliv SDI dovodi do porasta uvoza tehnologije, opreme i sirovina, što može usloviti pogoršanje TR zemlje. U literaturi postoji veliki broj radova koji pronalaze uzročnost od FR ka TR. Garg & Prabheesh (2015) su na slučaju Indije utvrdili da između TR i računa kapitala ne postoji uzročna veza. Zatim su sproveli empirijsko istraživanje uzročnih odnosa između komponenti TR i računa kapitala posredstvom deviznog kursa. Utvrdili su da postoji uzročna veza od nedužničkih tokova kapitala prema TR, posredstvom realnog efektivnog deviznog kursa. Dakle, dekompozicija tokova kapitala je doprinela da se sagleda međusobni uticaj posmatranih varijabli. Preporuka ovog rada je da je potrebno unaprediti stabilnost finansijskog sektora pre nego što se izvrši potpuna liberalizacija računa kapitala. Turan (2015) je sproveo empirijsku analizu međuodnosa između TR i FR i njegovih glavnih komponenti. Na uzorku od nekoliko zemalja (Hrvatska, Mađarska, Poljska i Slovenija) je primenio Toda-Jamamoto test Grejndžerove uzročnosti (Granger, 1969), koristeći kvartalne podatke. Autor je došao do zaključka o postojanju jednostrane uzročnosti od FR prema TR za Hrvatsku i Sloveniju, odnosno od TR prema FR za Poljsku i Rumuniju, dok je u slučaju Mađarske otkrivena dvosmerna uzročnost. Yan & Yang (2008) su empirijski dokazali da priliv stranog kapitala može prouzrokovati perzistentnost deficita TR i dovesti do valutne krize. Takođe je pokazano da se priliv stranog kapitala i neravnoteža računa kapitala prepliću na različite načine između zemalja u razvoju i zemalja sa tržištem u nastajanju. Koristeći Grejndžerov test uzročnosti, autori su došli do zaključka da postoji uzročnost od priliva stranog kapitala prema TR u slučaju zemalja sa tržištem u nastajanju, dok je u slučaju razvijenih zemalja utvrđena zanemarljiva uzročnost. S obzirom na relativno nedovoljno razvijena finansijska tržišta, ovi autori zemljama sa tržištem u nastajanju preporučuju opreznost na području upravljanja velikim prilivom kapitala. Mastroyiannis (2012) je ispitivao međuodnos između TR i FR portugalske privrede. Primenjena kointegraciona analiza sugeriše postojanje dugoročne veze između priliva stranog kapitala i stanja TR, pri čemu postoji jednosmerna uzročnost od priliva stranog kapitala prema stanju TR. Međutim, autor je zaključio da na kratak rok postoji dvosmerni uticaj između ove dve varijable. Fry et al. (1995) su utvrdili da je kod pojedinih zemalja u razvoju

međuodnos između TR i FR jednosmeran, kod drugih dvosmeran, a da za neke zemlje ne postoji uzročnost između ovih računa.

Ciljevi istraživanja, metodologija i podaci

Namera ovog rada je da istraži pravce uzročnosti između TR i FR Srbije. Da bi se to postiglo, postavljeni su sledeći ciljevi: 1) da se prezentiraju dosadašnji nalazi u literaturi o međuodnosu između TR i FR; 2) da se postavi adekvatna metodologija istraživanja; 3) da se izlože i diskutuju rezultati empirijske analize o uzročnosti između TR i FR Srbije.

U radu se analizira period 2000 – 2019. godine. Originalni podaci su iskazani u evrima. Za svaku varijablu se koriste dve serije podataka: godišnji podaci za period 2000 – 2019. i kvartalni podaci za period 2007 – 2019. Kvartalne serije su formirane agregiranjem mesečnih podataka i služe za proveru robustnosti ocenjenog ekonometrijskog modela. Vremenske serije su za potrebe empirijske analize transformisane u prirodne logaritme. Serija označena kao LTR predstavlja logaritmovane vrednosti vremenske serije TR, dok LFR predstavlja logaritmovane vrednosti vremenske serije FR. Podaci su preuzeti sa sajta Narodne banke Srbije (https://www.nbs.rs/internet/cirilica/80/platni_bilans.html), pristupljeno 18.06.2020. Podaci za period 2007 – 2019. dati su prema BPM06 (Metodologija izrade platnog bilansa prema uputstvu MMF-a) i usklađeni su sa metodologijom BPM05, koja se odnosi na period 2000 – 2006. godine. Kao okvir za empirijsku analizu međusobnog odnosa spomenute dve vremenske serije, u radu su primenjeni VAR i VEC model. U radu će biti prvo izvršena provera stacionarnosti vremenskih serija u nivou. Koristeći standardne modele za testiranje jediničnog korena, utvrdili smo da su serije integrisane reda 1, što se uglavnom označava kao I(1). Sledeći korak je ocena VAR modela da bi se utvrdio red modela (autoregresiona struktura), relevantan za sprovođenje testa kointegracije. Da bismo utvrdili da li su varijable u našem modelu kointegrisane, u radu je primenjen kointegracioni test prema metodologiji koju su razvili Johansen (1991, 1995) i Johansen & Juselius (1990). Ova metodologija je uključena u softverski paket EViews 11 (EViews, 2020), koji je korišćen u ovom radu. Polazna tačka ove metodologije je VAR model reda *p* definisan kao:

$$y_t = \delta + A_1 y_{t-1} + \ldots + A_p y_{t-p} + Bx_t + \varepsilon_t \quad (1)$$

gde je y_t vektor nestacionarnih endogenih varijabli *k* x *1*, , ..., A_p je matrica parametra dimenzije *k* x *p*, x_t je *d* x *1* vektor egzogenih (determinističkih) varijabli, *B* je matrica parametara egzogenih varijabli dimenzije *k* x *d*, ε_t je *k* x *1* vektor slučajne komponente modela, δ je slobodan član, *p* je red docnje u VAR modelu (Lütkepohl, 2005). VAR se može preurediti kao:

$$\Delta y_t = \delta + \prod \ddot{A} y_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \quad y_{t-1} + Bx_t + \varepsilon_t \quad (2),$$

gde je

$$\Pi = \sum_{i=1}^{p} A_i - I \text{ i } \Gamma_i = -\sum_{j=i+1}^{p} A_j \text{ . (3)}$$

Π je matrica kointegracionog koeficijenta (matrica dugoročnog uticaja), Γ je matrica koeficijenta diferencirane vrednosti varijable *y* (matrica kratkoročnog uticaja). Ako matrica koeficijenta Π ima reduciran rang *r* < *k*, onda postoji *k* x *r* matrica α i β, svaka ranga *r*, tako da je Π = αβ' i $\beta' y_t$ stacionarno. β predstavlja kointegracioni vektor, a *r* je broj kointegracionih relacija (eng. cointegration rank). Matrica α sadrži parametre prilagođavanja VEC modela. Vektor opisan kao $\beta' y_{t-1}$ može se interpretirati kao rastojanje varijable od njene ravnotežne vrednosti. Ako je *r* = 0, između varijabli ne postoji kointegracija, tako da je u tom slučaju Π=0.

U literaturi postoje različiti postupci za ocenu postojanja kointegracije. U ovom radu ćemo koristiti Johansenov postupak da bismo testirali postojanje kointegracija i da bismo ocenili kointegracione parametre. Johansenov metod ocenjuje Π matricu u VAR-u bez ograničenja, a zatim se sprovodi test da se utvrdi da li se može odbaciti ograničenje usled smanjivanja ranga Π. Za dato *r*, estimator maksimalne verodostojnosti kointegracionog vektora β definiše kombinaciju od y_{t-1}, koja omogućuje za *r* najveću kanoničnu korelaciju Δy_t sa y_{t-1} posle korekcije za pomaknute diference determinističke varijable, ako postoje. Johansen preporučuje dva različita testa signifikantnosti ovih kanoničnih relacija i smanjenog ranga Π matrice: test traga i test maksimalne verodostojnosti. Statistika traga se izračunava kao:

$$J_{trace} = -T \sum_{i=r+1}^{k} \log(1-\lambda_i) \text{ (4),}$$

gde je λ_i najveća i-ta verodostojnost Π matrice, a *T* veličina uzorka.

Statistika maksimalne verodostojnosti se izračunava kao:

$$J_{max} = -T log(1-\lambda_{r+1}) \text{ (5)}$$

za r = 0, 1, ..., k-1. *T* u ovoj relaciji je veličina uzorka, a λ_i je *i*-ta najveća kanonična korelacija.

Pomoću testa traga se testira nulta hipoteza o postojanju *r* kointegracionih vektora nasuprot alternative hipoteze o postojanju *k* kointegracionih relacija, gde *k* predstavlja broj endogenih varijabli. Test maksimalne verodostojnosti testira nultu hipotezu o postojanju *r* kointegracionih relacija naspram alternativne da postoji *r + 1* kointegracionih relacija. Asimptotske kritične vrednosti se dobijaju u softverskom paketu EViews 11, koji smo koristili u ovom radu. Ukoliko se utvrdi postojanje dugoročne veze između varijabli, to će biti dokaz da su one kointegrisane.

Nakon utvrđivanja broja kointegracionih vektora, u radu je ocenjen adekvatan VAR model. Zatim je ispitana kratkoročna dinamika tako što je ocenjen vector error correction (VEC) model. Ako su varijable u VAR modelu kointegrisane, to znači da se VAR model može prikazati kao VEC model. Dakle, VEC je sličan VAR modelima i može se iskazati kao VAR model u jednačini (2). U radu se primenjuje Grejndžerov test uzročnosti da bi se otkrio pravac uzročnosti između varijabli.

Rezultati i diskusija

Prvi korak u empirijskoj analizi je provera stacionarnosti vremenskih serija TR i FR Srbije. Primenom proširenog Diki-Fulerovog (eng. Augmented Dickey-Fuller (ADF)) testa jediničnog korena (Dickey & Fuller, 1979) ustanovljeno je da obe serije u nivou poseduju najmanje po jedan jedinični koren. U drugoj iteraciji je zaključeno da su obe serije integrisane reda I(1). Da bismo proverili da li postoji kointegracija između ove dve serije, primenjen je Johansenov test kointegracije u okviru VAR modela. Sledeći korak je iniciranje VAR modela da bi se utvrdio optimalni broj docnji. Izbor docnji je izvršen prema rezultatima višedimenzionog AIC (Akaike, 1974) i SIC (Schwartz, 1978) informacionog kriterijuma, koji sugerišu kao optimalne tri docnje. Isti kriterijumi upućuju na kointegracioni model koju uključuje konstantu kao determinističku komponentu. Uzimajući u obzir ove sugestije, i pošto obe vremenske serije poseduju po jedan jedinični koren, pristupili smo proveri da li postoji kointegracija između ove dve varijable pomoću Johansenovog testa kointegracije (Johansen, 1991; 1995). Rezultati testa daju se u tabeli 1.

Tabela 1: Johansenov test kointegracije

Statistika traga (Eng. Trace Statistics)				
Nulta hipoteza o broju kointegracionih jednačina	Karakteristična vrednost	Statistika traga	0,05 Kritična vrednost	p-vrednost**
H_0: r=0* $H_1: r>0$	0,656156	22,34686	20,26184	0,0255
H_0: r=1 $H_1: r>1$	0,218823	4,198217	9,164546	0,3834
Maksimalna verodostojnost (Eng. Maximum Eigenvalue Statistics)				
H_0: r=0* $H_1: r>0$	0,656156	18,14864	15,89210	0,0218
H_0: r=1 $H_1: r>1$	0,218823	4,198217	9,164546	0,3834

*Napomene: * Označava odbacivanje hipoteze na nivou značajnosti od 0,05. ** MacKinnon-Haug-Michelis (1999) p-vrednost. Test statistike traga i maksimalne verodostojnosti ukazuju na postojanje jedne kointegracione jednačine na nivou značajnosti od 0,05.*

Izvor: Proračun autora

U tabeli 1. je testirana nulta hipoteza o odsustvu kointegracije između posmatranih varijabli, naspram alternativne da između njih postoji najmanje jedna kointegraciona relacija: $H_0: r=0$ (nema kointegracije) i $H_1: r>0$ (postoji najmanje jedna stacionarna veza) (r je broj stacionarnih kombinacija). Zaključak je da postoji jedna kointegraciona jednačina na nivou značajnosti od 5%. Budući

da su posmatrane vremenske serije kointegrisane, u narednom koraku ćemo koristiti VAR model koji uključuje vremenske serije u nivou.

Pošto je u modelu identifikovana jedna kointegraciona relacija, u tabeli 2 je data ocena dugoročne veze između posmatranih varijabli. Ocenjen je kointegracioni vektor β. Ove ocene se zasnivaju na normalizaciji $\beta' S_{11} \beta = I$, pri čemu je S_{11} definisano u Johansen (1995). Ocenjeni koeficijenti obe varijable su bez ograničenja. Svaka varijabla je posmatrana pojedinačno kao nezavisna promenljiva (model se ocenjuje dva puta). Znaci uz ocenjene kointegracione koeficijente u tabeli 2 su obrnuti zbog normalizacije. U Relaciji 1 tabele 2 posmatra se LTR kao zavisna varijabla, a u Relaciji 2 zavisna varijabla je LFR.

Tabela 2: Dugoročna veza između varijabli

	LTR	LFR	C
Relacija 1	1,000	-0,576 (0,152) [-3,796]	-3,425 (1,181) (-2,899)
Relacija 2	-1,737 (0,317) [-5,483]	1,000	5,949 (2,418) [2,460]

Napomena: U ( ) je data standardna greška a u [ ] t-statistika.

Izvor: Autor

U relaciji 1 tabele 2, u kojoj je normalizacija izvršena na LTR, koeficijent uz LFR (-0,576) znači da porast salda FR (suficit) od 1% dovodi do rasta deficita TR za 0,58% (porast zaduženosti zemlje prema inostranstvu dovodi do povećanja deficita TR). Relacija 2 pokazuje da porast deficita TR za 1% dovodi do porasta salda FR za 1,74%. Oba ocenjena koeficijenta su statistički signifikantna i imaju očekivani predznak.

U ocenjenom VAR(3) modelu, prema rezultatima Brojš-Godfrijevog testa autokorelacije (eng. Breuch-Goodfrey Serial correlation LM test) (videti Breusch & Pagan, 1980), u prvih 12 docnji ne postoji autokorelacija. (za red autokorelacije videti Hannan & Quinn,1979) Reziduali ocenjenog VAR(3) modela, prema rezultatima Dornik-Hansenovog (Dornik & Hansen, 1994) i Lutkepolovog (Lütkepohl, 1991) testa normalnosti reziduala, su normalno raspodeljeni. Rezultati Vajtovog testa heteroskedastičnosti reziduala (White, 1980) pokazuju odsustvo heteroskedastičnosti. Pošto ocenjeni VAR(3) model pokazuje zadovoljavajuća statistička svojstva, opredelili smo se za specifikaciju sa tri docnje.

Da bismo proverili da li je neka od razmatrane dve varijable u modelu egzogena, u ocenjenom VAR(3) modelu primenićemo Grejndžerov test uzročnosti (eng. Granger Causality test). Rezultati testa daju se u tabeli 3.

Tabela 3: Grejndžerova VAR uzročnost/Valdov (eng. Wald) test egzogenosti

Zavisna promenljiva	χ^2 statistika	Stepeni slobode	p-vrednost
LTR	10,741	3	0,0132
LFR	1,571	3	0,666

Izvor: Proračun autora

U tabeli 3 se testiraju sledeće hipoteze: H_0: LFR ne uzrokuje LTR (hipoteza tvrdi da prethodno kretanje LFR ne utiče na LTR); H_1: LFR uzrokuje LTR. Na osnovu dobijenih rezultata odbacuje se nulta hipoteza po kojoj LFR ne uzrokuje LTR (ocenjena x^2 statistika je statistički signifikantna na nivou od 5%) i prihvata alternativna da LFR uzrokuje LTR. Na osnovu rezultata u trećem redu tabele 3 ne može se odbaciti nulta hipoteza da LTR ne uzrokuje LFR (ocenjena test statistika nije statistički signifikantna). Prema tome, u postavljenom dvodimenzionom sistemu postoji jednosmerna uzročnost od FR prema TR. U međusobnom odnosu ove dve varijable, LTR je endogeno determinisana varijabla, a LFR egzogena varijabla. To praktično znači da saldo FR utiče na deficit TR, dok deficit TR ne utiče na saldo FR (svakako treba imati u vidu da Grejndžerova uzročnost ne znači da je jedna pojava rezultat one druge, već da je samo reč o uzročnosti Grejndžerovog tipa). Osim toga, strukturne karakteristike privrede Srbije takođe utiču na formiranje deficita TR (Kovačević, 2018). Budući da su vremenske serije u razmatranom sistemu kointegrisane, može se zaključiti da se TR u svom kretanju prilagođava stazi dugoročne ravnotežne veze koju formira sa FR.

Nakon što je utvrđeno postojanje Grejndžerove uzročnosti od FR prema TR, i nakon što su varijable kointegrisane, sledeći korak je da ocenimo model sa korekcijom ravnotežne greške za TR. VEC model je primenjen tako što se varijabla TR ocenjuje kao zavisna promenljiva. Prilikom specifikacije docnje u VEC modelu imamo u vidu da se interval docnje odnosi na docnju prve diference. Posmatrano u odnosu na nivo vremenske serije LTR, VEC model je restriktivni VAR sa dve docnje. U tabeli 4 se daju rezultati ocenjenog VEC(2) modela.

Tabela 4: Model sa korekcijom ravnotežne greške

	Zavisna promenljiva ΔLTR
Ravnotežna greška	- 0,653 (-3,537)*
ΔLTR_{t-1}	0,192 (1,021)****
ΔLTR_{t-2}	-0,658 (-3,610)*
ΔLFR_{t-1}	-0,109 (-0,580)****
ΔLFR_{t-2}	0,408 (2,311)**
Sumarna statistika	
Koeficijent determinacije R^2	0,718
Prilagođeno R	0,624
Zbir kvadrata reziduala	1,372
Standardna greška jednačine	0,338
F-statistika	7,642
Log likelihood vrednost	-2,727
Akaike AIC	0,909
Schwarz SC	1,154
Mean dependent	0,091
S.D. dependent	0,551

*Napomene: * Označava signifikantnost na nivou od 1%.*
*** Označava signifikantnost na nivou od 5%. *** Označava signifikantnost na nivou od 10%.*
**** Označava odsustvo statističke signifikantnosti. U zagradama su date t-vrednosti.*

Izvor: Autor

Prvi interesantan nalaz u tabeli 4 je da ocenjena regresija za zavisnu varijablu ΔLTR ima značajan koeficijent determinacije R^2=0,718 što znači da posmatrani regresori objašnjavaju oko 70% varijabiliteta promenljive ΔLTR. Ocena koeficijenta prilagođavanja za ΔLTR varijablu je statistički značajna na nivou od 1% i sugeriše da se svake godine oko 65% dinamike deficita TR prilagođava dugoročnoj ravnotežnoj vezi koju formira sa saldom FR. Ocenjeni koeficijent prilagođavanja ima očekivan negativan predznak. To je preduslov modela da bi se odstupanje u kretanju varijabli od njihove dugoročne veze korigovalo, tako da ocenjena ravnotežna greška predstavlja snagu koja vuče varijable ka njihovoj dugoročnoj ravnotežnoj vezi. Ocenjeni koeficijent prve docnje prve diference serije TR nije statistički signifikantan, dok je koeficijent druge docnje statistički signifikantan na nivou od 1%. To zapravo znači da se tekuće promene varijable ΔLTR mogu objasniti ranijim promenama ove varijable. Prethodne vrednosti varijable ΔLFR (druga docnja) takođe utiču na kretanje ΔLTR, iz čega se nameće zaključak da promene bilansa FR pokazuju Grejndžerovu uzročnost na promene bilansa TR. To praktično znači da težište prilagođavanja dugoročnoj vezi između ΔLTR i ΔLFR leži na ΔLTR. Brzina prilagođavanja nakon odstupanja od ravnoteže zavisi od vrednosti koeficijenta. Dakle, kratkoročna odstupanja od dugoročne ravnotežne vrednosti koriguju se prema veličini ocenjenog parametra prilagođavanja. U ocenjenom VEC modelu je izvršena provera Grejndžerove uzročnosti između varijabli i potvrđena je kauzalnost od FR prema TR.

U cilju provere specifikacije modela, ocenjen je VEC model za kvartalne vremenske serije LTR i LFR, koje pokrivaju vremenski period od 2007:Q1 do 2019:Q4. Podaci su preuzeti sa sajta NBS (https://www.nbs.rs/internet/cirilica/80/platni_bilans.html), pristupljeno 24.06.2020. Vremenske serije su desezonirane pomoću Census X-13 u softverskom paketu EViews 11. Obe vremenske serije poseduju po jedan jedinični koren. Primenom Johansenovog testa kointegracije utvrđeno je da između dve serije postoji jedna kointegraciona jednačina. Nakon što je potvrđeno postojanje kointegracije, ocenjeni su koeficijenti dugoročne veze. Rezultati se daju u tabeli 5.

Tabela 5: Dugoročna veza između varijabli LTR i LFR (kvartalni podaci za period od 2007:Q1 do 2019:Q4)

	LTR	LFR	C
Relacija 1	1,000	-0,956 (0,044) [-21,506]	-0,386 (0,280) [-1,377]
Relacija 2	-1,079 (0,055) [-19,730]	1,000	0,635 (0,352) [1,802]

Napomene: U ( ) je data standardna greška, a u [ ] t-statistika.

Izvor: Proračun autora

Na osnovu tabele 5 normalizovani koeficijenti dugoročne veze imaju očekivani predznak i oba su statistički signifikantna. Koeficijent uz LFR (-0,956) u relaciji 1 pokazuje da u slučaju porasta suficita FR za 1%, deficit TR se uvećava za 0,96%. Na osnovu relacije 2 zapaža se da porast deficita TR za 1% dovodi do

porasta suficita FR (neto priliv stranog kapitala) za 1,08% (koeficijenti u tabeli 6 su normalizovani, što je uslovilo promenu njihovog predznaka).

Ocenjen je VAR(3) jer su taj red docnje sugerisali višedimenzioni informacioni kriterijumi. Sprovedeni testovi reziduala su pokazali da ovaj model ima zadovoljavajuća svojstva: ne poseduje autokorelaciju, raspodela reziduala je normalna (prema Doornik-Hansenovom testu normalnosti), i nije registrovana heteroskedastičnost greške. Dakle, ocenjen model poseduje stacionarne karakteristike. Na osnovu ocenjenog modela ispitana je simultana međuzavisnost između TR i FR. Cilj je da se proveri endogenost varijabli. Rezultati se daju u tabeli 6.

Tabela 6: Grejndžerova VAR uzročnost/Valdov (eng. Wald) test egzogenosti

Zavisna promenljiva	χ^2 statistika	Stepeni slobode	p-vrednost
LTR	13,7799	3	0,0032
LFR	3,6673	3	0,2997

Izvor: Autor

Rezultati VAR modela su potvrdili prethodni nalaz o postojanju jednosmerne uzročnosti od FR ka TR. Pošto smo utvrdili da su ove dve vremenske serije kointegrisane, može se zaključiti da se TR prilagođava dugoročnoj ravnotežnoj vezi koju formira sa FR. Međutim, TR ne utiče na kretanje FR jer ne postoji Grejndžerova uzročnost u ovom pravcu (ocenjeni koeficijent nije statistički signifikantan).

Pošto smo ustanovili postojanje Grejndžerove uzročnosti od FR prema TR, preostalo je da ocenimo koeficijent kratkoročne dinamike prilagođavanja TR u svom kretanju prema dugoročnoj ravnoteži koju formira sa FR. U tom cilju ćemo oceniti VEC model, pri čemu se varijabla TR u modelu ocenjuje kao zavisna promenljiva. Rezultati ocenjenog VEC(2) modela daju se u tabeli 7 (specifikacija označava docnju u odnosu na prvu diferencu).

Tabela 7: Model sa korekcijom ravnotežne greške (kvartalni podaci od 2007:Q1 do 2019:Q4)

	Zavisna promenljiva ΔLTR
Koeficijent prilagođavanja	-0,511(-2,076)**
$\Delta LT_{Rt-}1$	-0,057(-0,280)****
ΔLTR_{t-2}	0,414(2,514)**
ΔLFR_{t-1}	-0,180(-0,984)****
ΔLFR_{t-2}	-0,474(-3,306)**
S1	-1,302(-7,077)*
S2	0,713(3,559)**
S3	0,724(3,995)*
S4	0,456(2,529)**
S5	0,374(2,129)**
S6	-0,548(-3,052)*
S7	-0,554(-3,088)*
S8	0,256(1,379)****
S9	0,391(2,093)**

	Zavisna promenljiva ΔLTR
Sumarna statistika	
Koeficijent determinacije R^2	0,788
Prilagođeno R	0,709
Zbir kvadrata reziduala	1,061
Standardna greška jednačine	0,174
F-statistika	9,990
Log likelihood	24,368
Akaike AIC	-0,423
Schwarz SC	0,117
Mean dependent	-0,008
S.D. dependent	0,323

*Napomene: * Označava signifikantnost na nivou od 1%.*
*** Označava signifikantnost na nivou od 5%. *** Označava signifikantnost na nivou od 10%.*
**** Označava odsustvo statističke signifikantnosti. U zagradama su date t-vrednosti.*
S1-S9 su veštačke varijable kojima se potiru autlajeri u kvartalnoj vremenskoj seriji LTR.

Izvor: Autor

Ocenjeni koeficijent prilagođavanja (eng. error correction term) za ΔLTR varijablu je statistički značajan na nivou od 5% i pokazuje da se u svakom kvartalu 51% dinamike deficita TR prilagođava dugoročnoj ravnotežnoj vezi koju formiraju ove dve vremenske serije. Koeficijenti kratkoročne dinamike na drugoj docnji su statistički signifikantni na nivou od 5%. Naša empirijska analiza uz korišćenje kvartalnih podataka je potvrdila robustnost prethodno primenjenog VAR modela na godišnjim podacima.

Empirijski nalazi u ovom radu pokazuju da između FR i TR postoji dugoročna ravnotežna veza, i da se ove dve pojave u tekućem kretanju približavaju dugoročnoj ravnoteži. Identifikovana je uzročnost od FR prema TR. Dobijeni rezultati šalju značajne poruke nosiocima ekonomske politike u Srbiji. Pre svega, dugotrajan deficit TR većih razmera može da dovede do pritiska na devizni kurs, što može da izazove valutnu krizu. Mada neto priliv SDI relaksira spoljnu zaduženost zemlje, a time i pritisak na devizni kurs, rast deficita računa primarnog dohotka vrši kontinuiran pritisak na uvećanje deficita TR. Rastući fond stranog kapitala u privredi Srbije (SDI, portfolio investicije i spoljni dug) mogao bi da oteža stanje u platnom bilansu u slučaju eksternih šokova. Nagla liberalizacija FR mogla bi da ugrozi održivost TR Srbije. Nalazi u ovom radu potvrđuju ranije nalaze do kojih su došli Kim & Kim (2011). Pošto strukturni faktori takođe utiču na formiranje deficita TR Srbije, koji se uvećava sa porastom privredne aktivnosti, nosioci ekonomske politike treba da preduzimaju mere u cilju otklanjanja strukturnih neravnoteža.

Zaključak

U ovom radu smo istraživali međusobne veze između TR i FR platnog bilansa Srbije. Pošto smo utvrdili da postoji kointegracija između ovih varijabli, u radu je primenjen Grejndžerov test uzročnosti u VAR okruženju. Polazeći od godišnjih podataka, utvrdili smo da postoji dugoročna veza između bilansa FR i TR, tako da

porast suficita FR za 1% dovodi do porasta deficita TR za 0,58%. Ako se bilans TR uzme kao nezavisna varijabla u ocenjenom modelu, porast deficita TR za 1% vodi porastu suficita FR bilansa za 1,74%. Ocena koeficijenta prilagođavanja za varijablu TR je statistički značajna na nivou od 1% i sugeriše da se svake godine oko 65% dinamike deficita TR prilagođava dugoročnoj ravnotežnoj vezi koju formira sa saldom FR. Ocenjena slučajna greška je statistički signifikantna i pokazuje da dve varijable koriguju tekuće kretanje u pravcu svoje dugoročne ravnotežne veze. Primenjen VAR Grejndžerov test uzročnosti je pokazao da u ocenjenom VAR modelu postoji jednosmerna uzročnost od FR prema TR. U tom slučaju, težnja ekonomske politike da reducira deficit TR podrazumeva da se stalno nadgleda stanje FR. Globalna ekonomska i finansijska kriza iz 2007 – 2009. godine je ukazala na problem naglog pada investicija i izloženost svake zemlje eventualnom „bekstvu" kapitala. Stoga kontinuirano preispitivanje održivosti deficita TR ujedno znači i potrebu stalnog praćenja i preispitivanja održivog nivoa stranog kapitala u privredi Srbije.

Glavni doprinos ovog empirijskog istraživanja je u tome što su dobijeni rezultati pokazali da postoji jednostrana Grejndžerova uzročnost od FR ka TR Srbije. Ovaj nalaz je posebno značajan u slučaju porasta priliva kapitala u zemlju (poslednjih godina neto priliv SDI), jer to uzrokuje porast deficita TR. Porast fonda SDI generiše rastuće iznose repatrijacije profita i povećava deficit računa primarnog dohotka (odliv dividendi). Nagla liberalizacija FR bi mogla da pogorša stanje platnog bilansa i izazove valutnu krizu u slučaju eksternih šokova (finansijska kriza ili nagli prekid priliva kapitala). Veliki priliv kapitala u „normalno" vreme može da izazove nestabilnost platnog bilansa u vreme oštrih eksternih šokova. Prezentirani empirijski nalazi dopunjuju ranija istraživanja koja se odnose na međuodnose kapitalnog i TR i prilagođavanje platnog bilansa zemalja ZB.

Ograničenje istraživanja u ovom radu je u tome što se analiza temelji na kratkim vremenskim serijama i ispitivanju međuodnosa dva globalna računa platnog bilansa: TR i FR. Da bi se bolje razumeo uticaj FR na TR potrebno je sprovesti detaljnije istraživanje koje će obuhvatiti uticaj relevantnih komponenti FR na TR. Osim toga, u budućim istraživanjima bi trebalo razložiti uticaj komponenti računa robe i usluga, kako bi se preciznije identifikovali ključni strukturni činioci koji utiču na formiranje deficita TR platnog bilansa Srbije i njenu spoljnu konkurentnost.

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The Causal Relationship Between Current Account and Financial Account Balance in Western Balkan Countries – the Case of Serbia

Radovan Kovačević Faculty of Economics, University of Belgrade
e-mail: radovank@ekof.bg.ac.rs

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Summary: The Western Balkans (WB) countries registered an increase in the current account (CA) deficit and net capital inflow in the period before the outbreak of the global financial crisis of 2008. The external debt of these countries has increased. The aim of this paper is to examine the causality relationship between the CA and financial accounts (FA) balance of Serbia. A framework for the empirical analysis is the vector autoregression (VAR) model and the vector error correction (VEC) model. Using the Johansen cointegration test, we find the existence of a long-run causality relationship between these two variables. The estimated long-run coefficient on the FA variable as an independent variable shows that an increase of Serbia's FA balance by 1% leads to an increase in the CA deficit of Serbia by 0.58%. Applying the Granger causality test, it was found that causality runs from FA to the CA, which implies recommendations for economic policymakers. The finding indicates the need to continuously check the sustainability of the CA deficit of Serbia, as well as to monitor the level of presence of foreign capital in the Serbian economy.

Keywords: current account, financial account, cointegration, Granger causality, VAR model, VEC model, Western Balkan, Serbia

JEL: F21, F32, F34, C32

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Introduction

The WB countries (Albania, Bosnia and Herzegovina, Montenegro, Northern Macedonia, and Serbia) recorded an increase in net foreign capital inflows, but also an increase in the CA deficit in the period before the outbreak of the global financial crisis in 2008. The capital inflows have stimulated the expansion of domestic demand in WB, which contributed to the widening of the trade deficit. A large part of the net capital inflow relates to the development of infrastructure, which is the prerequisite for strengthening the competitiveness of the WB countries. However, the increasing trade deficit raises the question of whether foreign capital plays a role in enhancing the export competitiveness of WB economies. The trade deficit and the CA deficit rose to an unsustainable level before the outbreak of the global financial crisis. However, in the post-crisis period, there was a significant reduction in the CA deficit, which improved the macroeconomic performance of these countries. However, in recent years, there has been a widening in the WB countries CA deficit. As a result, the question of its sustainability again becomes a topical subject (Bartlett & Prica, 2017). That is understandable, because the ratio of external debt and exports in most WB countries is quite high, which is an important indicator of their external solvency. The trends in the international trade of the WB countries are similar, although there are differences in their international economic position (Kitova & Steinhauzer, 2018).

The current position of the WB countries on the international capital market depends largely on the performance of their payment balance. Countries that are characterized by a CA deficit are forced to create a surplus in the FA to finance that deficit. For any country with a long-term CA deficit, it is important to assess the external debt sustainability in order to finance that deficit (Bulut, 2011; Rosini & Zanghiery, 2009). A view that the CA deficit is mainly caused by the trade deficit is widespread in the literature (Cota et al., 2017). At the same time, the CA deficit represents the transfer of foreign accumulation to the domestic country. It supplements the small domestic savings (Chinn & Prasad, 2003; Makin & Narayan, 2008). The insufficient domestic savings is the reason why WB countries rely more on foreign funds, primarily on foreign direct investment (FDI) (Popović & Erić, 2017). Foreign accumulation is expected to turn into an investment, which could lead to an increase in exports. Certainly, the increase in investment will lead to higher aggregate demand, which will be partly satisfied through imports. It would generate upward pressure on the trade deficit and the CA deficit. The inflow of foreign capital, through the exchange rate appreciation, leads to a deterioration of the CA (Kim & Kim, 2011). In the last few years, FDI inflow into the WB has increased, although it still lags behind other countries in transition (Estrin & Uvalić, 2014). The inward FDI helps countries to engage in global value chains (GVCs), which contributes to the increase in their exports (Shimbov et al., 2019; Stöllinger, 2016; Srholec, 2007) and structural changes in their economy (McMillan et al., 2014). However, in host countries, there is an additional balance of payments problem. Namely, as much as the FDI inflow in the initial stages relieves the payment balance of the host countries from the pressure for additional borrowing abroad, in the later stages (when the reinvestment of the realized profit stops) the pressure

on the primary income account increases. Countries with large net FDI inflows face a growing negative primary income account balance, which increases their CA deficit. In the end, the question of financing this deficit arises again. The structure of foreign capital inflows and financial market regulation also affects the long-term performance of the balance of payments (Moral-Benito & Roehn, 2016). The foreign capital in the WB countries generates the above effects on their economies and balance of payments. This paper examines the relationship between the CA and FA in Serbia as a representative WB country.

The rest of the paper is structured as follows. The second part presents the theoretical background in terms of the relationship between CA and FA. The third part contains the research objectives, research methodology, and describes the data used. The fourth part gives empirical results of research and discussions, while the last, fifth part, gives the conclusions.

Literature Review

The literature concerning the relationship between CA and FA differs mainly according to the direction of conditionality (whether the CA imbalance affects the FA or vice versa), as well as according to the mechanisms by which one phenomenon affects another. The differences in views are mainly according to what is the initial impulse that encourages the increase in aggregate demand, which in the open economy leads to the reduction in the CA surplus or an increase in the CA deficit.

Authors who take the view that the CA causes the movement of the FA believe that the increase in aggregate demand affects the increase in imports, resulting in an induced capital inflow to cover the new imbalance. As an argument, they point out that the expansionary fiscal policy can stimulate the growth of consumption or investments, and that this will cause a disturbance in the FA. In the case of expansionary fiscal policy through deficit financing (a budget deficit), the government seeks to borrow from the capital market (Bernheim, 1988). In the case of foreign loans, that is, according to these economists, proof that the increase in aggregate demand caused by an increase in budget spending requires foreign loans. In that case, it is concluded that the disturbance in the CA causes the disturbance of the FA. A similar sequence of events may occur due to expansionary monetary policy. Xie and Chen (2014) investigated the mutual causality between the CA deficit and the budget deficit for 11 OECD countries, using the Granger non-causality test (Granger, 1969). Their findings show that there is bidirectional causality between these variables. The authors concluded that the budget deficit causes higher domestic interest rates, which attracts foreign capital. The foreign capital inflows will lead to local currency appreciation, which leads to an increase in the CA deficit (Salvatore, 2006). Grier and Ye (2009) showed that the time series of the budget deficit and the CA balance is stationary and conditionally heteroskedastic and that they do not have a common path in the long run. They also found that short-term dynamics are characterized by a persistent positive correlation between budget deficit shocks and CA deficit shocks.

Urbanovski (2017) has examined the relationships between the nominal exchange rate, the CA, and the FA of the Czech Republic. The cointegration analysis and a VEC model were applied, and the obtained results show that the Granger causality exists from the CA to the FA, and vice versa. The author concluded that excessive liberalization of the Czech financial system could lead to a large inflow of capital, and thus to a reduction of the surplus (or deepening of the CA deficit), which could cause a currency crisis in that country. Yan (2005) examined the relationship between the CA and the FA for developed countries and concluded that changes in the CA cause changes in the FA, i.e. that the FA serves to finance the CA imbalance. A similar conclusion was reached by Tang (2014) based on the analysis of the US economy. Oeking and Zwick (2015) analyzed the dynamics of the CA balance and the dynamics of different types of net capital flows (portfolio flows, direct investment and other investment flows) for selected OECD countries using the concept of Granger causality. Also, they conducted a test to check whether the direction of Granger's causality changes during the business cycle. The test results showed that there is Granger causality from changes in the CA to changes in the components of the FA. Besides, it has been observed that in the short-term flows the direction of causality changes depending on the phase of the business cycle: at the period of decline in economic activity financial flows finance the CA, while at the period of economic recovery financial flows induce CA changes.

Another group of economists believes that the increase in capital inflows leads to a disturbance in the CA. They believe that large capital inflows lead to currency appreciation, which encourages imports and leads to CA imbalances (Abell, 1990). In particular, it is mentioned that the FDI inflow leads to an increase in imports of technology, equipment, and raw materials, which may lead to deterioration in the CA. Many papers in the literature find causality from FA to CA. Garg and Prabheesh (2015) found, in the case of India, that there is no causal link between the CA and the capital account. They then conducted an empirical study on the causal relationships between the components of the CA and the capital account through the exchange rate. They found that there is a causal link from non-debt capital flows to the CA, through the real effective exchange rate. Thus, the decomposition of capital flows contributed to identifying the mutual influence between the observed variables. This paper recommends that it is necessary to improve the stability of the financial sector before the full capital account liberalization. Turan (2015) conducted an empirical analysis of the relationship between the CA and the FA and its main components. He applied the Toda-Yamamoto Granger Causality Test (Granger, 1969) in the sample of several countries (Croatia, Hungary, Poland, and Slovenia), using the quarterly data. The author concluded that there is unidirectional causality from the FA to the CA for Croatia and Slovenia, i.e. from the CA to the FA for Poland and Romania, while in the case of Hungary bidirectional causality was discovered. Yan and Yang (2008) have empirically proven that foreign capital inflows can cause persistent CA deficits and could lead to a currency crisis. It has also been shown that foreign capital inflows and capital account imbalances intertwine in different ways between developing countries and emerging market countries. By using Granger's non-causality test, the authors concluded that there is causality from foreign capital inflows to the CA in the case of emerging market countries, while the causality in the

case of developed countries was negligible. Given the relatively underdeveloped financial markets, these authors recommend caution to emerging market countries in the area of large capital inflow management. Mastroyiannis (2012) examined the causal relationship between the CA and foreign capital inflows in the Portuguese economy. The cointegration methodology was applied, and results suggest that there exists a long-run relationship between the foreign capital inflow and the CA balance, where a unidirectional causality runs from the foreign capital inflow to the CA balance. However, the author found that there is short-run bidirectional causality among these two variables. Fry et al. (1995) found that, in some developing countries, the relationship between the CA and FA is unidirectional, in others bidirectional, and that for some countries there is no causality between these accounts.

Research Objective, Methodology, and Data

The purpose of this study is to investigate the directions of the causality between the CA and the FA in the case of Serbia. To achieve this, the following goals have been set: 1) to present the findings so far in the literature on the relationship between CA and FA; 2) to set an adequate research methodology; 3) to present and discuss the results of the empirical analysis on the causation between the CA and the FA of Serbia.

The paper analyses the 2000 – 2019 period. The original data are expressed in euros. Two data sets are used for each variable: annual data for the period 2000 – 2019 and quarterly data for the period 2007 – 2019. Quarterly series are obtained by aggregating monthly data and serve to check the robustness of the estimated econometric model. Time series are transformed into natural logarithms for empirical analysis. The series labeled as a LCA represents the logarithmic values of the time series of the CA variable, while the LFA represents the logarithmic values of the time series of the FA variable. Data are taken from the website of the National Bank of Serbia (https://www.nbs.rs/internet/cirilica/80/platni_bilans.html), accessed on 18.6.2020. Data for the period 2007 – 2019 are given according to BPM06 (Balance of Payments Methodology according to the IMF instructions) and are harmonized with the BPM05 methodology, which refers to the period 2000 – 2006. A framework for the empirical analysis of the relationship between the CA and FA in this paper is the VAR model and the VEC model. We first check the stationarity of the time series in the level. By using standard methods for testing the unit root, we found that the series are integrated of order one, which is usually displayed as I(1). The next step is to estimate the VAR model to determine the order of the model (autoregressive structure), relevant for conducting the cointegration test. To determine whether the variables in our model are cointegrated, we use a cointegration test according to the methodology developed by Johansen (1991, 1995) and Johansen and Juselius (1990). This methodology is included in the software package EViews 11 (EViews, 2020), which we use in this paper. The starting point of this methodology is a VAR model of order *p* defined as:

$$y_t = \delta + A_1 y_{t-1} + \ldots + A_p y_{t-p} + Bx_t + \varepsilon_t \quad (1)$$

where y_t is a *k* x 1 vector of non-stationary endogenous variables, A_1, ..., A_p are *k* x *p* matrices of the lag coefficients, x_t is *d* x 1 vector of exogenous (deterministic) variables, *B* is a *k* x *d* matrix of exogenous variables, ε_t is *k* x 1 vector of innovations, δ is a free term, *p* is the lag order in the VAR model (Lütkepohl, 2005). VAR can be rearranged as:

$$\Delta y_t = \delta + Đy_{t-1} + \sum_{i=1}^{p-} \tilde{A}_i Ä y_{t-1} + Bx_t + \varepsilon_t \quad (2),$$

where

$$Đ = \sum_{i=1}^{p} A_i - I \text{, and } \Gamma_i = -\sum_{j=i+1}^{p} A_j . \quad (3)$$

Π is the cointegration coefficient matrix (long-run impact matrix), Γ is the coefficient of the differentiated value of the variable *y* matrix (short-run impact matrix). If the coefficient matrix Π has reduced rank *r* < *k*, then there exist *k* x *r* matrices α and β, each with rank *r* such that Π = αβ› and $\beta' y_t$ is I(0). The β represents the cointegrating vector, and *r* is the number of cointegration relations (the cointegration rank). The matrix α contains the adjustment parameters in the VEC model. The vector described as $\beta' y_{t-1}$ can be interpreted as the distance of a variable from its equilibrium value. If *r* = 0, there is no cointegration between the variables, so in that case Π=0.

Various procedures were used in the literature for estimating the existence of cointegration. In this paper, we will use the Johansen procedure to test the existence of cointegrations and to estimate the cointegration parameters. Johansen's method estimates the Π matrix in the unrestricted VAR, and then a test is performed to determine whether the restrictions due to the reduced rank of Π can be rejected. For a given *r*, the maximum likelihood estimator of the cointegration vector β defines the combination of y_{t-1}, that allows for *r* the largest canonical correlation of Δy_t with y_{t-1} after correction for lagged differences and deterministic variables, if such exist (Johansen, 1995). Johansen recommends two different tests to examine the significance of these canonical correlations and the reduced rank of the Π matrix: the trace test and the maximum eigenvalue test. Trace statistic is calculated as:

$$J_{trace} = -T \sum_{i=r+1}^{k} \log\left(1 - \lambda_i\right) \quad (4),$$

where λ_i is the *i*-th largest eigenvalue of the Π matrix, and *T* is the sample size.

Maximum eigenvalue statistic is computed as:

$$J_{max} = -Tlog\left(1-\lambda_{r+1}\right) \quad (5)$$

for r = 0, 1, ..., k-1. T in this relation is the sample size, and λ_i is the i-th largest canonical correlation.

Using the trace test, the null hypothesis about the existence of r cointegration vectors is tested in this paper against the alternative hypothesis of the existence of k cointegration relations, where k is the number of endogenous variables. The maximum likelihood test tests the null hypothesis about the existence of r cointegration relations against the alternative of $r + 1$ cointegration relations. Asymptotic critical values are obtained in the EViews 11 software package, which we used in this paper. If the existence of a long-run relationship between the variables is established, it will be proof that they are cointegrated.

After determining the number of cointegration vectors r, we estimate an adequate VAR model. The short-run dynamics is then analyzed in the VEC model. If the variables in the VAR model are cointegrated, this means that the VAR model can be represented as a VEC model. Thus, VEC is similar to VAR models and can be expressed as a VAR model in equation (2). This paper uses the Granger non-causality test to detect the direction of causality between variables.

Results and Discussion

The first step in the empirical analysis is to check the stationarity of the time series of the CA and FA of Serbia. Using the Augmented Dickey-Fuller (ADF) unit root test (Dickey and Fuller, 1979), it was found that both series have at least one unit root at a level. In the second iteration, it was concluded that both series are integrated of order I(1). To check for the cointegration of two series, the Johansen cointegration test in the VAR model is used. The next step is to initiate a VAR model to determine the optimal model order. The choice of lag-length in the VAR model was made according to multidimensional AIC (Akaike, 1974) and SIC (Schwartz, 1978) information criteria, which suggest as the optimal three lag order. The same criteria point to a cointegration model that includes a constant as a deterministic component. Taking these suggestions into account, and since both time series have one unit root, we proceed to test for cointegration among these two variables using the Johansen cointegration test (Johansen, 1991; 1995). The test results are given in Table 1.

Table 1: Johansen Cointegration Test

Unrestricted Cointegration Rank Test (Trace Statistics)				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistics	0.05 Critical Value	Prob.**
H_0: r=0* $H_1: r > 0$	0.656156	22.34686	20.26184	0.0255
H_0: r=1 $H_1: r > 1$	0.218823	4.198217	9.164546	0.3834
Unrestricted Cointegration Rank Test (Maximum Eigenvalue Statistics)				
H_0: r=0* $H_1: r > 0$	0.656156	18.14864	15.89210	0.0218
H_0: r=1 $H_1: r > 1$	0.218823	4.198217	9.164546	0.3834

*Notes: * Denotes rejection of the hypothesis at the 0.05 level.*
*** MacKinnon-Haug-Michelis (1999) p-values. Trace and Max-eigenvalue test indicate 1 cointegration eqn(s) at the 0.05 level.*

Source: Own research

In Table 1, the null hypothesis of no cointegration between the two variables against the alternative that there is at least one cointegration relation between them was tested: $H_0: r = 0$ (no cointegration) and $H_1: r > 0$ (there is at least one stationary connection) (r is the number of stationary combinations). The conclusion is that there is one cointegration equation at the significance level of 5%. Since the observed time series are cointegrated, in the next step we will use a VAR model that includes time series in the level.

Since one cointegration relationship is identified in the model, Table 2 presents an estimate for the long-run relationship between the observed variables. The cointegration vector β was estimated. These estimates are based on the normalization of $\beta' S_{11} \beta = I$, where S_{11} is defined in Johansen (1995). The estimated coefficients of both variables are without restrictions. Each of the two independent variables is considered individually (the model is estimated twice). Due to the normalization process, the signs of the cointegration coefficients are reversed. In Relation 1 (Table 2) LCA is considered as a dependent variable, and in Relation 2 the dependent variable is LFA.

Table 2: The Long-Run Relationship Between Variables

	LCA	LFA	C
Relation 1	1.000	-0.576 (0.152) [-3.796]	-3.425 (1.181) (-2.899)
Relation 2	-1.737 (0.317) [-5.483]	1.000	5.949 (2.418) [2.460]

Note: Standard errors in ( ) & t-statistics in [ ].

Source: Own research

In relation 1 of Table 2, in which normalization is performed on the LCA, the coefficient on the LFA (-0.576) means that an increase in the FA balance (sur-

plus) of 1% leads to an increase in the CA deficit by 0.58% (an increase in external debt leads to an increase in the CA deficit). Relation 2 shows that an increase in the CA deficit by 1% leads to an increase in the FA balance by 1.74%. Both estimated coefficients are statistically significant and have the expected sign.

In the estimated VAR (3) model, according to the results of the Breusch-Godfrey Serial correlation LM test (see Breusch & Pagan, 1980), there is no autocorrelation in the first 12 lags (for the order of autocorrelation see Hannan & Quinn, 1979). The residuals from the estimated VAR (3) model, according to the results of the Dornik & Hansen (1994) and Lütkepohl (1991) residual normality test, are normally distributed. White (1980) residual heteroskedasticity test results show the absence of heteroskedasticity. Since the estimated VAR (3) model shows satisfactory statistical properties, we opted for the specification which includes three lags.

To check for possible exogeneity of variables, we apply the Granger non-causality test in the estimated VAR (3) model. The test results are given in Table 3.

Table 3: VAR Granger Causality/Block Exogeneity Wald test

Dependent variable	χ^2 statistics	df	Prob.
LCA	10.741	3	0.0132
LFA	1.571	3	0.666

Source: Author

The following hypotheses are tested in Table 3: H_0: LFA does not cause LCA (hypothesis states that the past value of LFA does not affect LCA); H_1: LFA causes LCA. Based on the obtained results, the null hypothesis according to which LFA does not cause LCA (estimated x^2 statistics is statistically significant at the level of 5%) is rejected and an alternative that LFA causes LCA is accepted. Based on the results in the third row of Table 3, the null hypothesis that LCA does not cause LFA cannot be rejected (the estimated test statistics are not statistically significant). Therefore, in this two-dimensional system, there is a one-way causality relationship from the FA to the CA (LCA is an endogenously determined variable, and LFA is an exogenous variable). This practically means that the balance of the FA affects the CA deficit, while the CA deficit does not affect the balance of the FA (it should be borne in mind that Granger's causality does not imply that one variable is the result of another, but that it is only a matter of causality of the Granger type). Also, the structural characteristics of the Serbian economy affect the CA deficit (Kovačević, 2018). Since the time series in the considered system are cointegrated, it can be concluded that the CA movements are adjusted towards the long-run equilibrium path with the FA.

Since the existence of Granger causality from FA to CA has been established, and since the variables are cointegrated, the next step is to estimate the equilibrium error correction model for the CA. The VEC model is applied by estimating the CA variable as a dependent variable. To estimate a VEC model, it needs to specify the lag length (it should be remembered that the lag interval specification refers to lags of the first difference terms). So, concerning the

level of the time series LCA, the VEC model is a restricted VAR with two lags. Table 4 gives the results of the estimated VEC (2) model.

Table 4: VEC Estimates

	Dependent variable ΔLCA
Error Correction	- 0.653 (-3.537)*
ΔLCA_{t-1}	0.192 (1.021)****
ΔLCA_{t-2}	-0.658 (-3.610)*
ΔLFA_{t-1}	-0.109 (-0.580)****
ΔLFA_{t-2}	0.408 (2.311)**
Summary statistics	
R- squared	0.718
Adj. R-squared	0.624
Sum sq. resids	1.372
S.E. equation	0.338
F-statostic	7.642
Log likelihood	-2.727
Akaike AIC	0.909
Schwarz SC	1.154
Mean dependent	0.091
S.D. dependent	0.551

*Notes: *Indicates significance at the 1% level.*
***Indicates significance at the 5% level. ***Indicates significance at the 10% level.*
*****Denote the absence of statistical significance. t-value in parentheses.*

Source: Author

The first interesting finding in Table 4 is that the estimated regression for the dependent variable ΔLCA has a significant value of the coefficient of determination R^2=0.718 which means that the observed regressors explain about 70% of the variability in the variable ΔLCA. The estimated adjustment coefficient for the ΔLCA variable is statistically significant at the level of 1% and suggests that each year about 65% of the CA dynamics are adjusted to the long-run equilibrium relationship between FA balances. The estimated adjustment coefficient has the expected negative sign. This is a model prerequisite to correct the deviation in the movement of variables from their long-run relationship, so that the estimated equilibrium error represents the force which pulls the variables towards their long-term equilibrium relationship. The estimated coefficient for the first lag of the first difference of the CA variable is not statistically significant, while the coefficient for the second lag is statistically significant at the level of 1%. This means that the current changes in the ΔLCA variable can be explained by previous changes in this variable. The previous values of the variable ΔLFA (lag 2) also affect the movement of ΔLCA, so it can be concluded that changes in the FA balance Granger cause changes in the CA balance. This practically means that the main burden of adjustment to the long-run relationship between ΔLCA and ΔLFA lies on ΔLCA. The speed of adjustment after deviation from equilibrium depends on the value of the coefficient. Thus, short-run deviations from the long-run equilibrium value are adjusted according to the size of the estimated adjustment coefficient. In the estimated VEC model,

the Granger causality between the variables is checked and the causality from the FA to the CA is confirmed.

To check the model specification, the VEC model has been estimated for the quarterly time series LCA and LFA, which cover the period 2007:Q1 to 2019:Q4. The data are taken from the NBS website (https://www.nbs.rs/internet/cirilica/80/platni_bilans.html), accessed 6.24.2020. The time series are seasonally adjusted using the Census X-13 in the EViews 11 software package. Both time series have one unit root. Using the Johansen Cointegration test, it was determined that there is one cointegration equation between the two series. Since the existence of cointegration was confirmed, the coefficients of the long-run relationship have been estimated. The results are given in Table 5.

Table 5: The Long-Term Relationship Between the Variables LCA and LFA (period, 2007:Q1, 2019:Q4)

	LCA	LFA	C
Relation 1	1.000	-0.956 (0.044) [-21.506]	-0.386 (0.280) [-1.377]
Relation 2	-1.079 (0.055) [-19.730]	1.000	0.635 (0.352) [1.802]

Note: Standard errors in ( ); t-statistics in [ ].

Source: Author

According to Table 5, the normalized long-run relationship coefficients have the expected sign and both are statistically significant. The coefficient on LFA (-0.956) in Relation 1 shows that an increase in a surplus of the FA by 1% will lead to the increase in the CA deficit by 0.96%. Relation 2 shows that the increase in the CA deficit by 1% leads to the increase in the FA surplus (net inflow of foreign capital) by 1.08% (coefficients in Table 6 are normalized, which caused a change in their sign).

VAR (3) model has been estimated because this lag order was suggested by multidimensional information criteria. The residual tests have been performed and results showed that this model has satisfactory properties: there is no autocorrelation, the residuals have a normal distribution (according to the Doornik-Hansen normality test), and there is no heteroskedasticity. Thus, the estimated model is stationary. Based on the estimated model, the simultaneous relationship between the CA and the FA is examined. The aim is to check for endogeneity of variables. The results are given in Table 6.

Table 6: VAR Granger Causality/Block Wald Test

Dependent variable	χ^2 statistics	df	Prob.
LCA	13.7799	3	0.0032
LFA	3.6673	3	0.2997

Source: Author

The results of the VAR model confirmed the previous finding of one-way causality from the FA to the CA. Since we have determined that these two time series are cointegrated, it can be concluded that the CA adjusts to the long-run equilibrium relationship with the FA. However, the CA does not affect the movement of the FA because there is no Granger causality in this direction (the estimated coefficient is not statistically significant).

Since we have identified the Granger causality running from the FA to the CA, it remains to estimate the coefficient of short-run dynamics of the CA adjustment in its movement towards the long-term equilibrium with the FA. Therefore, we will estimate the VEC model, where the CA variable is estimated as a dependent variable. The results of the estimated VEC (2) model are given in Table 7 (the lag interval specification refers to lags of the first difference terms).

Table 7: Vector Error Correction (VEC) Model Estimates (quarterly data, 2007:Q1, 2019:Q4)

	Dependent variable ΔLCA
Error Correction	-0.511 (-2.076)**
ΔLCA_{t-1}	-0.057 (-0.280)****
ΔLCA_{t-2}	0.414 (2.514)**
ΔLFA_{t-1}	-0.180 (-0.984)****
ΔLFA_{t-2}	-0.474 (-3.306)**
S1	-1.302 (-7.077)*
S2	0.713 (3.559)**
S3	0.724 (3.995)*
S4	0.456 (2.529)**
S5	0.374 (2.129)**
S6	-0.548 (-3.052)*
S7	-0.554 (-3.088)*
S8	0.256 (1.379)****
S9	0.391 (2.093)**
Summary statistics	
R- squared	0.788
Adj. R-squared	0.709
Sum sq. resids	1.061
S.E. equation	0.174
F-statistic	9.990
Log likelihood	24.368
Akaike AIC	-0.423
Schwarz SC	0.117
Mean dependent	-0.008
S.D. dependent	0.323

*Note: * Indicates significance at the 1% level. ** Indicates significance at the 5% level. *** Indicates significance at the 10% level. **** Denotes the absence of statistical significance. t-values in parenthesis. S1-S9 denotes dummy variables that remove outliers in the time series quarterly data LCA.*

Source: Own research

The estimated error correction term for the ΔLCA variable is statistically significant at the level of 5% and shows that in each quarter 51% of the dynamics of the CA deficit are adjusted to the long-run equilibrium relationship between these two times series. The coefficients of short-run dynamics at the second lag are statistically significant at the level of 5%. Our empirical analysis using the quarterly data confirmed the robustness of the previously applied the VAR model to annual data.

The empirical findings in this paper show that there is a long-run equilibrium relationship between the FA and the CA and that these two phenomena in the current movement are approaching a long-run equilibrium. The causality from FA to CA has been identified. The obtained results send significant messages to policymakers in Serbia. First of all, a large proportion of the long-run CA deficit can lead to pressure on the exchange rate, which can cause a currency crisis. Although the FDI net inflow relaxes the country's external indebtedness, and thus the pressure on the exchange rate, the growth of the primary income account deficit exerts continuous pressure to increase in the CA deficit. The growing stock of foreign capital in the Serbian economy (FDI, portfolio investment, and external debt) could aggravate the balance of payments in the event of external shocks. The sudden liberalization of the FA could jeopardize the sustainability of Serbia's CA. The findings of this study confirmed previous findings by Kim & Kim (2011). Since structural factors also affect Serbia's CA deficit, that increases when economic activity increases, policymakers should take measures to eliminate structural imbalances.

Conclusion

In this paper, we have investigated the relationships between CA and FA in Serbia. Since we have found cointegration between these variables, the VAR Granger non-causality test was applied. Using the annual data, we find that there is a long-run relationship between the FA and CA balance, so that an increase in the FA surplus by 1% leads to an increase in the CA deficit by 0.58%. If we take CA balance as an independent variable in the estimated model, an increase in the CA deficit by 1% leads to the growth in the FA surplus by 1.74%. The estimated adjustment coefficient for the CA variable is statistically significant at the level of 1% and suggests that each year about 65% of the dynamics of the CA deficit are adjusted to the long-run equilibrium relationship with the FA balance. The estimated Error term is statistically significant and shows that the two variables correct the current movement in the direction of their long-run equilibrium relationship. The applied VAR Granger non-causality test showed that in the estimated VAR model there is a one-way causality running from FA to CA. In this case, the ambition of policymakers to reduce the CA deficit implies that they should permanently monitor the FA. The global economic and financial crisis of 2007 – 2009 pointed to the problem of a sharp drop in investment and the exposure of each country to a possible "capital flight". Therefore, the continuous review of the CA deficit sustainability also means the need for permanent monitoring and review of the sustainable level of foreign capital in the Serbian economy.

The main contribution of this empirical research is its finding that there is a one-sided Granger causality running from FA to CA in Serbia. This finding is particularly significant in the case of an increase in capital inflows (net FDI inflows in recent years) as that capital causes an increase in the existing CA deficit. The inward stock of FDI generates profit repatriation and an increase in the primary income account deficit (dividend outflow). Sudden liberalization of the FA could exacerbate the balance of payments and provoke a currency crisis in the event of external shocks (financial crisis or sudden cessation of capital inflows). Large capital inflows in normal times can cause a balance of payment difficulties at times of severe external shocks. Our empirical findings complement previous research on relationships between FA and CA and the adjustment of the balance of payments in WB countries.

The limitation of the research in this paper is that the analysis is based on a short time series and examining the relationship between the two global balance of payments accounts: CA and FA. To better understand the impact of FA on CA, it is necessary to conduct more detailed research that will include the impact of the relevant components of FA on CA. Also, future research should explain the impact of the components of the goods and services accounts, in order to more precisely identify the key structural factors that affect Serbia's CA deficit and its external competitiveness.

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