RAZVOJ TRGOVINE IZMEĐU NR KINE I CIE : ANALIZA UTICAJA INICIJATIVE „16+1"

Elena Jovičić[32], Jelena Minović[33], Dejana Pavlović[34], Duško Bodroža[35]

Apstrakt

Glavni cilj rada je da se analizira razvoj trgovinskih odnose između Kine i 16 zemalja Centralne i Istočne Evrope (CIE) u periodu 2000-2022. Naime, uz primenu gravitacionog modela, ispituju se faktori koji su direktno doprineli povećanju trgovinske razmene, uz poseban osvrt na analizu uticaja učešća zemalja CIE u formatu „16+1". Empirijski rezultati pokazuju da ekonomski rast u NRK i CIE, uključujući članstvo zemalja CIE u EU, su imali pozitivan i značajan uticaj na razvoj bilateralne trgovine između NR Kine i CIE, a to u svim slučajevima – kada su ukupna trgovina (TT), ali takođe uvoz zemalja CIE iz NR Kine (IM), kao i izvoz zemalja CIE u Kine (EX) posmatrane kao zavisne promenljive. Učešće u formatu „16+1" je doprinelo povećanju trgovine samo u slučaju kada je izvoz CIE u NR Kinu zavisna promenljiva, ali, u poređenju sa članstvom u EU, se ipak pokazalo kao manje značajno.

Ključne reči: *CIE, NR Kina, inicijativa „16+1", trgovina, gravitacioni model*

JEL: *F15, F43*

Uvod

Tokom protekle tri decenije, Narodna Republika Kina (NRK) zabeležila je nezapamćen privredni rast (UNCTAD, 2021), što je dovelo do toga da od 2012. godine bude rangirana kao najveći izvoznik na svetu i drugi najveći uvoznik na svetu (Gurría, 2014). Godine 2022, sama ukupna robna razmena NR Kine dostigla je rekordnu vrednost od 42,07 biliona juana (6,3 biliona američkih dolara) (the General Administration of Customs People's Republic of China - GACC, 2023).

[32] dr Elena Jovičić, Naučni saradnik, Institut ekonomskih nauka, Beograd, Srbija, e-mail: elena.jovicic@ien.bg.ac.rs ORCID 0000-0002-8356-9678

[33] dr Jelena Minović, Naučni savetnik, Institut ekonomskih nauka, Beograd, Srbija, e-mail, email: jelena.minovic@ien.bg.ac.rs ORCID 0000-0001-6254-4888

[34] dr Dejana Pavlović, Naučni saradnik, Institut ekonomskih nauka, Beograd, Srbija, e-mail: dejana.pavlovic@ien.bg.ac.rs ORCID 0000-0001-5090-302X

[35] dr Duško Bodroža, Naučni saradnik, Institut ekonomskih nauka, Beograd, Srbija, e-mail: dusko.bodroza@ien.bg.ac.rs ORCID 0000-0002-6219-1338

U skladu sa svojim ekonomskim usponom, NRK je značajno ojačala svoje ekonomske veze sa Centralnom i Istočnom Evropom (CIE). Inicijativa „16+1"[36], formirana 2012. godine sa ciljem da unapredi ekonomske, trgovinske, političke i kulturne veze između NR Kine i CIE, posebno je doprinela unapredjenju saradnje (Bodroža i Kolavčić, 2022). NRK je dala prioritet ulaganjima u sektor privrede a posebno u zemljama CIE u kojima postoji potreba za dugoročnim ulaganjima (tj. infrastruktura, energetika, telekomunikacije i poljoprivreda) (Yue, 2018). Štaviše, inicijativa nastoji da umanji trgovinske barijere između NRK i CIE kako bi se poboljšao pristup tržištu i potkrepio novi trgovinski potencijal. Inicijativa je takođe pomogla da CIE prevaziđe dugotrajne efekte finansijske krize iz 2008. godine privlačenjem priliva stranog kapitala (Matura, 2019; Szunomár, 2019). Kako su zaključili Vangeli i Pavlićević (2019), kao i Zakić (2020), globalna finansijska kriza iz 2008. bila je „prava prilika" i prekretnica u razvoju odnosa CIE i NRK. Usled trgovinske neravnoteže sa NR Kinom i njihovog statusa kao sekundarnih ekonomija unutar EU, mnoge zemlje CIE pozdravile su kineske investicije i poboljšanje veza sa NRK, videvši to kao mogućnost za razvoj infrastrukture i otvaranje pristupa neiskorišćenim novim tržištima (Szczudlik, 2019).

Osnaživanje odnosa između CIE i NR Kine po pokretanju formata „16+1" dovelo je do bržeg širenja bilateralne trgovine. Prema GACC, bilateralna trgovina između CIE i NR Kine stabilno je rasla od 2012. do 2022. godine (u proseku 8,1% godišnje). Ukupna vrednost robne razmene ostvarene između CIE i NRK 2022. godine je dostigla 158 milijardi američkih dolara, što je povećanje od 7% na godišnjem nivou i više nego dvostruki porast u odnosu na 2012. godinu kako u pogledu izvoza, tako i u pogledu uvoza. Bez obzira na to, robna razmena dovela je do disbalansa, jer je uvoz iz NRK u zemlje CIE porastao mnogo više nego izvoz (2,6 puta naspram 1,7 puta).

Uprkos sveukupnom rastu trgovine i saradnje, usled toga su se javili mnogobrojni izazovi koji sprečavaju razvoj efikasnije trgovine na štetu zemalja CIE. Među ostalim ključnim pitanjima, strateška orijentacija NRK ka dugoročnom povećanju izvoza domaćih proizvoda u odnosu na uvoz energije i minerala umanjila je ukupan uticaj CIE usled asimetrije u privrednoj moći i značajno je narušila trgovinsku ravnotežu u korist NRK. Tokom 2022. godine samo četiri od šesnaest zemalja CIE (Poljska, Rumunija, Letonija i Albanija) zabeležile su smanjenje u svom trgovinskom deficitu u odnosu na prethodnu godinu. Preostalih dvanaest zemalja je u toku istog perioda zabeležilo progresivno povećanje trgovinskog deficita sa NR Kinom.

---

[36] Sa pridruživanjem Grčke u 2019. godini, format je proširen na „17+1" a posle povlačenja baltičkih zemalja 2022. godine, inicijativa je nadalje zvanično poznata kao "Saradnja između Kine i zemalja Centralne i Istočne Evrope".

Format „16+1" se takođe suočio sa izazovima u vidu rastućih negativnih percepcija NRK u nekim delovima CIE. Baltičke zemlje, Češka i Slovačka su, recimo, kritikovale NRK zbog njene "diplomatije vuka ratnika", njene politike "jedne Kine" prema Tajvanu, kao i zbog njenih loših rezultata u oblasti poštovanja ljudskih prava i relativno visoke korupcije (Kavalski, 2022). Prema zvaničnom saopštenju da su se njihovi strateški ciljevi udaljili od formata „16+1" , Litvanija se 2021. godine povukla iz inicijative „16+1" , a njen primer su 2022. godine sledile Letonija i Estonija. Zabrinutost se javila i u nekim drugim zemljama CIE, prvenstveno zbog nedovoljnog broja investicionih projekata i opšteg nezadovoljstva (Salát, 2022).

Imajući u vidu da bi porast obima trgovine mogao da unapredi ekonomsku saradnju i dovede do pozitivnog neto efekta po privredni rast za sve zemlje učesnice (Jovičić et al., 2020), od ključnog je značaja da se analizira da li je učešće u inicijativi „16+1" direktno doprinelo povećanju trgovinske razmene između CIE i Kine ili su drugi faktori imali značajan uticaj. Samim tim, primenom gravitacionog modela koji se uobičajeno koristi u analizama međunarodne trgovine, svrha ove studije je da se ispitaju bilateralni trgovinski odnosi između NRK i 16 zemalja CIE u periodu od 2000. do 2022. godine.

Struktura rada je sledeća. Nakon uvoda, u drugom delu je predstavljen pregled literature, dok je u trećem delu opisana metodologija. Četvrti deo predstavlja rezultate istraživanja. U poslednjem delu je predstavljena diskusija kao i zaključna razmatranja.

Pregled literature

Saradnja između NRK i CIE

Uspostavljanje veza između CIE i NR Kine otvorilo je nove debate koje uključuje nove komparativne sub-regionalne i sub-nacionalne analize (Bharti, 2022). Pored brojnih studija koje ispituju „16+1" i odgovarajuću ekonomsku u političku pozadinu uključenosti kako CIE, tako i NR Kine (Turcsányi et al., 2014; Vangeli i Pavlićević, 2019), istraživači su analizirali i odnose između NRK i CIE u kontekstu inicijative "Pojas i put", imajući u vidu da su i ova inicijativa i format „16+1" povezane jer se obe fokusiraju na povećanje povezanosti i produbljivanjem saradnje (Matura, 2016; Pepermans, 2018; Szunomár, 2019).

Što se tiče razvoja ekonomske saradnje između NR Kine i CIE koja potiče iz „16+1", studije su uglavnom istraživale razvoj investicija ili trgovinskih odnosa. Na primer, Šteinbuka et al. (2017) istražujući nedavne investicione trendove između EU i Kine, zajedno sa trgovinskom saradnjom i pitanjima ekspanzivnog rasta saradnje između CIE i NRK (koje uključuju platformu „16+1"), tvrde da investicije NRK i dalje ostaju umerene, a praćene su povećanim trgovinskim

deficitom. Isto tako, Grieger (2018) zaključuje da je trgovina između NR Kine i CIE doživela značajan rast, ali prevashodno u korist NR Kine. Grieger (2018) takođe primećuje da kineske SDI predstavljaju neznatan udeo u ukupnim SDI uprkos velikoj koncentraciji u najvećim zemljama CIE.

Andrijauskas et al. (2020), istražujući odnose NR Kine i CIE, ukazuju na skroman ekonomski uticaj NR Kine na zemlje CIE jer se one prvenstveno oslanjaju na trgovinu i investicije sa EU i drugim razvijenim zemljama. Slično tome, na osnovu detaljnog empirijskog istraživanja, Matura (2019) nije pronašao dokaze o snažnijem uticaju intenziviranja trgovinskih odnosa između NRK i CIE, primećujući slabu korelaciju između trgovine i nivoa političkih odnosa.

Uprkos značajnom razvoju saradnje NR Kine sa CIE, Horváth (2020, str. 642) smatra da je „u poređenju sa drugim multilateralnim odnosima, značaj saradnje CIE i NRK manji od druge multilateralne saradnje", zaključujući da je zabrinutost zemalja Zapadne Evrope od proširenja saradnje CIE i NRK, i da su dosta preuveličani.

Inače, moglo bi se primetiti, da je većina autora saglasna (Gigov i Poposka, 2022; Stanojević et al., 2021; Szunomár et al., 2020; Jaklič i Svetličič, 2019; Jaćimović et al. 2018; Yue, 2018; i drugi) da, uprkos tome što su NRK i CIE značajno unapredile međusobnu saradnju, kao i trgovinu tokom poslednje decenije, visoka očekivanja u pogledu koristi od realizacije inicijative "16+1" nisu bila u potpunosti ispunjena

Gravitacioni model

Otkako je prvobitno uveo svoju formulaciju davne 1962. godine, model gravitacije je služio kao koristan alat u analizi međunarodne trgovine. Međutim, zbog neadekvatnosti njegovog teorijskog okvira, formalnih matematičkih izvođenja i dokaza, primena modela u društvenim i naučnim istraživanjima je bila raznovrsna, a ostaje predmet dalje diskusije (Li et al., 2020). Anderson (1979) i Bergstrand (1985) dali su značajan doprinos formulaciji modela i njegovom teorijskom temelju: dok je Bergstrand obezbedio mikroekonomsku osnovu modela tako što je povezao bilateralnu trgovinu i teoriju, a istovremeno je uključio i ekonomsku ponudu. Anderson je sledio pristup diferencijaciji proizvoda postavljajući prve teorijske temelje za gravitacionu jednačinu kao ekonomista (Shahriar et al., 2019).

Gravitacioni model danas ima široku primenu u raznim empirijskim analizama (Van Bergeijk i Brakman, 2010; De Benedictis i Taglioni, 2011; Krisztin i Fischer, 2015; Narayan i Nguyen, 2016; Irshad et al., 2017; Shahriar et al., 2019; Kohl, 2019; Martin i Pham, 2020; Golovko i Sahin, 2021; Yotov, 2022) kako bi se lakše objasnili i predvideli tokovi trgovine između zemalja i ponudio uvid u relativnu važnost faktora kao što su veličina ekonomije i udaljenost za oblikovanje obrazaca međunarodne trgovine, čime je učvršćen položaj ovog

modela kao vrednog resursa za kreatore politika i firme koje učestvuju u međunarodnoj trgovini.

Oslanjajući se na širok spektar ekonomskih pokazatelja, kao i na fizičku udaljenost između privreda koje se analiziraju, gravitacioni model se u velikoj meri primenjuje u analiziranju i predviđanju tokova bilateralne trgovine (Head i Mayer, 2014). Gravitacioni model inkorporira nekoliko metodoloških i teorijskih dostignuća, uključujući i nove aproksimacije za tržišne prepreke, kao i mere za analiziranje ekonomske udaljenosti i stranih direktnih ulaganja (Van Bergeijk i Brakman, 2010). Zbog kapaciteta koje ima kao analitički alat, gravitacioni model se koristi u raznim analizama u oblasti međunarodnih migracija (Beine et al., 2016), poljoprivrede i stočarstva (Atif et al., 2017; Luo i Tian, 2018), zdravstva (Teow et al., 2018), turizma (Santana-Gallego et al., 2016) i investicija (Chang, 2014). Međutim, i dalje se prvenstveno koristi u istraživanjima u oblasti međunarodne trgovine, pre svega sa ciljem uračunavanja međunarodnih tokova kapitala i radne snage (Zhou et al., 2019). Ovaj model se može primeniti i za utvrđivanje ekonomskih odnosa između dve zasebne privrede ili zemlje, kao što je, na primer, obim u kojem su sankcije i cene nafte uticale na spoljnu trgovinu između Rusije i Irana u periodu od 1994. do 2013. godine (Rasoulinezhad, 2016). Primenom pojednostavljenog gravitacionog modela na baltičke države (Estoniju, Letoniju i Litvaniju), Byers et al. (2000) su utvrdili da su se njihovi međusobni trgovinski tokovi ne samo smanjili, već su se proširili i na druge bivše države SSSR-a. Proučavajući raspad SSSR-a, Xuegang et al. (2008) su koristili tri objašnjavajuće promenljive (BDP, BDP po glavi stanovnika i šangajske organizacije za saradnju (ŠOS) – za koje je sve utvrđeno da su značajne), da razviju gravitacioni model za bilateralnu trgovinu regiona Sinđan.

Nedostatak jedinstvenog konsenzusa o ekonometrijskoj specifikaciji gravitacionog modela ostavlja prostora za debatu. Međutim, upotreba panel podataka i dalje može predstavljati značajne prednosti zbog svoje mnogo veće veličine uzorka u odnosu na studije poprečnog preseka ili vremenskih serija, jer poboljšava preciznost procene regresije. Korišćenje panel podataka takođe može doprineti ublažavanju problema pristrasnosti rezultata usled izostavljenih promenljivih i heterogenosti, koji se često javljaju u istraživanjima poprečnog preseka. Štaviše, preporučuje se primena panel podataka za procenu gravitacionog modela međunarodne trgovine jer bi izostavljanje značajnih varijabli takođe moglo da generiše pristrasne rezultate i pogrešne zaključke (Pesaran, 2015).

Metodologija

Da bi se istražio uticaj formata „16+1" na razvoj trgovinskih tokova između NRK i CIE, primenjen je pristup gravitacionog modela zasnovan na Tinbergen-ovom (1962) osnovnom obliku:

$$Y_{ij} = C\frac{Z_i Z_j}{D_{ij}^2} \tag{1}$$

Gde je Y_{ij} obim bilateralne trgovine između zemlje i i zemlje j. Z_i i Z_j je BDP zemlje i i zemlje j, D_{ij} je rastojanje između zemlje i i zemlje j.

Osnovne jednačine proširenih gravitacionih modela primenjenih u ovom istraživanju ocenjene su na sledeći način:

Model1: $\ln Y_{ij,t} = C_1 + \alpha_1 \ln(Z_{it}) + \alpha_2 \ln(Z_{jt}) + \alpha_3 \ln(D_{ij}) + \varepsilon_{ijt}$, (2)

Model2: $\ln Y_{ij,t} = C_2 + \beta_1 \ln(Z_{it}) + \beta_2 \ln(Z_{jt}) + \beta_3 \ln(D_{ij}) + \beta_4 COOP_{ij} + \zeta_{ijt}$, (3)

Model3: $\ln Y_{ij,t} = C_3 + \lambda_1 \ln(Z_{it}) + \lambda_2 \ln(Z_{jt}) + \lambda_3 \ln(D_{ij}) + \lambda_4 EU_{ij} + \xi_{ijt}$, (4)

Moldel4: $\ln Y_{ij,t} = C_4 + \gamma_1 \ln(Z_{it}) + \gamma_2 \ln(Z_{jt}) + \gamma_3 \ln(D_{ij}) + \gamma_4 COOP_{ij} + \gamma_5 EU_{ij} + \chi_{ijt}$, (5)

gde je $Y_{ij,t}$ ustvari $EX_{ij,t}$, tj. obim izvoza iz CIE zemalja u NRK, zatim $IM_{ij,t}$, tj. obim uvoza iz NRK u zemlje CIE, i TT_{ij}, tj. ukupan obim bilateralne trgovine između zemlje i i zemlje j, respektivno, $i=1$ (Kina), $j=2,3,4,\dots,17$ (CIE zemlje). Z_{it} je kineski BDP u godini t. Z_{jt} je BDP zemlje j u godini t. D_{ij} je rastojanje u kilometrima između Kine i zemlje j, $t=2000, \dots, 2022$. $COOP_{ij}$ je *dummy* promenljiva za učešće u formatu "16+1" . EU_{ij} je *dummy* promenljiva za učešće u Evropskoj uniji. $\varepsilon_{ijt}, \zeta_{ijt}, \xi_{ijt}, \chi_{ijt}$ su članovi greške. Za ocenu parametara u modelima korišćena je metoda najmanjih kvadrata.

Godišnji podaci za promenljive su prikupljeni iz različitih izvora: UN Comtrade za bilateralne trgovinske tokove, Svetska banka za BDP i Great Circle Distance data za udaljenost između glavnih gradova. Analizom su obuhvaćene godine od 2000 do 2022, a skup panel podataka se sastoji od 17 zemalja sastavljenih od 16 zemalja CIE (Albanija, Bosna i Hercegovina, Bugarska, Hrvatska, Češka, Estonija, Mađarska, Letonija, Litvanija, Crna Gora, Severna Makedonija, Poljska, Rumunija, Srbija, Slovačka i Slovenija) i NRK.

Rezultati

U tabeli 1 je prikazana deskriptivna statistika za korišćene promenljive. Kako su vrednosti za srednju vrednost i medijanu za sve promenljive, isključujući *dummy* promenljive, veoma slične, to ukazuje da su promenljive normalno raspoređene. Shodno tome, *dummy* promenljive nemaju normalnu raspodelu, jer srednje vrednosti i medijana ovih varijabli značajno odstupaju. Najveću standardnu devijaciju ima promenljiva EX, što ukazuje da je izvoz veoma varijabilan u odnosu na sve druge korišćene promenljive. Međutim, promenljiva D ima

najmanju standardnu devijaciju, što je i očekivano, jer je rastojanje najmanje varijabilno u odnosu na sve druge korišćene promenljive.

Tabela 1: Deskriptivna statistika

Promenljiva	Srednja vrednost	Medijana	Std. dev.	Maksimum	Minimum
EX	18,272	18,580	2,443	21,923	6,921
BDP	17,537	17,626	1,272	20,350	13,800
BDP_{Kina}	22,417	22,868	0,967	23,619	20,435
D	8,887	8,911	0,062	8,950	8,758
IM	20,828	20,762	1,564	24,629	16,415
TT	14,045	14,006	1,589	17,785	9,546
COOP	0,316	0,000	0,466	1,000	0,000
EU	0,553	1,000	0,498	1,000	0,000

Izvor: Autorska ocena.

U tabelama od 2 do 4 predstavljeni su ocenjeni parametri na osnovu procene uticaja formata „16+1" na NRK-CIE trgovanje. Rezultati pokazuju da je svih dvanaest regresija statistički značajno i da se podaci dobro uklapaju u modele, prema F- statistikama i R^2, respektivno.

Tabela 2: Regresiona analiza: zavisna promenljiva je EX

Promenljiva	OLS1	OLS2	OLS3	OLS4
C	45,917*** (0,002)	46,837*** (0,002)	13,241 (0,327)	16,921 (0,214)
BDP	0,870*** (0,000)	0,868*** (0,000)	0,527*** (0,000)	0,510*** (0,000)
BDP_{Kina}	0,789*** (0,000)	0,759*** (0,000)	0,511*** (0,000)	0,354*** (0,007)
D	-6,819*** (0,000)	-6,846*** (0,000)	-1,901 (0,214)	-1,906 (0,212)
COOP		0,095 (0,745)		0,469* (0,073)
EU			2,221*** (0,000)	2,268*** (0,000)
R^2	0,416	0,416	0,545	0,549
Adjusted R^2	0,411	0,409	0,539	0,542
F-statistika	82,257 (0,000)	61,560 (0,000)	103,464 (0,000)	83,956 (0,000)

Beleška: p-vrednosti su predstavljene u zagradama. ***, **, * su p<0,01, p<0,05, i p<0,1, respektivno.
Izvor: Autorska ocena.

145

Tabela 3: Regresiona analiza: zavisna promenljiva je IM

Promenljiva	OLS1	OLS2	OLS3	OLS4
C	43,185*** (0,000)	43,061*** (0,000)	32,451*** (0,000)	33,305*** (0,000)
BDP	0,736*** (0,000)	0,736*** (0,000)	0,623*** (0,000)	0,619*** (0,000)
BDP_{Kina}	0,453*** (0,000)	0,457*** (0,000)	0,361*** (0,000)	0,325*** (0,000)
D	-5,110*** (0,000)	-5,107*** (0,000)	-3,495*** (0,000)	-3,497*** (0,000)
COOP		-0,013 (0,936)		0,109 (0,485)
EU			0,727*** (0,000)	0,740*** (0,000)
R^2	0,581	0,581	0,615	0,615
Adjusted R^2	0,578	0,577	0,610	0,610
F-statistika	161,637 (0,000)	120,884 (0,000)	138,800 (0,000)	110,974 (0,000)

Beleška: p-vrednosti su predstavljene u zagradama. ***, **, * su p<0,01, p<0,05, i p<0,1, respektivno.
Izvor: Autorska ocena.

Tabela 4: Regresiona analiza: zavisna promenljiva je TT

Promenljiva	OLS1	OLS2	OLS3	OLS4
C	35,061*** (0,000)	34,908*** (0,000)	22,714*** (0,005)	23,689*** (0,004)
BDP	0,736*** (0,000)	0,736*** (0,000)	0,607*** (0,000)	0,602*** (0,000)
BDP_{Kina}	0,480*** (0,000)	0,485*** (0,000)	0,375*** (0,000)	0,333*** (0,000)
D	-5,028*** (0,000)	-5,024*** (0,000)	-3,170*** (0,001)	-3,172*** (0,001)
COOP		-0,016 (0,923)		0,124 (0,432)
EU			0,836*** (0,000)	0,851*** (0,000)
R^2	0,575	0,575	0,617	0,618
Adjusted R^2	0,571	0,570	0,613	0,613
F-statistika	157,323 (0,000)	117,660 (0,000)	140,406 (0,000)	112,326 (0,000)

Beleška: p-vrednosti su predstavljene u zagradama. ***, **, * su p<0,01, p<0,05, i p<0,1, respektivno.
Izvor: Autorska ocena.

Kada su ukupna trgovina (TT) i uvoz (IM) zavisne promenljive, tada su BDP za NRK i BDP zemalja CIE, udaljenost između Kine i CIE, i članstvo u EU

statistički značajne promenljive na nivou od 1% poverenja, dok učešće u „16+1" formatu izgleda neznačajno. Kada je izvoz (EX) zavisna promenljiva, onda je, pored statističke značajnosti BDP-a i za NRK i za zemlje CIE, članstvo u EU je statistički značajno na nivou poverenja od 1%, dok je *dummy* promenljiva za učešće u formatu „16+1" statistički značajna na 10% poverenja, kada regresioni model uključuje sve promenljive. Međutim, rastojanje između CIE i NR Kine je neznačajno u ovom slučaju.

Diskusija i zaključci

Širenje uticaja NRK na globalnom nivou imalo je efekta i na promene trgovinskih tokova širom sveta, uključujući region Centrale i Istočne Evrope. Isto tako, inicijativa „16+1" dočekana sa pretpostavkom da će poboljšati bilateralne trgovinske odnose i podstakne trgovinske tokove. Uz primenu gravitacionog modela, nastojali smo da ispitamo da li je inicijativa „16+1" generisala povećanu trgovinu između NR Kine i CIE.

Prema rezultatima analize, promenljive koje utiču na bilateralnu trgovinu NRK-CIE (ukupna trgovina, izvoz i uvoz) jesu BDP NR Kine i njenih partnerskih zemalja, kao i članstvo u EU. Ovi nalazi impliciraju da ekonomski rast u NRK i CIE, uključujući članstvo u EU, imaju značajan pozitivan uticaj na bilateralne trgovinske tokove između analiziranih ekonomija.

Kada je reč o ukupnoj trgovini i uvozu iz NRK, udaljenost ima negativan uticaj na bilateralnu trgovinu, dok učešće u formatu „16+1" nije značajno. Nalazi takođe sugerišu da članstvo u EU pozitivno utiče na povećanje obima trgovine. Ovo se može objasniti dubljom i dugotrajnijom saradnjom između NR Kine i EU, kao i činjenicom da zemlje CIE koje su istovremeno članice EU su posebno privlačne za NRK, čiji jedan od primarnih ciljeva jeste ulazak na zapadnoevropska tržišta.

Posmatrajući izvoz zemalja CIE u NRK, došlo se do zaključka da članstvo u EU i učešće u formatu „16+1" su doprineli povećanju obima trgovinskih tokova, s obzirom na to da promenljive imaju pozitivne i statistički značajne vrednosti. Ipak, na osnovu analiziranog modela procenjuje se da je članstvo u EU značajnije u smislu svog uticaja na rast bilateralne trgovine od učešća u „16+1". Razlog može biti to da, sem dublje saradnje između NRK i EU koja je već bila pomenuta ranije, zemlje CIE koje su članice EU imaju prednost u poređenju sa zemljama koje još nisu pristupile Uniji zahvaljujući boljoj politici podrške izvoza, kao i lakšem pristupu globalnim lancima vrednosti.

Rezultati studije korespondiraju sa nalazima Stanojevića i Qiu (2022) koji su došli do zaključka da članstvo u EU ima pozitivan i značajan uticaj na rast trgovine između NR Kine i zemalja CIE. Naši rezultati se takođe poklapaju sa rezultatima Stanojevića et al. (2021) koji tvrde da ne postoji dovoljno dokaza da je saradnja u okviru inicijative „16+1" dovela do značajnog porasta trgovinskih tokova između zemalja CIE i NRK. Pored toga, naša studija otkriva statističku značajnost *dummy*

varijable „učešće u „16+1" na nivou poverenja od 10% u slučaju kada je izvoz (EX) zavisna varijabla, što je u korelaciji sa rezultatima Jovičić i Minović (2021).

Govoreći o rezultatima, treba imati u vidu to da sprovedena studija ima određena ograničenja. Kao prvo, uprkos dobrim pokazateljima empirijske analize, procena bilateralne trgovine pomoću gravitacionog modela i dalje nema čvrste teorijske osnove, što implicira neophodnost njenog unapređenja. Drugo, metoda najmanjih kvadrata korišćena u studiji može biti nedosledna u pogledu prisustva heteroskedastičnosti (Santos Silva i Tenreiro, 2006) kojoj bi trebalo u budućim istraživanjima suprotstaviti metode nelinearne estimacije. Treće, ograničen izbor faktora koji utiču na trgovinu NRK-CIE je bio posmatran u ovoj studiji. Stoga, sveobuhvatnija analiza koja uključuje dodatne faktore i promenljive bi mogla doprineti verodostojnosti rezultata u budućim istraživanjima. Na kraju, zemlje CIE su razmatrane u celini; buduća istraživanja bi trebalo da analiziraju trgovinu između NR Kine i pojedinih zemalja CIE kako bi se bolje utvrdili faktori koji su doprineli povećanju uvoza i izvoza.

Zahvalnica

Literatura

1. Anderson, J. E. (1979). A Theoretical Foundation for the Gravity Equation. *The American Economic Review*, 69 (1), 106-116.
2. Andrijauskas, K., Bachulska, A., Bērziņa-Čerenkova, U. A., Karásková, I., Karindi, L., & Szunomár, Á. (2020). *Empty shell no more: China's growing footprint in Central and Eastern Europe*. Association for International Affairs (AMO).
3. Atif, R.M., Haiyun, L., & Mahmood, H. (2017). Pakistan's agricultural exports, determinants and its potential: an application of stochastic frontier gravity model. *The Journal of International Trade & Economic Development*, 26(3), 257-276.
4. Beine, M., Bertoli, S., & Fernandez-Huertas Mo, J. (2016). A Practitioners' Guide to Gravity Models of International Migration. *The World Economy*, 39(4), 496-512. doi: 10.1111/twec.12265.
5. Bergstrand, J.H. (1985). The gravity equation in international trade: Some microeconomic foundations and empirical evidence. *The Review of Economics and Statistics*, 67, 474–481.
6. Bharti, M. S. (2022). The evolution of China's economic engagement in Central and Eastern Europe. *Economic and Regional Studies*, 15(1), 90-106.

7. Bodroža D., & Kolavčić M. (2022). The impact of investment on the economic activity of the Balkan Silk Road Countries. In: Bujan, M.A. (Ed.), Beraha, I. (Ed.): *Opportunities and Challenges for Multinational Enterprises and Foreign Direct Investment in the Belt and Road Initiative*: 144-171, IGI Global, Hershey, Pennsylvania, USA.

8. Byers, D.A., Talan B.I., & Lesser, B. (2000). New borders and trade flows: A gravity model analysis of the Baltic states. *Open Economies Review*, 11(1), 73-91

9. Chang, S. C. (2014). The determinants and motivations of China's outward foreign direct investment: A spatial gravity model approach. *Global Economic Review*, 43(3), 244-268.

10. De Benedictis, L., & Taglioni, D. (2011). *The gravity model in international trade*, 55-89. Springer Berlin Heidelberg.

11. GACC (2023). General administration of custom PRC – Statistics. Available at: http://english.customs.gov.cn/statics/report/preliminary.html

12. Gigov, I. S., & Poposka, K. (2022). China's Trade and Investment in the Western Balkans Under the Belt and Road Initiative: Focus on North Macedonia. In *Opportunities and Challenges for Multinational Enterprises and Foreign Direct Investment in the Belt and Road Initiative*, 234-259. IGI Global.

13. Golovko, A., & Sahin, H. (2021). Analysis of international trade integration of Eurasian countries: Gravity model approach. *Eurasian Economic Review*, 11, 519-548.

14. Grieger, G. (2018). China, the 16+1 format and the EU. Available at: https://policycommons.net/artifacts/1335766/china-the-161-format-and-the-eu/1942476/

15. Gurría, A. (2014). China Go Global. OECD. Available at: https://www.oecd.org/china/china-go-global.htm

16. Head K, & Mayer T. (2014). Gravity equations: workhorse, toolkit, and cookbook. *Handb Int Econ*, 4,131–195.

17. Horváth, L. (2020). The geopolitical role of China in the CEE region. *Contemporary Chinese Political Economy and Strategic Relations: An International Journal*, 6(2), 617-651.

18. Irshad, M.S., Xin, Q, Shahriar, S., & Arshad, H. (2017). A Panel Data Analysis of China's Trade Pattern with OPEC Members: Gravity Model Approach. *Asian Economic and Financial Review*, 8(1), 103-116.

19. Jaćimović, D., Dragutinović Mitrović, R., Bjelić, P., Tianping, K., & Rajković, M. (2018). The role of Chinese investments in the bilateral exports of new EU member states and Western Balkan countries. *Economic research-Ekonomska istraživanja*, 31(1), 1185-1197.

20. Jaklič, A., & Svetličič, M. (2019). China and Central and Eastern European Countries within '16+1': Group or Bilateral Relations?. *Entrepreneurial Business and Economics Review*, 7(2), 83-100.
21. Jovičić, E., & Minović, J. (2021). Bilateral Trade Relations between China and CEE Countries: A Gravity Model Approach. *Global economic trends - challenges and opportunities: book of abstracts*, 75-78.
22. Jovičić, E., Stevanović, S., & Beraha, I. (2020). Serbia-China bilateral trade relations: major challenges and opportunities. *Economic Analysis*, 53(2), 133-144.
23. Kavalski, E. (2022). The end of China's affair with Central and East Europe. In D.M. Arase; P. M. Amakasu Raposo de Medeiros Carvalho (Eds). *The Belt and Road Initiative in Asia, Africa, and Europe*, Abingdon/New York: Routledge.
24. Kohl, T. (2019). The Belt and Road Initiative's effect on supply-chain trade: evidence from structural gravity equations. *Cambridge Journal of Regions, Economy and Society*, 12(1), 77-104.
25. Krisztin, T., & Fischer, M. M. (2015). The gravity model for international trade: Specification and estimation issues. *Spatial Economic Analysis*, 10(4), 451-470.
26. Li, E., Lu, M., & Chen, Y. Analysis of China's Importance in "Belt and Road Initiative" Trade Based on a Gravity Model. *Sustainability*, 12(17), 6808.
27. Luo, Z., & Tian, X. (2018). Can China's meat imports be sustainable? A case study of mad cow disease. *Applied Economics*, 50(9), 1022-1042.
28. Martin, W., & Pham, C. S. (2020). Estimating the gravity model when zero trade flows are frequent and economically determined. *Applied Economics*, 52(26), 2766-2779.
29. Matura, T. (2016). Europe Needs to Take Full Advantage of the 16+1 Cooperation and OBOR. http://www.friendsofeurope.org/global-europe/europe-needs-to-take-full-advantage-of-the-161-cooperation-and-obor/
30. Matura, T. (2019). China–CEE trade, investment and politics. *Europe-Asia Studies*, 71(3), 388-407.
31. Narayan, S. & Nguyen, T. T. (2016). Does the trade gravity model depend on trading partners? Some evidence from Vietnam and her 54 trading partners. *International Review of Economics and Finance*, 41, 220-237.
32. Pepermans, A. (2018). China's 16+1 and Belt and Road Initiative in Central and Eastern Europe: economic and political influence at a cheap price. *Journal of Contemporary Central and Eastern Europe*, 26(2-3), 181-203.
33. Pesaran, M. H. (2015). *Time Series and Panel Data Econometrics*. UK, Oxford: Oxford University Press.

34. Rasoulinezhad, E., (2016). Investigation of sanctions and oil price effects on the Iran-Russia trade by using the gravity model. *Vestnik of St Petersburg University, Series*, 5(2), 68-84.

35. Salát, G. (2022). Opportunities and Challenges for the Further Development of the 16+1 Framework. *Results and challenges: ten years of China-CEEC cooperation*, 82, 80-99.

36. Santana-Gallego, M., Ledesma-Rodríguez, F. & Pérez-Rodríguez, J. (2016). International trade and tourism flows: An extension of the gravity model. *Economic Modelling*, 52, 1026-1033. doi: 10.1016/j.econmod.2015.10.043.

37. Santos Silva, J.M.C., & Tenreyro, S. (2006). The log of gravity. *The Review of Economics and Statistics*, 88, 641-658.

38. Shahriar, S., Qian, L., Kea, S., & Abdullahi, N. M. (2019). The gravity model of trade: A theoretical perspective. *Review of Innovation and Competitiveness: A Journal of Economic and Social Research*, 5(1), 21-42.

39. Stanojević, S., & Qiu, B. (2022). A study on the impact of EU membership on Sino-CEEC trade in the context of the 17+1 cooperation mechanism. *International Review*, (1-2), 60-64.

40. Stanojević, S., Qiu, B., & Chen, J. (2021). A Study on Trade between China and Central and Eastern European Countries: Does the 16+ 1 Cooperation Lead to Significant Trade Creation?. *Eastern European Economics*, 59(4), 295-316.

41. Šteinbuka, I., Muravska, T., & Kuznieks, A. (2017). Cooperation formats of China and Europe: Synergies and divergences. *TalTech Journal of European Studies*, 7(1), 98-118.

42. Szczudlik, J. (2019). Seven years of the 16+1: an assessment of China's 'multilateral bilateralism' in Central Europe. IFRI: Institut Français des Relations Internationales. Asie.Visions, No. 107. Retrieved from https://policycommons.net/artifacts/1406136/seven-years-of-the-161/2020399/ on 15 Sep 2023. CID: 20.500.12592/80xmsh.

43. Szunomár, Á. (2019). China's investments and infrastructural expansion in Central and Eastern Europe. *Opportunities and challenges: sustainability of China-EU relations in a changing world*, 84-103.

44. Szunomár, Á., Karindi, L., & Leonte, A. (2020). Economic relations: A sugar cane, or a sugar-coated stick? In: *Empty shell no more: China's growing footprint in Central and Eastern Europe*, 35-56.

45. Teow, K. L., Tan, K. B., Phua, H. P., & Zhu, Z. (2018). Applying gravity model to predict demand of public hospital beds. *Operations Research for Health Care*, 17, 65-70.

46. Tinbergen, J. (1962). *Shaping the World Economy. Suggestions for an International Economic Policy*. New York: Twentieth Century Fund.

47. Turcsányi, R., Qiaoan, R., & Kříž, Z. (2014). Coming from nowhere: the Chinese perception of the concept of Central Europe. Wydawnictwo Uniwersytetu Łódzkiego.
48. UNCTAD (2021). China: The rise of a trade titan, available at https://unctad.org/news/china-rise-trade-titan
49. Van Bergeijk, P. A., & Brakman, S. (2010). *The gravity model in international trade: Advances and applications.*
50. Vangeli, A., & Pavlićević, D. (2019). Introduction: new perspectives on China–Central and Eastern Europe relations. *Asia Europe Journal*, 17, 361-368.
51. Xuegang, C., Zhaoping, Y., & Xuling, L. (2008). Empirical analysis of Xinjiang‟s bilateral trade: Gravity model approach. *Chinese Geographical Science*, 18(1), 9-16.
52. Yotov, Y. V. (2022). On the role of domestic trade flows for estimating the gravity model of trade. *Contemporary Economic Policy*, 40(3), 526-540.
53. Yue, L. (2018). Economic 'highway' with three speed tracks and destinations between China and CEE. *China–CEE Institute (Budapest) Working Paper*, (14).
54. Zakić, K. (2020). Economic outcomes of the 17+1 Platform from the Chinese Point of View. Китай в мировой и региональной политике. *История и современность*, 25(25), 285-304.
55. Zhou, L., Lingzhi, L., & Lei, L. (2019). Avian Influenza, Non-Tariff Measures and the Poultry Exports of China. *Australian Journal of Agricultural and Resource Economics*, 63(1), 72-94. doi: 10.1111/1467-8489.12285.

CHINA-CEE TRADE DEVELOPMENT: ANALYSIS OF THE "16+1" INITIATIVE IMPACT

Elena Jovičić[37], *Jelena Minović*[38], *Dejana Pavlović*[39], *Duško Bodroža*[40]

Abstract

The development of trade relations between the PRC of China and the 16 countries of Central and Eastern Europe (CEE) from 2000-2022 are the subject of this research. Through the application of a gravity model, the factors that directly contribute to increased trade are examined, specifically examining the impact of CEE countries' participation in the "16+1" initiative. Empirical results show economic growth in the PRC and CEE, including CEE member-state status in the EU, has had a positive significant impact on developing bilateral trade between the PRC and CEE for all total trade (TT) (when viewed as dependent variables), as well as CEE imports to the PRC (IM) and CEE exports the PRC (EX). Participation in the "16+1" initiative is found to have contributed to increased trade only when CEE exports to the PRC were the dependent variable. However, when compared to EU membership, participation in "16+1" was found to be less significant.

Keywords: CEE, China, "16+1" initiative, trade, gravity model

JEL: F15, F43

Introduction

Over the last three decades, the People's Republic of China (PRC) has gone through unprecedented economic growth (UNCTAD, 2021), which has led to its ranking since 2012 as the primary global exporter and second-highest global importer (Gurría, 2014). Its total trade in goods alone reached a record 42.07 trillion Yuan ($6.3 trillion USD) in 2022 (the General Administration of Customs People's Republic of China - GACC, 2023).

In line with its economic growth, the PRC has significantly strengthened its economic ties with Central and Eastern Europe (CEE). The "16+1" format41,

---

[37] Elena Jovičić, PhD, Research Associate, Institute of Economic Sciences, Belgrade, Serbia, e-mail: elena.jovicic@ien.bg.ac.rs ORCID 0000-0002-8356-9678

[38] Jelena Minović, PhD, Principal Research Fellow, Institute of Economic Sciences, Belgrade, Serbia, e-mail: jelena.minovic@ien.bg.ac.rs ORCID 0000-0001-6254-4888

[39] Dejana Pavlović, PhD, Research Associate, Institute of Economic Sciences, Belgrade, Serbia, e-mail: dejana.pavlovic@ien.bg.ac.rs ORCID 0000-0001-5090-302X

[40] Duško Bodroža, PhD, Research Associate, Institute of Economic Sciences, Belgrade, Serbia, e-mail: dusko.bodroza@ien.bg.ac.rs ORCID 0000-0002-6219-1338

formed in 2012 to develop economic, trade, political and cultural ties between China and CEE, has substantially deepened cooperation (Bodroža & Kolavčić, 2022). The PRC has prioritized investment across economic sectors where CEE requires long-term investment (i.e., infrastructure, energy, telecommunications and agriculture) (Yue, 2018). Further, the initiative seeks to lower trade barriers between the PRC and CEE in order to improve market access and substantiate new trade potential. The initiative has also helped CEE overcome the lingering effects of the 2008 financial crisis by attracting foreign capital inflows (Matura, 2019; Szunomár, 2019). As concluded by both Vangeli and Pavlićević (2019) as well as Zakić (2020), the 2008 global financial crisis was "the right opportunity" and a turning point in the development of CEE-China relations. Following the trade imbalance with China and their status as secondary economies inside the EU, many countries within the wider CEE welcomed Chinese investment and improved ties with the PRC as a means to develop their infrastructure and open access to untapped new markets (Szczudlik, 2019).

Strengthening relations between CEE and China after initializing the "16+1" format led to a rapid expansion of bilateral trade. According to the GACC, bilateral trade between CEE and China steadily grew from 2012 to 2022 (8.1% on average per annum). The total amount of goods traded between CEE and the PRC reached $158 billion USD in 2022, a 7% year-on-year rise that more than doubled from 2012 in terms of both exports and imports. Nonetheless, this trade induced an imbalance as PRC imports to CEE grew more significantly than exports (2.6 and 1.7 fold, respectively).

Despite the overwhelming growth in trade and cooperation, there have been a number of associated challenges hindering the development of more efficient trade to the detriment of CEE countries. Among other key issues, the PRC's strategic orientation towards a long-term expansion of exports of domestically produced products in relation to importing energy and minerals has diminished CEE's overall influence due to the asymmetry in economic power and has heavily skewed trade in the PRC's favor. Only four of sixteen CEE countries (Poland, Romania, Latvia and Albania) recorded a decrease in their year-over-year trade deficit in 2022. The remaining twelve have seen trade deficits with China progressively widening within the same timeframe.

The "16+1" format has also faced challenges by growing negative perceptions of the PRC in some parts of CEE. The Baltic States, Czechia and Slovakia, for example, have criticized the PRC for its "wolf warrior diplomacy", its one-China policy towards Taiwan as well as for its poor human rights record and relatively high corruption (Kavalski, 2022). Under the official explanation that their

---

[41] With Greece joining in 2019, the format was widened to "17+1" and following the Baltic countries' withdrawal in 2022, the initiative has since been officially known as "Cooperation between China and Central and Eastern European Countries".

strategic goals had divulged from the "16+1" format, Lithuania withdrew from the "16+1" in 2021, followed by Latvia and Estonia in 2022. Concerns have also arisen in some other CEE countries, primarily due to insufficient investment projects and general dissatisfaction (Salát, 2022).

Since an increase in trade volume might further economic cooperation and produce a positive net effect on economic growth for all participating economies (Jovičić et al., 2020), it is crucial to analyze whether participation in the "16+1" initiative has directly contributed to an increase in CEE-China trade or whether other factors have had a significant impact. Therefore, using the gravity model which is commonly applied to analyzing international trade, the purpose of this study is to examine bilateral trade relations between the PRC and 16 CEE countries from 2000 to 2022.

The structure of the paper is as follows. After the introduction, the second section provides a literature review, followed by the methodology section. The fourth section presents the results of the study. The final section gives a discussion with concluding marks.

Literature review

PRC-CEE cooperation

The established ties between CEE and the PRC have given life to a new debate involving novel comparative sub-regional and sub-national analyses (Bharti, 2022). Besides numerous studies examining "16+1" and the PRC's involvement in CEE as well as the respective economic and political backgrounds of the states involved (Turcsányi et al., 2014; Vangeli & Pavlićević, 2019), scholars have also been analyzing PRC-CEE ties within the Belt and Road Initiative (BRI) and "16+1" as they both interlinked and focused on enhancing connectivity and deepening collaboration (Matura, 2016; Pepermans, 2018).

Regarding the development of the economic cooperation between the PRC and CEE originating from "16+1", studies have chiefly researched investment or trade-relation development. To illustrate, Šteinbuka et al. (2017), investigating recent EU-China investment trends along with trade cooperation and issues of expansive growth between CEE countries and China (which include the "16+1" platform), argue the PRC's investment remains moderate but is coupled by increased trade deficits. Likewise, Grieger (2018) concludes that China-CEE trade has experienced substantial growth significantly skewed in the PRC's favor. Grieger (2018) also distinctly notes that Chinese FDI represents an insignificant proportion of total FDI stock despite its heavy concentration in the largest CEE countries.

Andrijauskas et al. (2020), scrutinizing China-CEE relations, point to China's modest economic impact on CEE countries as they rely primarily on trade and

investment with the EU and other such developed countries. Similarly, based on a thorough empirical investigation, Matura (2019) found no evidence of the sound impact of intensified trade relations between China and CEE, noting a weak correlation between trade and political relations.

Despite the PRC's significant cooperation development with CEE, Horváth (2020, p. 642) states that "compared to other multilateral relations, the importance of the CEE-China Cooperations is dwarfed by other multilateral cooperation", concluding that the concerns of Western European countries of expansion of CEE-China relations have been exaggerated.

Otherwise, it could be noticed that there is a general agreement (Gigov & Poposka, 2022; Stanojević et al., 2021; Szunomár et al., 2020; Jaklič & Svetličič, 2019; Jaćimović et al., 2018; Yue, 2018; and others) that, despite the PRC and CEE having significantly advanced mutual cooperation as well as trade over the last decade, the high expectations of benefits from realizing the "16+1" initiative have not been entirely met.

Gravity model

Since originally pioneering its equation in 1962, the gravity model has served as a useful tool in international-trade analysis. However, due to inadequacies in its theoretical framework, formal mathematical derivations and proofs, the model's application in social and scientific research has been varied and subject to further discussion (Li et al., 2020). Both Anderson (1979) and Bergstrand (1985) made substantial contributions to the model's formulation and theoretical background: whereas Bergstrand provided for the model's microeconomic basis by concretely linking bilateral trade and theory while also incorporating economic supply, Anderson followed a product-differentiation approach to lay the first theoretical groundwork as an economist (Shahriar et al., 2019).

The gravity model is now widely used across multiple empirical analyses (Van Bergeijk & Brakman, 2010; De Benedictis & Taglioni, 2011; Krisztin & Fischer 2015; Narayan & Nguyen, 2016; Irshad et al., 2017; Shahriar et al., 2019; Kohl, 2019; Martin & Pham, 2020; Golovko & Sahin, 2021; Yotov, 2022) to help explain and predict trade flows between countries and offer insight into the relative importance of factors such as economic size and distance in shaping international trade patterns, thereby establishing the model as a valuable resource for policymakers and businesses involved in international trade.

Relying on a diverse range of economic indicators as well as the physical distance between economies being analyzed, the gravity model has received significant application in analyzing and predicting bilateral trade flows (Head & Mayer, 2014). The gravity model incorporates several methodological and theoretical advances, including new approximations for trade barriers, as well as measures to analyze economic distance and foreign direct investment (Van Bergeijk &

Brakman, 2010). For its abilities as an analytical tool, the gravity model has been used across a range of analyses into international migration (Beine et al., 2016), agriculture and livestock (Atif et al., 2017; Luo & Tian 2018), health care (Teow et al., 2018), tourism (Santana-Gallego et al., 2016) and investment (Chang, 2014); nevertheless, the model is still chiefly applied to research on international trade to chiefly account for international capital and labor flows (Zhou et al., 2019). The model may be applied to determine economic relations between two separate economies or countries, such as the extent to which sanctions and oil prices affected foreign trade between Russia and Iran from 1994 to 2013 (Rasoulinezhad, 2016). Through the application of a thrifty-gravity model on the Baltic States (Estonia, Latvia and Lithuania), Byers et al. (2000) found their mutual trade flow to have not only decreased but also shifted to other erstwhile USSR states. In studying the collapse of the USSR, Xuegang et al. (2008) utilized three explanatory variables (GDP, GDP per capita and the Shanghai Cooperation Organization (SCO) - which were all found to be significant) to develop a gravity model for Xinjiang's bilateral trade.

A lack of uniform consensus on the gravity model's econometric specification leaves room for debate. However, panel-data usage may still present considerable advantages owing to its much more substantial sample size in relation to cross-sectional or time-series studies as it improves regression-estimate precision. Panel-data use may also help mitigate omitted variable bias and heterogeneity issues which occur frequently in cross-sectional research. Furthermore, panel-data is recommended to be applied to estimate the international-trade gravity model as omitting significant variables might also generate biased results and misleading conclusions (Pesaran, 2015).

Methodology

To investigate the impact of the "16+1" format on trade-flow development between the PRC and CEE, the gravity model approach was applied based on Tinbergen's (1962) basic form:

$$Y_{ij} = C \frac{Z_i Z_j}{D_{ij}^2}$$

Where Y_{ij} is the bilateral trade volume between country i and country j. Z_{ij} is the GDP of country i and country j, D_{ij} is the distance between country i and country j.

The baseline equations of the extended gravity models applied in this study are estimated as follows:

Model 1: $\ln Y_{ij,t} = C_1 + \alpha_1 \ln(Z_{it}) + \alpha_2 \ln(Z_{jt}) + \alpha_3 \ln(D_{ij}) + \varepsilon_{ijt,}$ (2)

Model 2: $\ln Y_{ij,t} = C_2 + \beta_1 \ln(Z_{it}) + \beta_2 \ln(Z_{jt}) + \beta_3 \ln(D_{ij}) + \beta_4 COOP_{ij} + \zeta_{ijt,}$ (3)

Model 3: $\ln Y_{ij,t}=C_3+\lambda_1\ln(Z_{it})+\lambda_2\ln(Z_{jt})+\lambda_3\ln(D_{ij})+\lambda_4 EU_{ij}+\xi_{ijt,}$ (4)

Moldel 4: $\ln Y_{ij,t}=C_4+\gamma_1\ln(Z_{it})+\gamma_2\ln(Z_{jt})+\gamma_3\ln(D_{ij})+\gamma_4 COOP_{ij}+\gamma_5 EU_{ij}+\chi_{ijt,}$ (5)

where $Y_{ij,t}$ is $EX_{ij,t}$, i.e. the volume of export from CEE countries to the PRC, then $IM_{ij,t}$, i.e. the volume of import from the PRC to CEE countries, and TT_{ij}, i.e. the total bilateral trade volume between country i and country j, respectively, $i=1$ (China), $j=2,3,4,…,17$ (CEE countries). Z_{it} is China's GDP in year t. Z_{jt} is the GDP of country j in year t. D_{ij} is the distance in kilometers between China and country j, $t=2000, …, 2022$. $COOP_{ij}$ is the dummy variable on participating in the "16+1" format. EU_{ij} is the dummy variable on participating in the European Union. $\varepsilon_{ijt,}$ $\zeta_{ijt,}$ $\xi_{ijt,}$ χ_{ijt} are the error terms. For estimation parameters in the models, the Panel Least Square method is used.

Annual data for variables are gathered from diverse sources: the UN Comtrade for bilateral trade flows, the World Bank for GDP and the Great Circle Distance data for the distance between capital cities. Covering the years from 2000 to 2022, a panel dataset consisting of 17 countries comprised of 16 CEE countries (Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Czechia, Estonia, Hungary, Latvia, Lithuania, Montenegro, North Macedonia, Poland, Romania, Serbia, Slovakia and Slovenia) and the PRC.

Results

Table 1 shows descriptive statistics for used variables. Therefore, the mean and median values for all variables, excluding dummy variables, are very close, indicating that the variables are normally distributed. Consequently, dummy variables are not normally distributed, because the mean and median values of these variables deviate significantly. The biggest standard deviation has the EX variable, indicating that export is highly variable among other used variables. However, variable D has the smallest standard deviation, and it is expected that distance is the least variable among other used variables.

Table 1. Descriptive statistics

Variable	Mean	Median	Std. Dev.	Maximum	Minimum
EX	18.272	18.580	2.443	21.923	6.921
GDP	17.537	17.626	1.272	20.350	13.800
GDP$_{ch}$	22.417	22.868	0.967	23.619	20.435
D	8.887	8.911	0.062	8.950	8.758
IM	20.828	20.762	1.564	24.629	16.415
TT	14.045	14.006	1.589	17.785	9.546

	COOP	0.316	0.000	0.466	1.000	0.000
	EU	0.553	1.000	0.498	1.000	0.000

Source: Authors' estimation.

Tables 2 - 4 present coefficients derived from assessing the impact of the "16 + 1" format on PRC-CEE trade. The results show that all twelve regressions are statistically significant and that the models fit the data well, according to F-statistics and R^2, respectively.

Table 2. Regression analysis: The dependent variable is EX

Variable	OLS1	OLS2	OLS3	OLS4
C	45.917*** (0.002)	46.837*** (0.002)	13.241 (0.327)	16.921 (0.214)
GDP	0.870*** (0.000)	0.868*** (0.000)	0.527*** (0.000)	0.510*** (0.000)
GDP$_{ch}$	0.789*** (0.000)	0.759*** (0.000)	0.511*** (0.000)	0.354*** (0.007)
D	-6.819*** (0.000)	-6.846*** (0.000)	-1.901 (0.214)	-1.906 (0.212)
COOP		0.095 (0.745)		0.469* (0.073)
EU			2.221*** (0.000)	2.268*** (0.000)
R^2	0.416	0.416	0.545	0.549
Adjusted R^2	0.411	0.409	0.539	0.542
F-statistic	82.257 (0.000)	61.560 (0.000)	103.464 (0.000)	83.956 (0.000)

Note: p-values are presented in parentheses. ***, **, * are p<0.01, p<0.05, and p<0.1, respectively.

Source: Authors' estimation.

Table 3. Regression analysis: The dependent variable is IM

Variable	OLS1	OLS2	OLS3	OLS4
C	43.185*** (0.000)	43.061*** (0.000)	32.451*** (0.000)	33.305*** (0.000)
GDP	0.736*** (0.000)	0.736*** (0.000)	0.623*** (0.000)	0.619*** (0.000)
GDP$_{ch}$	0.453*** (0.000)	0.457*** (0.000)	0.361*** (0.000)	0.325*** (0.000)
D	-5.110*** (0.000)	-5.107*** (0.000)	-3.495*** (0.000)	-3.497*** (0.000)
COOP		-0.013 (0.936)		0.109 (0.485)

159

			0.727***	0.740***
EU			(0.000)	(0.000)
R^2	0.581	0.581	0.615	0.615
Adjusted R^2	0.578	0.577	0.610	0.610
F-statistic	161.637 (0.000)	120.884 (0.000)	138.800 (0.000)	110.974 (0.000)

Note: p-values are presented in parentheses. ***, **, * are $p<0.01$, $p<0.05$, and $p<0.1$, respectively.

Source: Authors' estimation.

Table 4. Regression analysis: The dependent variable is TT

Variable	OLS1	OLS2	OLS3	OLS4
C	35.061*** (0.000)	34.908*** (0.000)	22.714*** (0.005)	23.689*** (0.004)
GDP	0.736*** (0.000)	0.736*** (0.000)	0.607*** (0.000)	0.602*** (0.000)
GDP_{ch}	0.480*** (0.000)	0.485*** (0.000)	0.375*** (0.000)	0.333*** (0.000)
D	-5.028*** (0.000)	-5.024*** (0.000)	-3.170*** (0.001)	-3.172*** (0.001)
COOP		-0.016 (0.923)		0.124 (0.432)
EU			0.836*** (0.000)	0.851*** (0.000)
R^2	0.575	0.575	0.617	0.618
Adjusted R^2	0.571	0.570	0.613	0.613
F-statistic	157.323 (0.000)	117.660 (0.000)	140.406 (0.000)	112.326 (0.000)

Note: p-values are presented in parentheses. ***, **, * are $p<0.01$, $p<0.05$, and $p<0.1$, respectively.

Source: Authors' estimation.

When Total trade and Import are the dependent variables, the GDP for the PRC and the GDP of CEE countries, the distance between China and CEE, and membership in the EU are statistically significant variables at 1%, while participation in the "16+1" format appears to be insignificant. When Export is the dependent variable, then, in addition to the statistical significance of the GDP for both the PRC and CEE countries, as well as when membership in the EU is at a confidence level of 1%, the dummy variable of participation in the "16+1" format yields a confidence level of 10% which is also statistically significant when the regression model includes all variables. However, the distance between CEE and the PRC is indicated to be insignificant in this case.

Discussions and Conclusions

The PRC expanding its influence globally has impacted trade patterns worldwide. Likewise, the "16+1" initiative was met with anticipation to both improve bilateral trade relations and foster trade flows. Using the gravity model, we have striven to examine the question whether the "16+1" initiative has generated increased trade between the PRC and CEEC.

According to the findings of the analyses, the variables that influence all PRC-CEE bilateral trade (total trade, exports and imports) are the GDP of both the PRC and its partner countries as well as whether a state is an EU member or not. The findings imply that economic growth in the PRC and CEE, including EU membership, has a significant positive impact on the bilateral trade flows between all economies.

For total trade and imports from the PRC, the distance has a significantly negative impact on bilateral trade, while participation in "16+1" is found to be insignificant. The findings also suggest that EU membership appears to be highly beneficial to increased trade. This may be accounted for by the deeper cooperation with the PRC and the EU itself. Moreover, EU members, including those in CEE, are more attractive to the PRC, which accords with the PRC's primary goal of entering and establishing themselves in Western European markets.

Considering the export of CEE countries to the PRC, it was concluded that EU membership and participation in "16+1" have contributed to the increase in the volume of trade flows, given that the variables yielded positive and statistically significant values. Nevertheless, our model estimates that EU membership is more significant in terms of its impact on bilateral trade growth than participation in "16+1". Apart from the deeper cooperation between the PRC and the EU already mentioned before, the explanation can be the fact that the CEE countries that are EU members EU member provided with additional export support as well as improved access to global value chains as compared to non-EU countries.

The study's results correspond to the findings of Stanojević and Qiu (2022), who conclude that EU membership has both a positive and significant contribution to Sino-CEEC trade growth. Our results also concur with those of Stanojević et al. (2021) who contend there to be insufficient proof that cooperation under the "16 + 1" initiative has generated a significant rise in trade flows between the PRC and CEEC. Notwithstanding, our study also reveals the statistical significance of the "participation in the "16+1" dummy variable, which yielded a confidence level of 10% when exports (EX) were the dependent variable and which correlates to the results of Jovičić and Minović (2021).

The study conducted has certain limitations that must be borne in mind. Foremost of which is that, despite its performing well in the empirical analysis, the gravity model's estimation of bilateral trade still lacks solid theoretical underpinnings,

implying the necessity of improving its theoretical foundation. Secondly, the Panel-least square employed in the study may be inconsistent in the presence of heteroscedasticity (Santos Silva & Tenreyro, 2006), which should be counteracted by non-linear estimators applied in future research. Thirdly, there has been only a small selection of factors affecting PRC-CEE trade reviewed in this study; a more comprehensive analysis involving additional factors and variables should be considered and discussed in future research. Lastly, CEE countries were considered on the whole; future research should analyze trade between the PRC and CEE on a country-by-country basis to better pinpoint what factors contributed to increased imports and exports.

Acknowledgments

References

1. Anderson, J. E. (1979). A Theoretical Foundation for the Gravity Equation. *The American Economic Review*, 69 (1), 106-116.
2. Andrijauskas, K., Bachulska, A., Bērziņa-Čerenkova, U. A., Karásková, I., Karindi, L., & Szunomár, Á. (2020). *Empty shell no more: China's growing footprint in Central and Eastern Europe*. Association for International Affairs (AMO).
3. Atif, R.M., Haiyun, L., & Mahmood, H. (2017). Pakistan's agricultural exports, determinants and its potential: an application of stochastic frontier gravity model. *The Journal of International Trade & Economic Development*, 26(3), 257-276.
4. Beine, M., Bertoli, S., & Fernandez-Huertas Mo, J. (2016). A Practitioners' Guide to Gravity Models of International Migration. *The World Economy*, 39(4), 496-512. doi: 10.1111/twec.12265.
5. Bergstrand, J.H. (1985). The gravity equation in international trade: Some microeconomic foundations and empirical evidence. *The Review of Economics and Statistics*, 67, 474–481.
6. Bharti, M. S. (2022). The evolution of China's economic engagement in Central and Eastern Europe. *Economic and Regional Studies*, 15(1), 90-106.
7. Bodroža D., & Kolavčić M. (2022). The impact of investment on the economic activity of the Balkan Silk Road Countries. In: Bujan, M.A. (Ed.), Beraha, I. (Ed.): *Opportunities and Challenges for Multinational Enterprises and Foreign Direct Investment in the Belt and Road Initiative*: 144-171, IGI Global, Hershey, Pennsylvania, USA.

8. Byers, D.A., Talan B.I., & Lesser, B. (2000). New borders and trade flows: A gravity model analysis of the Baltic states. *Open Economies Review*, 11(1), 73-91

9. Chang, S. C. (2014). The determinants and motivations of China's outward foreign direct investment: A spatial gravity model approach. *Global Economic Review*, 43(3), 244-268.

10. De Benedictis, L., & Taglioni, D. (2011). *The gravity model in international trade*, 55-89. Springer Berlin Heidelberg.

11. GACC (2023). General administration of custom PRC – Statistics. Available at: http://english.customs.gov.cn/statics/report/preliminary.html

12. Gigov, I. S., & Poposka, K. (2022). China's Trade and Investment in the Western Balkans Under the Belt and Road Initiative: Focus on North Macedonia. In *Opportunities and Challenges for Multinational Enterprises and Foreign Direct Investment in the Belt and Road Initiative*, 234-259. IGI Global.

13. Golovko, A., & Sahin, H. (2021). Analysis of international trade integration of Eurasian countries: Gravity model approach. *Eurasian Economic Review*, 11, 519-548.

14. Grieger, G. (2018). China, the 16+1 format and the EU. Available at: https://policycommons.net/artifacts/1335766/china-the-161-format-and-the-eu/1942476/

15. Gurría, A. (2014). China Go Global. OECD. Available at: https://www.oecd.org/china/china-go-global.htm

16. Head K, & Mayer T. (2014). Gravity equations: workhorse, toolkit, and cookbook. *Handb Int Econ*, 4,131–195.

17. Horváth, L. (2020). The geopolitical role of China in the CEE region. *Contemporary Chinese Political Economy and Strategic Relations: An International Journal*, 6(2), 617-651.

18. Irshad, M.S., Xin, Q, Shahriar, S., & Arshad, H. (2017). A Panel Data Analysis of China's Trade Pattern with OPEC Members: Gravity Model Approach. *Asian Economic and Financial Review*, 8(1), 103-116.

19. Jaćimović, D., Dragutinović Mitrović, R., Bjelić, P., Tianping, K., & Rajković, M. (2018). The role of Chinese investments in the bilateral exports of new EU member states and Western Balkan countries. *Economic research-Ekonomska istraživanja*, 31(1), 1185-1197.

20. Jaklič, A., & Svetličič, M. (2019). China and Central and Eastern European Countries within '16+1': Group or Bilateral Relations?. *Entrepreneurial Business and Economics Review*, 7(2), 83-100.

21. Jovičić, E., & Minović, J. (2021). Bilateral Trade Relations between China and CEE Countries: A Gravity Model Approach. *Global economic trends - challenges and opportunities: book of abstracts*, 75-78.

22. Jovičić, E., Stevanović, S., & Beraha, I. (2020). Serbia-China bilateral trade relations: major challenges and opportunities. *Economic Analysis*, 53(2), 133-144.
23. Kavalski, E. (2022). The end of China's affair with Central and East Europe. In D.M. Arase; P. M. Amakasu Raposo de Medeiros Carvalho (Eds). *The Belt and Road Initiative in Asia, Africa, and Europe*, Abingdon/New York: Routledge.
24. Kohl, T. (2019). The Belt and Road Initiative's effect on supply-chain trade: evidence from structural gravity equations. *Cambridge Journal of Regions, Economy and Society*, 12(1), 77-104.
25. Krisztin, T., & Fischer, M. M. (2015). The gravity model for international trade: Specification and estimation issues. *Spatial Economic Analysis*, 10(4), 451-470.
26. Li, E., Lu, M., & Chen, Y. Analysis of China's Importance in "Belt and Road Initiative" Trade Based on a Gravity Model. *Sustainability*, 12(17), 6808.
27. Luo, Z., & Tian, X. (2018). Can China's meat imports be sustainable? A case study of mad cow disease. *Applied Economics*, 50(9), 1022-1042.
28. Martin, W., & Pham, C. S. (2020). Estimating the gravity model when zero trade flows are frequent and economically determined. *Applied Economics*, 52(26), 2766-2779.
29. Matura, T. (2016). Europe Needs to Take Full Advantage of the 16+1 Cooperation and OBOR. http://www.friendsofeurope.org/global-europe/europe-needs-to-take-full-advantage-of-the-161-cooperation-and-obor/
30. Matura, T. (2019). China–CEE trade, investment and politics. *Europe-Asia Studies*, 71(3), 388-407.
31. Narayan, S. & Nguyen, T. T. (2016). Does the trade gravity model depend on trading partners? Some evidence from Vietnam and her 54 trading partners. *International Review of Economics and Finance*, 41, 220-237.
32. Pepermans, A. (2018). China's 16+1 and Belt and Road Initiative in Central and Eastern Europe: economic and political influence at a cheap price. *Journal of Contemporary Central and Eastern Europe*, 26(2-3), 181-203.
33. Pesaran, M. H. (2015). *Time Series and Panel Data Econometrics*. UK, Oxford: Oxford University Press.
34. Rasoulinezhad, E., (2016). Investigation of sanctions and oil price effects on the Iran-Russia trade by using the gravity model. *Vestnik of St Petersburg University, Series*, 5(2), 68-84.
35. Salát, G. (2022). Opportunities and Challenges for the Further Development of the 16+1 Framework. *Results and challenges: ten years of China-CEEC cooperation*, 82, 80-99.

36. Santana-Gallego, M., Ledesma-Rodríguez, F. & Pérez-Rodríguez, J. (2016). International trade and tourism flows: An extension of the gravity model. *Economic Modelling*, 52, 1026-1033. doi: 10.1016/j.econmod.2015.10.043.
37. Santos Silva, J.M.C., & Tenreyro, S. (2006). The log of gravity. *The Review of Economics and Statistics*, 88, 641-658.
38. Shahriar, S., Qian, L., Kea, S., & Abdullahi, N. M. (2019). The gravity model of trade: A theoretical perspective. *Review of Innovation and Competitiveness: A Journal of Economic and Social Research*, 5(1), 21-42.
39. Stanojević, S., & Qiu, B. (2022). A study on the impact of EU membership on Sino-CEEC trade in the context of the 17+1 cooperation mechanism. *International Review*, (1-2), 60-64.
40. Stanojević, S., Qiu, B., & Chen, J. (2021). A Study on Trade between China and Central and Eastern European Countries: Does the 16+ 1 Cooperation Lead to Significant Trade Creation?. *Eastern European Economics*, 59(4), 295-316.
41. Šteinbuka, I., Muravska, T., & Kuznieks, A. (2017). Cooperation formats of China and Europe: Synergies and divergences. *TalTech Journal of European Studies*, 7(1), 98-118.
42. Szczudlik, J. (2019). Seven years of the 16+1: an assessment of China's 'multilateral bilateralism' in Central Europe. IFRI: Institut Français des Relations Internationales. Asie.Visions, No. 107. Retrieved from https://policycommons.net/artifacts/1406136/seven-years-of-the-161/2020399/ on 15 Sep 2023. CID: 20.500.12592/80xmsh.
43. Szunomár, Á. (2019). China's investments and infrastructural expansion in Central and Eastern Europe. *Opportunities and challenges: sustainability of China-EU relations in a changing world*, 84-103.
44. Szunomár, Á., Karindi, L., & Leonte, A. (2020). Economic relations: A sugar cane, or a sugar-coated stick? In: *Empty shell no more: China's growing footprint in Central and Eastern Europe*, 35-56.
45. Teow, K. L., Tan, K. B., Phua, H. P., & Zhu, Z. (2018). Applying gravity model to predict demand of public hospital beds. *Operations Research for Health Care*, 17, 65-70.
46. Tinbergen, J. (1962). *Shaping the World Economy. Suggestions for an International Economic Policy*. New York: Twentieth Century Fund.
47. Turcsányi, R., Qiaoan, R., & Kříž, Z. (2014). Coming from nowhere: the Chinese perception of the concept of Central Europe. Wydawnictwo Uniwersytetu Łódzkiego.
48. UNCTAD (2021). China: The rise of a trade titan, available at https://unctad.org/news/china-rise-trade-titan
49. Van Bergeijk, P. A., & Brakman, S. (2010). *The gravity model in international trade: Advances and applications.*

50. Vangeli, A., & Pavlićević, D. (2019). Introduction: new perspectives on China–Central and Eastern Europe relations. *Asia Europe Journal*, 17, 361-368.

51. Xuegang, C., Zhaoping, Y., & Xuling, L. (2008). Empirical analysis of Xinjiang‟s bilateral trade: Gravity model approach. *Chinese Geographical Science*, 18(1), 9-16.

52. Yotov, Y. V. (2022). On the role of domestic trade flows for estimating the gravity model of trade. *Contemporary Economic Policy*, 40(3), 526-540.

53. Yue, L. (2018). Economic 'highway' with three speed tracks and destinations between China and CEE. *China–CEE Institute (Budapest) Working Paper*, (14).

54. Zakić, K. (2020). Economic outcomes of the 17+1 Platform from the Chinese Point of View. Китай в мировой и региональной политике. *История и современность*, 25(25), 285-304.

55. Zhou, L., Lingzhi, L., & Lei, L. (2019). Avian Influenza, Non-Tariff Measures and the Poultry Exports of China. *Australian Journal of Agricultural and Resource Economics*, 63(1), 72-94. doi: 10.1111/1467-8489.12285.