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Bankarstvo

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Sadržaj Contents

Vladimir Vasić	
Digitalizacija 24/7 kao odgovor na turbulentna vremena.....	4
Vladimir Vasić	
24/7 Digitalisation as a Response to Turbulent Events	6
Dragan Jović	
Valutni odbor, monetarna regulacija i makroprudenciona regulacija u Bosni i Hercegovini.....	8
Dragan Jović	
Currency Board, Monetary Regulation, and Macroprudential Regulation in Bosnia and Herzegovina	22
Almir Alihodžić	
Istraživanje strukture kapitala građevinskog sektora Republike Srpske.....	37
Almir Alihodžić	
A Study of the Capital Structure in the Construction Sector of Republika Srpska.....	52
Svetlana Pantelić	
Otkupom starog srebrnog novca do novih kovanica od 50 dinara.....	67
Svetlana Pantelić	
Redeeming Old Silver Coins for the Purpose of Minting New 50-Dinar Coins.....	71
Zlata Lukić	
Razvojna ekonomija u borbi protiv siromaštva	75
Zlata Lukić	
Development Economics in the Fight Against Poverty.....	81
Barometar / Barometer	87
Uputstvo za autore	90
Instructions for the authors	93



Digitalizacija 24/7 kao odgovor na turbulentna vremena

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Ovih dana svedoci smo da se promena načina života od analognog ka digitalnom uselila u sve pore našeg života – poslovnog i privatnog. Promena je, doduše, izazvana ne baš dobrim podsticajem – nalazimo se u jeku značajne krize ekonomije i života širom sveta usled delovanja virusa COVID-19.

Na društvenim mrežama osvanulo je jednostavno pitanje koje bi do izbijanja krize imalo drugačiji tačan odgovor; sigurno ste ga i sami videli. Naime, na pitanje šta je vodilo vašu transformaciju ka digitalnom, ponuđeni odgovori su: 1. CEO, 2. CTO ili 3. COVID 19. Svima je sada jasno da se u ovoj situaciji koja je munjevitom brzinom zadesila svet suočavamo sa činjenicom da je upravo ovaj neočekivani faktor izmestio naše živote u digitalni svet. Svi smo preko noći postali iskusni korisnici raznih platformi u korporativnom svetu. Tako se dešava da se i odluke strateškog nivoa donose putem konferencijskih poziva, operativne odluke i dokumenta dostavljaju isključivo elektronskim putem. Ovaj proces je uključio i najmlađe, kao važan deo našeg društva: zahvaljujući brznoj reakciji Vlade, nacionalne televizije i škole, nastava na daljinu za naše mlade odvija se na digitalan način, onako kako tim generacijama prirodno odgovara. Naši građani su svoju digitalnu pismenost unapredili vrlo brzo ovih dana, čak i ako im primena tehnologija prethodno nije bila bliska.

Ovaj proces je u vrlo kratkom roku transformisao naše celo društvo i naše načine života. Mnogi autori širom sveta analitički su se bavili uticajem virusa COVID-19 na rapidnu digitalizaciju našeg društva, tako da se predviđa da su sektori koji su najbrže odreagovali i dostigli vrtohlave visine profitabilnosti: 1. daljinsko komuniciranje, 2. onlajn kupovina i dostava, 3. virtuelni događaji i 4. oblak (Cloud).

1. Daljinsko komuniciranje - telekomunikacije

Mnogi ljudi iz industrije i korporativnog života ranije nisu blagonaklono gledali na rad od kuće, neki su to čak i zabranjivali svojim zaposlenima. Sada – upravo zahvaljujući radu od kuće, planeta nije stala. Od bankara, inženjera vazduhoplovstva, advokata, notara, do gotovo svakog nastavnika u zemlji i širom sveta - radni život se kod većine nas promenio. Pored toga, razgovaramo sa

prijateljima i provodimo vreme sa porodicom putem videopoziva, kako se ne bismo potpuno izolovali jedni od drugih.

2. Onlajn kupovina i dostava

Onlajn kupovina je sada pravilo za mnoge koji su u prošlosti izbegavali taj način nabavke. Moji saradnici i ja smo, nedavno, u istraživanjima naišli na ilustrativni primer: gospodin koji živi u Njujorku naručivao je namirnice putem Amazona i dobijao ih između 5 i 7 sati ujutru, ali je bio frustriran kada su mu prošlog petka rekli da nema više slobodnih termina za isporuke. Tražnja je prevazišla i kapacitete jednog Amazona! Osiguravajuće kompanije vezane za zdravstveni sektor već su se prilagodile onlajn poslovanju, a i drugi ih ubrzano slede. Ako kompanija danas ne može da izmeni način na koji se isporučuju njeni proizvodi ili usluge, i ne pređe na digitalno, izgleda da za nju zaista neće biti mesta na budućem tržištu nakon COVID krize.

3. Virtuelni događaji

Sektor poslovnog i konferencijskog turizma je stao širom sveta. Industrija događaja je ovog proleća snažno pogođena: mnoge kompanije su jednostavno preusmerile svoje budžete na digitalne događaje ili digitalni sadržaj. Samo će vreme pokazati da li će jesen biti veoma prometna sezona ili će kompanije odlučiti da i dalje preferiraju internet događaje nego događaje sa ličnim kontaktom. Iz internog korporativnog ugla, svakodnevno vidim ljude kako sa svojim kolegama objavljuju fotografije svojih velikih mrežnih sastanaka. Takođe, sâm sam vrlo često u prilici da koristim platforme za ovakve sastanke i uviđam ogromnu prednost i efikasnost ovog načina rada.

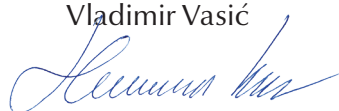
4. Oblak (Cloud)

Kada ne bi postojali „oblaci“ tokom pandemije koronavirusa, kompanije bi se borile da bezbedno dele i kopiraju dokumente, pristupaju analitičkim bazama i još mnogo toga. Čak i kratke fizičke udaljenosti predstavljale bi izazov za saradnju između kolega bez oblaka. U stvarnom vremenu ne bi bilo lako, striming bi bio problem, pametni telefoni ne bi bili pametni, a brzi podaci izazov.

Za mnoge od naših građana koji nisu navikli na digitalni način rada, COVID-19 je možda ubrzao vremensku liniju za digitalnu transformaciju. Jedan od jednostavnih saveta koje svakodnevno dajem kao bankar jeste – koristite digitalne kanale za plaćanja, koristite platne kartice, izbegavajte gotovinu. Čini se da je digitalna transformacija trenutno u žiži poslovnog sveta. Neka tako i ostane!

Glavni i odgovorni urednik

Vladimir Vasić





24/7 Digitalisation as a Response to Turbulent Events

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We have recently been bearing witness to the shift from analogue to digital permeating all aspects of our lives – business and private. This shift was instigated by less than favourable factors, however – we are in the midst of a significant global economic and health crisis, caused by the COVID-19 virus.

Social networks were used to share a simple question which would have had a completely different answer prior to the crisis outbreak; you must have seen it yourself. Namely, the question of what spearheaded your digital transformation offered the following possible answers: 1. CEO, 2. CTO or 3. COVID-19. By now, it has become clear to everyone that, in this situation which has taken the world by storm, we are facing the fact that this unexpected factor was actually the one to thrust us into the digital world. We have all become experienced users of various platforms in the corporate word, basically overnight. Thus, we also have instances of strategic level decisions being made over conference calls, while operative decisions and documents are made and submitted exclusively electronically. This process did not even exclude the youngest, and highly important, members of our society: thanks to the quick response of the Government, the national broadcasting service and the schools, our children are now learning from home, via digital means, as is naturally suitable for these generations. Our citizens have rapidly improved their digital literacy, even if their technological skills had previously not been up to par.

This process has quickly transformed our entire society, as well as our lifestyles. Many authors worldwide have analytically examined the effects of COVID-19 on the rapid digitalisation of our society, and the estimates are that the sectors which have responded the quickest and reached skyrocketing profitability levels are: 1. remote communication, 2. online shopping and delivery, 3. virtual events and 4. the cloud.

1. Remote Communication – Telecommunications

Many members of the industry and the corporate sector have previously not regarded working from home as a favourable option, while some went as far as to prohibit that option for their employees. Now – thanks to working from home, the planet has not stopped. From bankers, aircraft engineers, lawyers and public notaries, to almost every teacher in the country and abroad – the

working day has changed for most of us. Aside from that, we talk to friends and spend time with our families over video calls, in order to prevent complete isolation.

2. Online Shopping and Delivery

Online shopping is now a staple for many who had previously avoided that option. My associates and I have recently come across a study with an illustrative example: a man from New York used to order groceries via Amazon and received the shipments between 5 and 7 a.m. but was frustrated last Friday when they informed him that there were no available slots for delivery. The demand has surpassed even Amazon's capacity! Insurance companies dealing with the health sector have already adapted to online business, and others are rapidly following suit. If a company cannot change the way it provides its products or services overnight, and does not become digital as soon as possible, then the chances are that there will not be a place for it in the future market, after the COVID crisis.

3. Virtual Events

The sector of business and conference tourism has stopped all over the world. The event industry has suffered a severe blow this spring: many companies have simply redirected their budgets towards digital events or digital content. Only time will tell whether autumn will be a very busy season, or if companies will keep preferring online events over those necessitating personal contact. From my own corporate perspective, I see people posting pictures of their colleagues and themselves participating in large online meeting, i.e. conference calls, on a daily basis. Moreover, I very often have the opportunity to use such platforms and I understand the advantages and the efficiency of this way of conducting business.

4. The Cloud

Had it not been for clouds during this coronavirus pandemic, companies would have been hard pressed to safely share and copy documents, access analytical databases, etc. Even short physical distances would have been a challenge for colleagues working together without the use of cloud technology. Real-time cooperation would have been difficult, streaming would have been an issue, smart phones would not have been truly smart, and quick data exchange would have been a challenge.

For many of our citizens who are not used to the digital way of doing business, COVID-19 might have sped up their digital transformation. One of the simpler pieces of advice that I constantly give out as a banker is – use digital payment options, use payment cards, and avoid cash. It seems as though the topic of digital transformation is at the forefront of the business world. Let us keep it that way!

Editor-in-Chief
Vladimir Vasić



Valutni odbor, monetarna regulacija i makroprudenciona regulacija u Bosni i Hercegovini

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obezbedio
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Sažetak: Ovo istraživanje predstavlja efekte primjene diskrecionih i automatskih instrumenata u četiri slučaja monetarne i makroprudencione regulacije u Bosni i Hercegovini. Efektivnost politike valutnog odbora se povećava ako se njegova ortodoksija smanjuje. Izmjerali smo novčane uslove prije i poslije globalne krize. Monetarni uslovi su se poboljšavali od drugog kvartala 2014. godine. Izolovani su efekti negativne naknade na višak rezervi na primarnom tržištu javnog duga BiH. Procijenili smo, takođe, efekte diferencirane stope obavezne rezerve na ročnu strukturu pasive bankarskog sektora u Bosni i Hercegovini. Na kraju, testiran je odnos između obavezne rezerve kao instrumenta monetarnog regulisanja i rasta kredita. Istraživanje je pokazalo da Centralna banka Bosne i Hercegovine može uticati na neke operativne varijable/ indikatore monetarne politike. Svi nalazi pokazuju da Centralna banka Bosne i Hercegovine nije „obična mjenjačnica“ i da zaista može voditi autonomnu i diskrecionu monetarnu politiku.

Ključne reči: monetarna politika, valutni odbor, obavezna rezerva, indeks monetarnih kretanja, negativna naknada.

JEL: E42, E52, E58, G28

Uvod

Rasprostranjen način razmišljanja o bh valutnom odboru jeste da je Centralna banka Bosne i Hercegovine (CBBiH) „obična mjenjačnica“, tj. da ne vodi autonomnu i diskrecionu monetarnu politiku. Ova vrsta takozvanog „glavnog toka monetarnog mišljenja“ o bh valutnom odboru je glavna motivacija za istraživanje koje želimo da predstavimo. Naša glavna hipoteza je da CBBiH provodi i može da provodi monetarnu politiku, iako je devizni kurs fiksiran, iako bh referentna kamatna stopa i emisiona banka kao ustanova posljednjeg utočišta (eng. lender of last resort) ne postoje i iako postoji automatska konverzija bh (BAM) u rezervnu valutu (EUR). Da bismo dokazali ovu hipotezu, ispitaćemo efekte nekoliko instrumenata monetarne politike i makroprudencione politike u monetarnom režimu Bosne i Hercegovine. Kroz analizu monetarnih uslova, obavezne rezerve, diferencirane stope obavezne rezerve i naknade na višak iznad obavezne rezerve, želimo dokazati da postoje efekti domaće monetarne i makroprudencione regulacije i da se ona sprovodi korištenjem diskrecionih, pa čak i automatskih instrumenata monetarne i makroprudencione politike. Autonomija monetarne politike je u istraživanju definisana kao sposobnost uticaja na kratkoročne prinose i na kreditni rast.

U prvom dijelu istraživanja dajemo pregled literature, a nakon toga slijedi dio o podacima i metodologiji. Centralni dio istraživanja ima četiri sekcije: a) indeks monetarnih uslova, b) negativna naknada na višak iznad obavezne rezerve, c) diferencirana stopa obavezne rezerve i d) stopa obavezne rezerve. Na kraju istraživanja nalaze se zaključci i reference.

Pregled literature

Ne postoji jedinstven stav o stepenu autonomije monetarne politike u uslovima fiksnog deviznog kursa, pa samim tim ni u uslovima novčanog odbora. Pojedini autori smatraju da je fiksni devizni kurs dobra opcija čak i u uslovima visokog stepena valutne supstitucije i endogenih šokova (Calvo, 1999). Na drugoj strani su autori (Obstfeld i Rogoff, 1995) koji, analizirajući krizu Evropskog mehanizma deviznih kurseva tokom 1992. godine, kao i Meksičku krizu (1994-1995) zaključuju da fiksni devizni kurs vodi gubljenju kontrole nad ponudom novca. Princip „nemogućeg trojstva“ poručuje da je samostalna monetarna politika nemoguća u režimu fiksnog deviznog kursa i u odsustvu kontrole kretanja kapitala (Fleming, 1963), a čak se i režimu varijabilnog deviznog kursa osporava autonomna monetarna politika u uslovima velike mobilnosti kapitala (Rey, 2015). Postoje i stavovi da se kvalitetna monetarna politika zasniva na trojstvu varijabilnog deviznog kursa, inflacionog targetiranja i monetarnog pravila (Taylor, 2000), čime se apsolutno odbacuje režim fiksnog deviznog kursa, pa i novčanog odbora. U nekim istraživanjima izvršena je ekonometrijska verifikacija hipoteze da je stepen autonomije monetarne politike (mjereno sposobnošću uticaja na kratkoročne kamatne stope) veći u režimu varijabilnog nego u režimu fiksnog deviznog kursa (Shaumbaugh, 2002).

Indeks monetarnih uslova (MCI), kao mjera monetarnih uslova, koristi se od kraja prošlog vijeka, tj. od početka devedesetih godina. Tumačenje MCI je

diskutovano u radovima koje su napisali Neil i saradnici (2006) i Osborne i Holton (2010). MCI je razvijen za Hong Kong (HKMA, Kvartalni bilten 11/2010), a o pitanjima vezanim za MCI je diskutovano i u zoni evra (ECB, Mjesečni bilten, 2002). Neke od zemalja u neposrednom bh okruženju poput Hrvatske, (Benazić, 2012) i Albanije (Kodra, 2010) razvile su MCI. Glavni zaključak o MCI jeste da postoje različite metodologije za njegovo izračunavanje, a njegova vrijednost se mnogo razlikuje u zavisnosti od korištene metodologije. U domaćoj literaturi postoji samo jedna referenca o negativnim naknadama na višak rezervi (Jović, 2017) u kojoj se ukazuje na njen uticaj na prinose na primarnom tržištu javnog duga bh entiteta. Nismo našli niti jedno istraživanje o diferenciranoj stopi obavezne rezerve, ili obavezne rezerve u BiH. Sa druge strane, stopa obavezne rezerve se intezivno analizira u inostranoj literaturi, što nije slučaj sa uticajem diferencirane stope obavezne rezerve (DRRR) na ročnu strukturu i na obaveze bankarskog sektora. Glavno istraživanje u ovoj oblasti (IMF, 2011 i IMF, 2013) pokazalo je da stopa obavezne rezerve (RRR) smanjuje procikličnost bankarskih kredita i da RRR može smanjiti portfolio investicije u zemljama sa fleksibilnim deviznim kursom. Marginalna obavezna rezerva za devizne obaveze banake uz korištenje kapitalnog zahteva usporava rast cijena nekretnina na evropskim tržištima u nastajanju (Vandenbussche i saradnici, 2012), dok RRR na kratkoročne obaveze smanjuje rast kredita.

Podaci i metodologija

Procijenili smo efekte bh monetarne i makroprudencione regulacije na četiri načina. Prvi način je merenje monetarnih uslova, tj. izgradnja indeksa novčanog stanja (MCI). Ako su monetarni uslovi u BiH poboljšani nakon izbijanja globalne krize, onda je monetarna politika bila efikasna. Drugi način merenja efekata monetarne i makroprudencione regulacije u BiH je procjena efekata negativne naknade na višak rezervi.

Treći i četvrti način mjerenja su efekti diferencirane stope obavezne rezerve i efekata stope obavezne rezerve na dugoročne depozite i stopu rasta kredita.

Indeks monetarnog stanja (MCI) je izumljen u Kanadi krajem dvadesetog vjeka (tokom devedesetih godina). U originalnoj formi, predstavljen je kao:

$$MCI = -(\alpha(ir - ir_b) + \beta(REER - REER_b))100$$

gdje su: ir i ir_b aktivna domaća bankarska kamatna stopa i aktivna domaća bankarska kamatna stopa u baznoj godini, a $REER$ i $REER_b$ logaritam realnog efektivnog deviznog kursa i logaritam realnog efektivnog deviznog kursa u baznoj godini. Primijenili smo isti oblik MCI u našem istraživanju. Za baznu godinu koristili smo 2010. godinu, tj. prosjek za domaću kamatnu stopu i $REER$ za ovu godinu, jer se domaći indeks industrijske proizvodnje računa za istu baznu godinu. Neke karakteristike konstrukcije MCI moraju biti detaljnije objašnjene. Znak minus ispred jednačine određen je zbog uticaja domaće kamatne stope i realnog efektivnog kursa na monetarne uslove i zbog jednostavnosti tumačenja. Ako kamatne stope i $REER$ porastu, takva promjena je negativna i obrnuto. Povećanje MCI predstavlja poboljšanje monetarnih uslova, dok smanjenje MCI predstavlja pogoršanje novčanih uslova. Drugi dio

jednačine (tj. razlika u *REER*) se množi sa 100 da bi se došlo do promjene *REER* u procentima. Postoji mnogo načina procjene *MCI*, a mi smo izabrali originalni i najjednostavniji. Koeficijenti α i β su izvedeni iz modela predstavljenog kao;

$$IIP_{gr} = c(1) + c(2) * IIP_{gr}(-1) + c(3) * IR(-1) + c(4) * REER_{gr}(-1)$$

gdje su IIP_{gr} stopa rasta industrijske proizvodnje, $c(3)$ je α , a $c(4)$ je β , IR domaća kamatna stopa (aktivna kamatna stopa bh banaka), a *REER* je realni efektivni devizni kurs.

U martu 2016. godine, prvi put u monetarnoj istoriji BiH, uvedena je negativna naknada na višak rezervi. Odluka je stupila na snagu tri meseca kasnije. CBBiH je povezala svoju naknadu na višak sredstava iznad obavezne rezerve sa kamatnom stopom ECB. U vrijeme kada je donijeta odluka ova stopa ECB je negativna - 0,4%. Izmjerali smo efekte ove promjene pomoću Wilcoxon – Mann – Whitney testa, tj. testa sume rangova. Ovaj test pokušava da utvrdi da li postoji razlika između opservacija izloženih različitim tretmanima. U našem slučaju, tretman je negativna naknada na višak rezervi tj. odsustvo negativne naknade na višak rezervi. Primjetili smo efekte naknada na primarnom tržištu trezorskih zapisa i obveznica bh entiteta (Republika Srpska/RS i Federacija Bosne i Hercegovine/FBiH). Naša pretpostavka je da mora postojati razlika u prinosima na primarnom tržištu prije i nakon uvođenja negativne naknade. Sa testom sume rangova, neparametarskim testom (Žižić et al., 1992. p. 351) provjerili smo ovu tezu. Nulta hipoteza u ovom testu je da je stopa prinosa do dospjeća jednaka prije i nakon uvođenja negativne naknade.

Od 1. januara 2009. do 1. jula 2016. godine monetarni režim u BiH posluje sa *DRRR*, tj. sa nižom obaveznom rezervom na dugoročne depozite i višom obaveznom rezervom na kratkoročne depozite (Tabela 1). Na početku ove vrste monetarnog režima, kao vrste makroprudencione regulacije, *RRR* je iznosila 14% na kratkoročne depozite i 10% na dugoročne depozite.

Tabela 1: *DRRR* u Bosni i Hercegovini

	1. januar 2009.	1. maj 2009.	1. februar 2011.	1. juli 2016.
<i>RRR</i> na obaveze sa dospjećem ispod godinu dana	14%	14%	10%	10%
<i>RRR</i> na obaveze sa dospjećem iznad godinu dana	10%	7%	7%	10%

Izvor: CBBiH.

Koristili smo višestruki regresioni model (parametri u modelima su ocijenjeni metodom najmanjih kvadrata) da bi se pronašla veza između *DDDR* i stope rasta dugoročnih depozita. U tu svrhu smo uveli vještačku varijablu za *DDDR*; vrijednost 1 u periodu 01/2009-06/2016, a izvan toga perioda 0. Ostali regresori bili su *EURIBOR* i domaće varijable; neperformansi krediti, stopa rasta *BDP*, stopa rasta kratkoročnih depozita i depozitni multiplikator (inverzna vrijednost stope obavezne rezerve).

Da bismo testirali efekte *RRR* na rast kredita, koristili smo takođe višestruki linearni regresioni model. Pored *RRR* u model smo uveli i puno regresora i kontrolnih varijabli: kreditni rast (sa vremenski pomakom), povrat na kapital bh bankarskog sektora, stopa rasta industrijske proizvodnje, stopa rasta *BDP*, stopa rasta depozita, *CPI*, odnos kredita i aktive (*LA*) i vještačku varijablu za krizu (od povlačenja strane pasive iz bankarskog sektora *BiH* (03/2009) pa do 06/2016. godine vrijednost ove varijable je 1) i pokretni prosjek. Dijagnostika za sve modele uključuje provjeru autokorelacije (*Durbin-Watson* test, *LM* test, *Q* statistika), normalnost rasporeda reziduala (*Jarque-Berra* test) i test homoskedastičnosti (test *Breusch-Pagan-Godfrey*). Broj stepeni slobode je određen kao $n-k$, gdje je n broj opservacija, a k broj parametara (uključujući konstantu, ako postoji) koji se ocjenjuju.

Da bi olakšali izlaganje rezultata istraživanja, koristili smo mnoštvo skraćenica (akronimi su izvedeni iz naziva na engleskom, a ne na srpskom jeziku).

Tabela 2: Popis korištenih skraćenica i izvori vremenskih serija

BR.	Skraćenice	Naziv na srpskom	Izvori vremenskih serija
1.	BSBH	bankarski sektor BiH	-
2.	BSFBH	bankarski sektor FBiH	-
3.	CBBH	Centralna banka BiH	-
4.	CPI	indeks potrošačkih cijena	BHAS
5.	DGR	stopa rasta depozita	CBBiH
6.	DUM_CRISIS	vještačka varijabla za krizu	-
7.	DUM_MPR	vještačka varijabla za makroprudencionu regulaciju	-
8.	DRRR	diferencirana stopa obavezne rezerve	CBBiH
9.	DW	Durbin-Votsonov test	-
10.	EURIBOR	dvanaestomjesečni EURIBOR	ECB
11.	GDP	bruto domaći proizvod	BHAS
12.	GDP_GR	stopa rasta bruto domaćeg proizvoda	BHAS
13.	IIP	indeks industrijske proizvodnje	BHAS
14.	IP_GR	stopa rasta industrijske proizvodnje	BHAS
15.	IMF	Međunarodni monetarni fond	-
16.	LA	udjel kredita u aktivi	CBBiH
17.	LGR	stopa kreditnog rasta	CBBiH
18.	LR	bh aktivna kamatna stopa	ABRS i FBA
19.	MCI	indeks monetarnih uslova	-
20.	NPL	neperformansni krediti	CBBiH
21.	REER	realni efektivni devizni kurs	CBBiH
22.	REER_GR	stopa rasta realnog efektivnog deviznog kursa	CBBiH
23.	ROAE	povrat na prosječan dionički kapital	CBBiH
24.	ROE	povrat na dionički kapital	CBBiH
25.	RRR	stopa obavezne rezerve	CBBiH
26.	STD_GR	stopa rasta kratkoročnih depozita	CBBiH
27.	TB	trezorski zapisi	-

Rezultati i diskusija

Indeks monetarnih kretanja (MCI)

Kreirani regresioni model je vrlo dobra reprezentacija odnosa između industrijske proizvodnje i kamatnih stopa/realnog efektivnog deviznog kursa (Tabela 3). Skoro svi koeficijenti su statistički značajni na nivou od 1% i ispod. Vrijednosti koeficijenata uz regresor *LR* i *REER_GR* su -1,66 i - 2,12. Ovi koeficijenti, kao što je i očekivano, imaju negativan znak, odnosno rast u *LR* i *REER_GR* smanjuje vrijednost rasta industrijske proizvodnje. Prema dijagnostici modeli su nepristrasne ocijene vrijednosti parametara. U modelu nema autokorelacije niti heteroskedastičnosti. Distribucija reziduala je normalna, a srednja vrijednost reziduala je nula.

Tabela 3: Regresioni model, zavisna varijabla - stopa rasta industrijske proizvodnje

	Koeficijenti	S.G.	t	p
C	8,16	2,18	3,75	0,0006
IIP_GR(-1)	0,33	0,13	2,59	0,0141
LR	-1,66	0,43	-3,90	0,0004
REER_GR	-2,12	0,68	-313	0,0035
R ²	0,45			
Prilagođeni R ²	0,38			
DW statistika	1,99			
Q- statistika (prvi ili drugi lag)	0,0131 (0,909)			
Statistika Jarque-Berra test	2,71 (0,26)			
Srednja vrijednost reziduala	0			
Breusch-Pagan-Godfrey test	6,07 (0,108)			
Broj stepeni slobode	37			
Vremenski period	2007Q2-2017Q2			

Izvor: Autor.

Model je osnova za konstrukciju MCI. Kada smo ga primjenili dobili smo sljedeću formulu za bh MCI indeks,

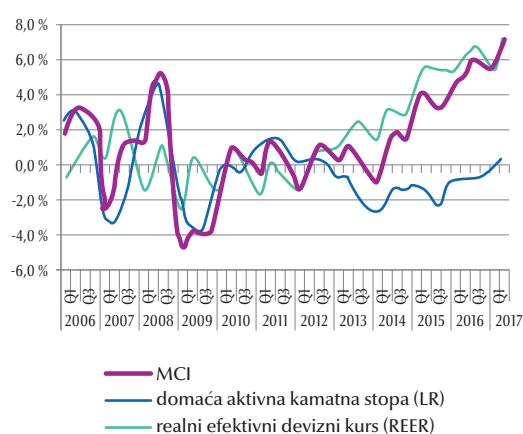
$$MCI = -(-1.66(ir - ir_b) - 2.12(REER - REER_b)100) \text{ ili}$$

$$MCI = -\left(\frac{1.66}{2.12}(ir - ir_b) + (REER - REER_b)100\right)$$

MCI pokazuje da se monetarni uslovi poboljšavaju od Q2 2014 (Grafikon 1), u poređenju sa izabranim baznim periodom (Ø Q32007 - Q42008). Postoji velika korelacija u kretanju REER i MCI, jer je REER glavna determinanta MCI (Grafikon 1). Izračunati MCI odnos 0,78 (1,66/2,12) je veoma nizak u poređenju sa drugim istraživanjima, doprinos REER izmjeni monetarnih uslova je zna-

čajno veći u slučaju Bosne i Hercegovine. Ova činjenica bi se mogla objasniti odsustvom referentne kamatne stope bh emisione banke. Doprinos REER poboljšanju monetarnih uslova je veći nego doprinos kamatnih stopa zbog većeg smanjenja (depresijacije) u REER nego u kamatnim stopama u odnosu na bazni period. Kanal deviznog kursa u BiH je važniji i intenzivniji nego kanal kamatnih stopa. Kretanje REER je potpuno van kontrole domaće monetarne politike, a to znači da na monetarne uslove u BiH utiču automatski faktori, a ne diskrecioni instrumenti monetarne politike.

Grafikon 1: Indeks monetarne politike u Bosni i Hercegovini

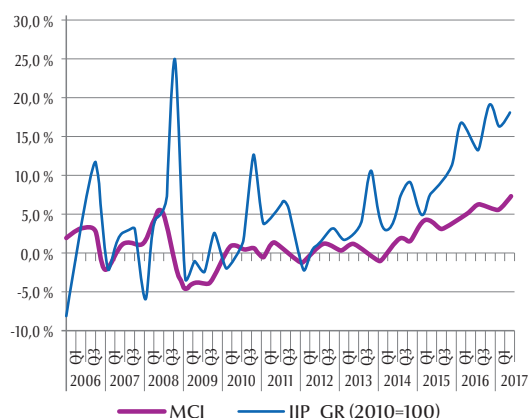


Izvor: Autor.

U 2016. i u prva dva kvartala 2017. godine *MCI* je mnogo veći od baznog *MCI* (veći je za oko 6%). Ali do zaključka da su monetarni uslovi poboljšani možemo doći samo upoređivanjem industrijske proizvodnje sa *MCI* (Grafikon 2). U posmatranom periodu Pearson-ov koeficijent korelacije je 0,55, a ako isključimo maksimum (eng. outlier) u Q4 2008. godine korelacija u periodu Q1 2009 - Q2 2017. godine iznosi 0,83.

Ovakav odnos je konačan dokaz da su monetarni uslovi poboljšani u odnosu na stopu rasta industrijske proizvodnje, a ne samo u odnosu na *MCI* u baznoj godini.

Grafikon 2: MCI i industrijska proizvodnja

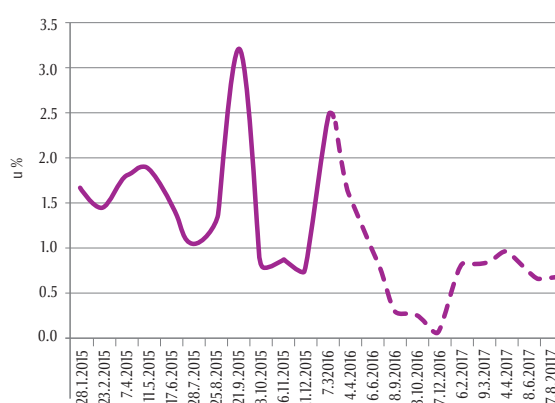


Izvor: Autor.

Negativna naknada na sredstva iznad obavezne rezerve

Odluka o negativnim naknadama na višak rezervi je stupila na snagu početkom jula 2016. godine. Odluka je donijeta krajem marta 2016. godine i od tada se uočavaju značajane promjene na stopama prinosa do dospelja na primarnom tržištu javnog duga bh entiteta, tj. na prinos do dospelja.

Grafikon 3: Prinos do dospelja, šestomjesečni trezorski zapisi - Republika Srpska (primarno tržište)



Izvor: BLSE (Obradio autor). Napomena: * Isprekidana linija predstavlja pri-nose nakon što je donijeta odluka o uvođenju negativne naknade.

Na oštar pad prinosa na primarnom tržištu utiču negativne naknade na višak rezervi, koja je određena kao polovina kamatne stope na depozitne olakšice ECB (-0,4%, tj. -0,2%). Nakon uvođenja negativne naknade na kratkoročni

javni dug Republike Srpske najmanji prinos je iznosio 0,1%, a Federacija BiH imala je negativne prinose na trezorske zapise čak pet puta.

Na osnovu testa sume rangova (Wilcoxon test) prije i nakon uvođenja negativne naknade (Tabela 4), postoji veoma značajna razlika u prinosima na 6 m TZ (RS) i 3 m TZ (FBiH). Za ove tržišne segmente p vrijednosti su vrlo niske 0,0037 i 0,016 tako da možemo odbiti nultu hipotezu o jednakosti prinosa prije i nakon uvođenja negativne naknade. Na tržištu šestomjesečnih trezorskih zapisa Federacije BiH, ova razlika u prinosima nije toliko očigledna i tako visoka, ali čak i na ovom tržištu možemo odbiti nultu hipotezu (na nivou od 10%) i tvrditi da u 90% slučajeva postoji razlika u prinosima prije i nakon uvođenja ove jedinstvenog instrumenta bh monetarne politike. Približno isti rezultat dobili smo za devetomjesečne trezorske zapise.

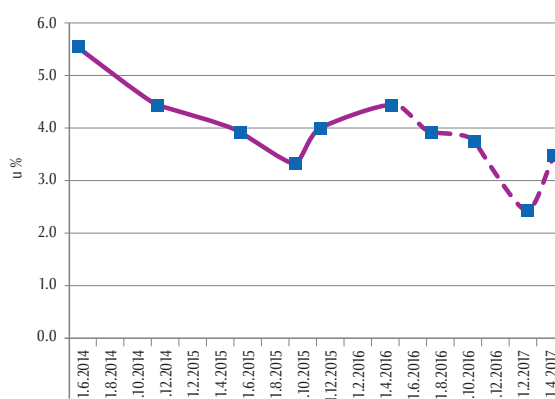
Tabela 4: Kratkoročno primarno tržište javnog duga, test sume rangova

	Republika Srpska	Federacija Bosne i Hercegovine	Federacija Bosne i Hercegovine	Federacija Bosne i Hercegovine
	6 mjesecni trezorski zapisi	3 mjesecni trezorski zapisi	6 mjesecni trezorski zapisi	9 mjesecni trezorski zapisi
vremenski period	01/2015-08/2017	01/2015-08/2017	01/2015-08/2017	01/2015-08/2017
z	2,9	2,42	1,63	1,549
vjerovatnoća > z	0,0037	0,016	0,10	0,12

Izvor: Autor.

Efekte negativnih naknada na dugoročno primarno tržište veoma je teško procijeniti zbog nerazvijenog tržišta javnog duga. Samo za jedan dio tržišta javnog duga imamo dovoljno podataka za analizu. Od 2014. godine Republika Srpska je izdala osam petogodišnjih obveznica (Grafikon 4). Vizuelnom analizom vremenske serije ne možemo utvrditi da li postoji razlika u prinosima prije i nakon uvođenja negativne naknade.

Grafikon 4: Prinos do dospeća, petogodišnje obveznice - Republika Srpska (primarno tržište)



Izvor: BLSE (Autor).

Test sume rangova pokazuje da ovi prinosi nisu u prosjeku drugačiji (Tabela 5). U oba slučaja, u dužem i u kraćem uzorku, ne možemo odbaciti nultu hipotezu, čak ni na nivou od 10%. P vrijednosti su veoma visoke, pa smo zaključili da negativna naknada nije uticala na prinose na dugoročnom primarnom tržištu javnog duga Republike Srpske.

Tabela 5: Prinos na petogodišnje obveznice primarnog tržišta javnog duga Republike Srpske, test sume rangova

	Republika Srpska	Republika Srpska
	Petogodišnje obveznice	Petogodišnje obveznice
vremenski period	01/2014-08/2017	01/2015-08/2017
z	1,26	0,3
vjerovatnoća > z	0,209	0,76

Izvor: BLSE (Obradio autor).

Diferencirana stopa obavezne rezerve (DRRR)

Model (Tabela 6) objašnjava 86% varijacija u stopi rasta dugoročnih depozita, a i ukupna dijagnostika modela je dobra; raspodjela reziduala je normalna (statistika *Jarque-Berra* test), srednja vrijednost reziduala je oko nule, nema heteroskedastičnosti, prema *Q* statistici autokorelacija je odsutna, uprkos činjenici da *DW* statistika (autokorelacija u prvoj doznji) pokazuje blagu pozitivnu autokorelaciju. Konstanta u modelu je izostavljena iz ekonomskih, a ne iz statističkih razloga. Model sa konstantom ne bi imao ekonomski logično tumačenje, jer je neprihvatljivo da, ako su sve varijable nula, ipak postoji rast dugoročnih depozita. Možemo reći da su procjene koeficijenata nepristrasne, jer su ispunjeni svi preduslovi za *BLUE* (najbolja linearna nepristrasna ocjena). Svi koeficijenti, uključujući vještačku varijablu za *DRRR* (vještačka varijabla za makroprudencionu regulaciju ili *DUM_MPR*) su statistički značajni na nivou od 5% ili čak manje (Tabela 6). Ako je sve ostalo jednako, uvođenje *DRRR* će povećati stopu rasta dugoročnih depozita za 3,4 procentna poena (p.p.), a među odabranim nezavisno-promenljivim varijablama ova varijabla je najuticajnija. Svi ostali regresori, *EURIBOR*, stopa rasta *BDP*, stopa rasta kratkoročnih depozita i depozitni multiplikator, podstiču stopu rasta dugoročnih depozita. Logično, znak ispred *NPL* je negativan, jer neizvjesnost tokom krize i recesije smanjuje tražnju za dugoročnim depozitima i obratno. Zaključujemo da *DRRR*, u okruženju drugih važnih varijabli, značajno utiče na ročnu strukturu obaveza bh banaka tj. u prosjeku doprinosi rastu finansijske stabilnosti. To znači da je ovaj dio makroprudencione regulacije koji je primjenjivala CBBiH djelotvoran.

Tabela 6: Efekti *DRRR* na stopu rasta dugoročnih depozita

	Koeficijenti	S.G.	t	p
DUM_MPR	3,40**	1,66	2,05	0,05
EURIBOR(-2)	2,65**	0,99	2,67	0,01
NPL(-4)	-0,70**	0,26	-2,66	0,02
GDP_GR(-7)	1,05***	0,17	6,13	0,00
STD_GR(-1)	0,17**	0,08	2,13	0,05
Depozitni multiplikator multiplikator	0,95**	0,40	2,36	0,03
R ²	0,86			
Prilagođeni R ²	0,83			
DW statistika	1,8			
LM test	0,044(0,84)			
Statistika Jarque-Berra test	0,63(7.26)			
Srednja vrijednost reziduala	0,026			
Breusch-Pagan-Godfrey test	7,24 (0,337)			
Broj stepeni slobode	20			
Period	2010Q4-2017Q1			

Izvor: BLSE (Obradio autor).

Napomena:

*** Značajno na nivou od 1%, ** Značajno na nivou od 5%, * Značajno na nivou od 10%.

Obavezna rezerva

U modelima smo koristili varijable u nivou, stope rasta, kao i varijable sa docnjama i pokretne prosjeke. Ove serije nisu kointegrirane. Uslov za kointegraciju je da su sve varijable u modelu $I(1)$ tj. u nivou nestacionarne, a nakon diferenciranja stacionarne $I(0)$. Na osnovu ADF testa (Augmented Dickey–Fuller test) smo utvrdili da ovaj uslov nije ispunjen i zato nije bilo potrebe za prilagođavanjem vremenskih serija. U sva četiri modela (Tabela 7) samo nekoliko regresora su statistički značajni na nivou od 5% i iznad. Nivo značaja je najčešće ispod 5%, pa čak i ispod 1%. Kvalitet modela, mjereno koeficijentom determinacije, je vrlo visok - iznad 0,9. Visok R^2 nije posljedica nestacionarnosti vremenskih serija, već dobre specifikacije modela. Lažna regresija (eng. spurious regression) postoji ako je Durbin-Votsonova statistika manja od R^2 , ako je vrijednost t statistike izuzetno visoka, ako postoji pozitivna autokorelacija i ako je DW izuzetno nizak, što nije slučaj u prezentovanim specifikacijama modela. Osim ROE i LA ($EQ1$, $EQ2$), svi regresori imaju očekivani znak, u skladu sa ekonomskom teorijom. Kod svih modela znak RRR (zatanjen red) je negativan, a uzima vrijednost u intervalu od -0,63 do -0,10. Promjene u stopi rasta kredita (LGR) i obaveznoj rezervi (RRR) imaju suprotne znakove. Najbolju dijagnostiku ima najmanji model, četvrti ($EQ4$), koji je ispunio sve uslove za *BLUE*. Suprotno ostalim modelima, samo četvrti model nema autokorelaciju na višim docnjama. U ovom modelu, osim RRR zavisne varijable su i: stopa rasta kredita, stopa rasta industrijske proizvodnje, stopa rasta depozita, CPI i pokretni prosjek. Sve ove jednačine, posebno četvrta, pokazuju da RRR proizvodi statistički značajan

efekat, očekivanog smjera, na rast kredita. *RRR* je kao diskrecioni instrument monetarne politike ispoljio djelotvornost.

Tabela 7: Obavezna rezerva i stopa rasta kredita

	EQ1	EQ2	EQ3	EQ4
	<i>LGR</i>	<i>LGR</i>	<i>LGR</i>	<i>LGR</i>
<i>LGR</i> (-1)	0,69*** (12,68)	0,80*** (15,97)	0,74*** (25,31)	0,73*** (34,22)
<i>ROE</i>		-0,15** (-2,33)		
<i>ROEA</i>	-0,30*** (-2,77)			
<i>IIP_GR</i>		0,06* (2,00)	0,07** (2,40)	0,08** (2,64)
<i>GDP_GR</i>	0,16* (1,84)			
<i>DGR</i>	0,16** (2,33)	0,21*** (8,04)	0,21*** (8,42)	0,25*** (14,77)
<i>CPI</i>	0,29** (2,39)	0,36*** (3,306)	0,55*** (5,87)	0,60*** (8,81)
<i>RRR</i>	-0,63*** (-3,13)	-0,40** (-2,71)		
<i>RRR</i> (-2)				-0,12*** (-10,30)
<i>RRR</i> (-3)			-0,10*** (-3,95)	
<i>LA</i>	0,11*** (2,85)	0,084** (2,50)		
<i>DUM_CRISES</i>	-2,03** (-2,03)			
<i>DUM_CRISES</i> (-2)		-2,5** (-2,08)		
<i>MA</i> (2)				-0,86** (3,07)
Vremenski period	2009Q1 – 2017Q1	2007Q3 – 2017Q1	2007Q4 -2017Q1	2007Q3-2017Q1

Napomena:

*** Značajno na nivou od 1%, ** Značajno na nivou od 5%,

* Značajno na nivou od 10%. U zagradi je *t* statistika.

Tabela 8: Dijagnostika

	EQ1	EQ2	EQ3	EQ4
<i>R</i> ²	0,91	0,99	0,99	0,99
Prilagođeni <i>R</i> ²	0,89	0,98	0,98	0,98
<i>DW</i> statistika	1,60	1,78	1,55	1,65
<i>LM</i> test-prva docnja	1,40 (0,235)	0,07 (0,79)	1,62 (0,21)	-

	EQ1	EQ2	EQ3	EQ4
Q statistika	AK na višim docnjama	AK na višim docnjama	AK na višim docnjama	nema AK
Statistika <i>Jarque-Berra</i> testa	1,82 (0,4)	0,08 (0,96)	0,29 (0,86)	1,81 (0,407)
Srednja vrijednost reziduala	0	0	0	0
Breusch-Pagan- Godfrey test	6,75 (0,56)	8,68 (0,394)	2,70 (0,75)	8,12 (0,15)
Broj stepeni slobode	25	31	33	33

Izvor: Autor.

Zaključak

Analizirali smo efekte monetarne politike BiH u periodu Q1 2006 - Q2 2017. primjenom četiri različite metodologije. BH monetarna politika ne može direktno da utiče na bh kamatne stope i na realni efektivni devizni kurs (*REER*). Uprkos ovoj činjenici, monetarni uslovi su se poboljšali od 2014. godine, sa aspekta industrijske proizvodnje, u poređenju sa periodom nakon izbijanja globalne ekonomske krize. Poboljšanje monetarnih uslova je dokaz da *REER*, kao automatski instrument monetarne politike, može biti djelotvoran i da kanal kamatne stope djelimično funkcioniše. Negativna naknada na višak rezervi prouzrokovala je negativan prinos do dospjeća na kratkoročni javni dug, po prvi put u istoriji bh monetarne politke. Sa rastom ročnosti javnog duga bh entiteta, efekti negativnih naknada na stopu prinosa na primarnom tržištu se smanjuju. Diferencirana stopa obavezne rezerve (veća na kratkoročne depozite, a niža na dugoročne depozite) je doprinjela ekstenziji ročnosti pasive bh bankarskog sektora. Između stope obavezne rezerve kao instrumenta monetarne politike i kreditnog rasta postoji jaka negativna međuzavisnost.

Glavni naučni doprinos istraživanja je u egzaktnom, empirijskom i ekonometrijskom odbacivanju teze da je bh emisiona banka „obična mjenjačnica“ i da u režimu valutnog odbora BiH nije moguće voditi autonomnu, diskrecionu i efektivnu monetarnu i makroprudencionu politiku i regulaciju. Donosioci ekonomskih odluka u BiH bi trebalo da budu svjesni efekata monetarne politike i njenih instrumenta, te moraju insistirati na njihovom daljem razvoju, kao i na uspostavljanju odgovornosti Centralne banke BiH za stanje u bh ekonomiji. Instrumentima monetarne politike CBBiH može uticati i na realne i na finansijske varijable u bh ekonomiji.

Izgradnja modela (VAR, VECM, SVAR), kako bi se pratili efekti bh monetarne politike na realne i finansijske varijable su neki od pravaca za buduća istraživanja ove vrste. Zanimljivo bi bilo i izolovati efekte bh monetarne politike na krivu prinosa u Republici Srpskoj i objasniti razlike u odnosu na krivu prinosa u Federaciji Bosne i Hercegovine. Naučni iskorak bi bio i objašnjenje kreditne i depozitne multiplikacije u monetarnom režimu sa negativnom naknadom na sredstva iznad obavezne rezerve.

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Currency Board, Monetary Regulation, and Macroprudential Regulation in Bosnia and Herzegovina

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Summary: This research presents the effects of discretionary and automatic instruments' application in four cases of monetary and macroprudential regulation in Bosnia and Herzegovina. The effectiveness of currency board policy is increasing if its orthodoxy is decreasing. We have measured monetary conditions before and after the global crisis. Monetary conditions had been improving since Q2 2014. The effects of negative remuneration on excess reserves on *BH* public debt's primary market are isolated. We have also estimated the effects of the differentiated reserve requirement rate on the maturity structure of *BH* banking sector's liability. Finally, we tested the relationship between the reserve requirement as a monetary regulation instrument and loan growth. The research showed that the Central Bank of Bosnia and Herzegovina can influence some operative variables/indicators of monetary policy. All findings show that the Central Bank of Bosnia and Herzegovina is not an "ordinary exchange office", and that it can, indeed, conduct autonomous and discretionary monetary policy.

Keywords: monetary policy, currency board, reserve requirement, monetary conditions index, negative remuneration.

JEL: E42, E52, E58, G28

Introduction

A widespread way of reasoning about the domestic currency board is that the Central Bank of Bosnia and Herzegovina (*CBBH*) is an “ordinary exchange office” i.e. it does not conduct autonomous and discretionary monetary policy. This kind of so-called “monetary main stream of thinking” about the *BH* currency board is the main motivation for the research we want to present. Our main hypothesis is that the *CBBH* conducts, and is indeed able to conduct monetary policy, even though exchange rate is pegged, even though the domestic key interest rate and the lender of last resort do not exist, and even though there is automatic conversion between the domestic (*BAM*) and reserve currency (*EUR*). In order to prove this hypothesis we will exam the behavior of a few instruments of monetary and macroprudential policy. Through the analysis of monetary conditions, reserve requirement, differentiated reserve requirement rate and remuneration on excess reserves, we want to prove the existence of effects of domestic monetary and macroprudential policy, and that they can be conducted by using discretionary and even automatic instruments of monetary and macroprudential policy. In research, monetary policy autonomy is defined as the capability to influence short-term yields and credit growth.

In the first part of this research, we give a review of literature used, followed by the data and methodology. The central part of this research has four sections: a) monetary conditions index, b) negative remuneration on excess reserves, c) differentiated reserve requirement rate, and d) reserve requirement rate. The conclusion and references are at the end of the paper.

Literature Review

There is no unique view on the degree of monetary policy autonomy in the case of fixed exchange rates, and therefore not in the case of the currency board. Some authors consider a fixed exchange rate to be a good option even in the case of high levels of currency substitution and endogenous shocks (Calvo, 1999). On the other hand, the authors (Obstfeld and Rogoff, 1995) who, analyzing the crisis of the European Exchange Rate Mechanism in 1992, as well as the Mexican crisis (1994-1995), conclude that the fixed exchange rate leads to a loss of control over money supply. The ‘impossible trinity’ principle states that monetary policy autonomy is impossible in a fixed exchange rate regime and in the absence of capital control (Fleming, 1963), and even in a flexible exchange rate regime, autonomous monetary policy is challenged in conditions of high capital mobility (Rey, 2015). There are also views that a sound monetary policy is based on a trinity of a variable exchange rate, inflation targeting, and a monetary rule (Taylor, 2000), which absolutely rejects the fixed exchange rate regime and even the currency board. In some studies, econometric verification of the hypothesis that the degree of monetary policy autonomy (measured by the ability to influence short-term interest rates) is higher in the flexible exchange rate regime than in the fixed exchange rate regime (Shaumbaugh, 2002).

The MCI, as a measurement of monetary conditions, has been in use since the end of the last century i.e. since the beginning of the '90s. The interpretation of the MCI was discussed in Ericsson et al. (2006) and also in Osborne and Holton (2010). The MCI was developed for Hong Kong (HKMA, Quarterly Bulletin 11/2010) and issues related to the MCI were discussed in the euro zone (ECB, Monthly Bulletin, 2002). Some of the neighboring countries like Croatia, (Benazić, 2012), and Albania, (Kodra, 2010), have developed their MCI. The main conclusion about the MCI is that there are different methodologies for its calculation, and its value varies a lot depending on used the methodology. In domestic literature, there is only one reference on the negative remuneration on excess reserves (Jović, 2017), which points to its influence on the public debt yields in Bosnia and Herzegovina. We did not find a single research paper on the differentiated reserve requirement rate or on the reserve requirement rate in Bosnia and Herzegovina. On the other hand, a reserve requirement rate has been intensively analyzed in foreign literature, which is not the case with the impact of a differentiated reserve requirement rate (DRRR) on the maturity structure and on the banking sector's liabilities. The main research in this area (IMF, 2011 and IMF 2013) showed that a reserve requirement rate (RRR) reduces the procyclicality of banking loans and that the RRR can reduce portfolio investments in countries with flexible foreign exchange. Marginal reserve requirement on banks' foreign liabilities with the use of capital requirement decelerates real estate price growth in emerging Europe, (Vandenbussche et al 2012), while the RRR on short-term liabilities reduces credit growth.

Data and Methodology

We have estimated the effects of the *BH* monetary and macroprudential regulation in four ways. The first way is the measurement of monetary conditions i.e. the construction of the monetary condition index (*MCI*). If monetary conditions in BH are better after the global crisis broke out, then the monetary policy was effective. The second way of measuring the BH monetary and macroprudential regulation effects is the estimation of the negative remuneration effects. The third and the fourth one are the measurement of differentiated reserve requirement effects and reserve requirement effects on long-term deposits and loan growth rate, respectively.

The Monetary Condition Index (*MCI*) was invented in Canada at the very end of the twentieth century (during the nineties). In its original form, it was presented as:

$$MCI = -(\alpha(ir - ir_b) + \beta(REER - REER_b))100$$

where are: ir and ir_b are the interest rate and interest rate in the base year, and $REER$ and $REER_b$ the log of real effective exchange rate and log of real effective exchange rate in the base year. We have applied the same form of the *MCI* formula in the research. For the base year, we have used 2010, i.e. average for interest rate and *REER* for this year, because the domestic index of industrial production has the same base year. Some characteristics of

the MCI have to be explained. The minus sign in front of the equation is set due to the impact of the interest rate and the real effective exchange rate on monetary conditions and due to ease of interpretation. If interest rates and *REER* go up, that kind of change is negative and vice versa. Increase in the *MCI* represents monetary conditions improving, while a decrease in the *MCI* represents monetary conditions worsening. The second part of the equation (i.e. difference in *REER*) is multiplied with 100 in order to get the change in percentages. There are many ways of *MCI* estimation, and we have chosen the original and the simplest one. The coefficients α and β are derived from the regression model represented as;

$$IIP_{gr} = c(1) + c(2) * IIP_{gr}(-1) + c(3) * IR(-1) + c(4) * REER_{gr}(-1)$$

where *IIP_{gr}* is the industrial production growth rate, and *C(3)* is α and *C(4)* is β , *IR_R* is the domestic lending rate (banking lending rate), and *REER* is the real effective exchange rate.

In March 2016, for the first time in *BH* monetary history, negative remuneration on excess reserves was introduced. The decision entered into force three months later. The *CBBH* linked its remuneration on excess reserves to the *ECB*'s deposit facility interest rate. In the time when the decision was made this rate was negative, - 0.4%. We have captured the effects of this change with the Wilcoxon – Mann – Whitney test, i.e. the rank-sum test. This test tries to figure out if there is a difference between observations exposed to different treatments. In our case, the treatment is negative remuneration on excess reserves i.e. the absence of negative remuneration on excess reserves. We have observed the effects of the remuneration on *BH* entities' (Republic of Srpska/*RS* and Federation of Bosnia and Herzegovina/*FBH*) treasury market or precisely on primary market's yields and on bond yields (also on the primary market). Our assumption is that there must be a difference in yields before and after the introduction of negative remuneration. With a rank-sum test, a sort of nonparametric test (Žižić et al., 1992. p. 351), we have checked this thesis. The null hypothesis in this test is that the value of the observation is equal before and after the introduction of negative remuneration.

Since 1 January 2009 and until 1 July 2016, the *BH* monetary regime had operated with *DRRR*. There were lower reserve requirements on long-term deposits and higher reserve requirements on short-term deposits (Table 1). At the beginning of this kind of reserve requirement regime, as a sort of macprudential regulation, the *RRR* was 14% for short-term deposits and 10% for long-term deposits.

Table 1: *DRRR* in Bosnia and Herzegovina

	1 January 2009	1 May 2009	1 February 2011	1 July 2016
<i>RRR</i> on liabilities with maturity below 1 year	14%	14%	10%	10%
<i>RRR</i> on liabilities with maturity above 1 year	10%	7%	7%	10%

Source: *CBBH*.

We have used multiple regression models (the parameters in models were estimated by the ordinary least square method/OLS) to find a connection between the *DRRR* and long-term deposits' growth rate. For that purpose we have introduced the model dummy for *DRRR* with a value of 1 in the period 01/2009-06/2016. The other regressors were EURIBOR, and domestic variables: nonperforming loans, GDP growth rate, short-term deposits' growth rate and deposit multiplier (inverse value of the reserve requirement rate).

In order to test the effects of the *RRR* on the credit growth, the multiple linear regression model was also used. Besides the *RRR*, we have introduced into the model a lot of regressors and controlled variables: credit growth lags, return on equity, industrial production growth rate, GDP growth rate, deposit growth rate, CPI, loan to asset ratio (LA), dummy (for the withdrawal of foreign liabilities from BH banking sector, 03/2009 – 06/2016 = 1) and moving average. The diagnostics for all models include checking for autocorrelation (*Durbin-Watson* test, *LM* test, *Q* statistics), normality (*Jarque-Berra* test), and homoscedasticity (*Breusch-Pagan-Godfrey* test). In order to facilitate the presentation, a lot of abbreviations were used. The number of degrees of freedom is defined as $n-k$, where n is number of observations, and k is number of parameters (including a constant, if it exists) to be estimated.

In order to facilitate the presentation of results we used many abbreviations (acronyms are derived from the names in English, and not in Serbian).

Table 2: List of Abbreviations and Sources of Time Series

No.	Abbreviation	Term	Sources of time series
1	BSBH	Banking Sector of Bosnia and Herzegovina	-
2	BSFBH	Banking Sector of the Federation of Bosnia and Herzegovina	-
3	CBBH	Central Bank of Bosnia and Herzegovina	-
4	CPI	Consumer Price Index	BHAS
5	DGR	Deposit Growth Rate	CBBH
6	DUM_CRISIS	Dummy for Crisis i.e. for the withdraw of foreign liabilities from <i>BSBH</i>	-
7	DUM_MPR	Dummy for Macprudential Regulation	-
8	DRRR	Differentiated Reserve Requirement Rate	CBBH
9	DW	Durbin-Watson Statistics	-
10	EURIBOR	12 month	ECB
11	GDP	Gross Domestic Product	BHAS
12	GDP_GR	Gross Domestic Growth Rate	BHAS
13	IIP	Index of Industrial Production	BHAS
14	IP_GR	Industrial Production Growth Rate	BHAS
15	IMF	International Monetary Fund	-
16.	LA	Loan to Asset Ratio	CBBH
17.	LGR	Loan Growth Rate	CBBH
18.	LR	Domestic Lending Rate	ABRS and FBA
19.	MCI	Monetary Conditions Index	-
20.	NPL	Nonperforming Loans	CBBH

No.	Abbreviation	Term	Sources of time series
21.	REER	Real Effective Exchange Rate	CBBH
22.	REER_GR	Real Effective Exchange Rate Growth Rate	CBBH
23.	ROAE	Return on Average Equity	CBBH
24.	ROE	Return on Equity	CBBH
25.	RRR	Reserve Requirement Rate	CBBH
26.	STD_GR	Short-Term Deposits Growth Rate	CBBH
27.	TB	Treasury Bills	-

Results and Discussion

Monetary Conditions Index (MCI)

The regression model we created is a very good representation of the relation between industrial production and interest rates/real effective exchange rate (Table 3). Almost all coefficients are significant at 1% level and below. The values of coefficients with the regressors lending rate (*LR*) and real effective exchange rate growth rate (*REER_GR*) are -1.66 and -2.12, respectively. These coefficients, as expected, have a negative sign i.e. growth in *LR* and *REER_GR* decreases the value of industrial production growth. According to the model's diagnostic, coefficients are unbiased estimates of parameter values. Neither autocorrelation nor heteroscedasticity exist in this model. The distribution of residuals is normal, and the residual's mean is zero.

Table 3: Regression model, dependent variable - industrial production growth rate

	Coefficient	S.E.	T	Prob.
C	8.16	2.18	3.75	0.0006
IIP_GR(-1)	0.33	0.13	2.59	0.0141
LR	-1.66	0.43	-3.90	0.0004
REER_GR	-2.12	0.68	-3.13	0.0035
R ²	0.45			
Adjusted R ²	0.38			
DW statistics	1.99			
Q-statistics (first or second lag)	0.0131 (0.909)			
JB statistics	2.71(0.26)			
Mean value of residuals	0			
Breusch-Pagan-Godfrey test	6.07(0.108)			
The number of degrees of freedom	37			
Period	2007Q2-2017Q2			

Source: Author.

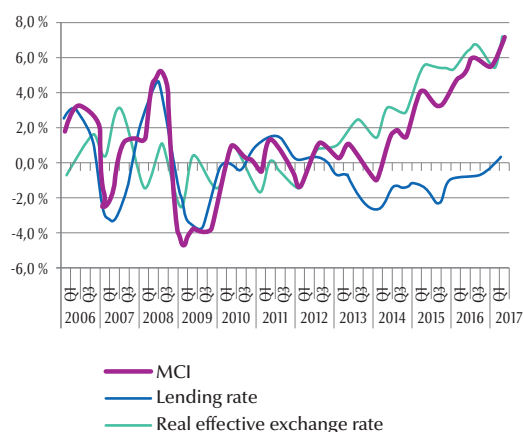
The model is the base for *MCI* construction. Applying it, we got following formula for Bosnia's *MCI* index,

$$MCI = -(-1.66(ir - ir_b) - 2.12(REER - REER_b)100) \text{ or}$$

$$MCI = -\left(\frac{1.66}{2.12}(ir - ir_b) + (REER - REER_b)100\right)$$

The Bosnian *MCI* shows that monetary conditions have been improving since Q2 2014 (Graph 1), compared to the chosen base period (Ø Q32007 – Q42008). There is a high correlation in the movements of the *REER* and the *MCI*, because the *REER* is a main contributor to the *MCI* (Graph 1). The calculated *MCI* ratio of 0.78 (1.66/2.12) is very low compared to the usual one and the contribution to the *MCI* is higher in the case of *REER*. The reasonable explanation for this fact could be the absence of the domestic central bank reference rate. The contribution of the *REER* to the *MCI* is higher than in the case of interest rates, due to the higher decrease (depreciation) in the *REER* than in interest rates comparing to the base period. Hence, the foreign exchange channel in BH is more important and more intensive than the interest rate channel. Movements in the *REER* are totally out of control of domestic monetary policy, and it means that monetary conditions in Bosnia are mainly influenced by automatic factors, and not by discretionary monetary policy instruments.

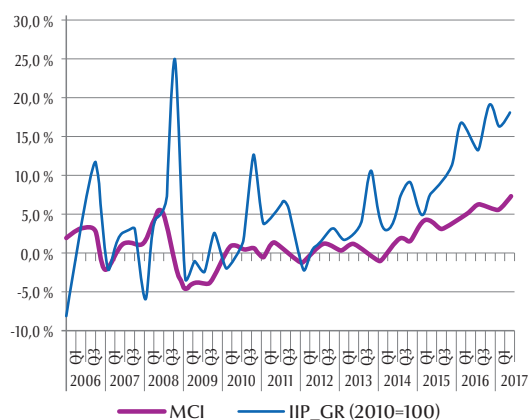
Graph 1: Monetary Policy Index in Bosnia and Herzegovina



Source: Author.

In 2016 and in the first two quarters of 2017, the *MCI* is much higher than the base *MCI* (it is around 6% higher), but we can reach a final conclusion about improving monetary conditions only by comparing the industrial production growth rate and the *MCI* (Graph 2). During the entire observed period, the correlation coefficient (Pearson's correlation coefficient) was 0.55, and if we exclude the peak in Q4 2008, the correlation in the period Q1 2009 – Q2 2017 was 0.83. This kind of relation is the final proof that monetary conditions are improved in relation to the industrial production growth rate and not only in relation to the *MCI* in the base year.

Graph 2: MCI and Industrial Production



Source: Author.

Negative Remuneration on Excess Reserves

The decision on the negative remuneration on excess reserves entered into force at the beginning of July 2016. The decision was made at the end of March 2016 and since then we have been able to see a significant effect on the primary market i.e. on the yield to maturity.

Graph 3: Yield to Maturity, 6 Months Treasury Bill - Republic of Srpska (primary market)



Source: BLSE (Author). Note: * Dashed line represents yields after negative remuneration entered into force.

The sharp decline in yields on the primary market is influenced by negative remuneration set at a half of the interest rate on ECB deposit facility rate (-0.4, i.e. -0.2%). After introducing negative remuneration on the short-term debt of

the Republic of Srpska, the lowest yield was 0.1%, and Federation of BH (FBH) had negative yields on short-term debt instruments as many as five times.

According to the Wilcoxon test, there is a very significant difference in yields on 6 m TB (RS) and 3 m TB (FBH) before and after introducing negative remuneration (Table 4). For these markets *P* values are very low 0.0037 and 0.016 so we can reject the null hypothesis on the equality of yields before and after negative remuneration. On 6 m TB market in Federation BH this difference in yields is not so obvious and so high, but even in this market we can reject the null hypothesis at 10% level, and claim that in 90% of cases there is a difference in yields before and after this extraordinary measure of domestic monetary policy. Approximately the same result was reached for 9 month treasury bills.

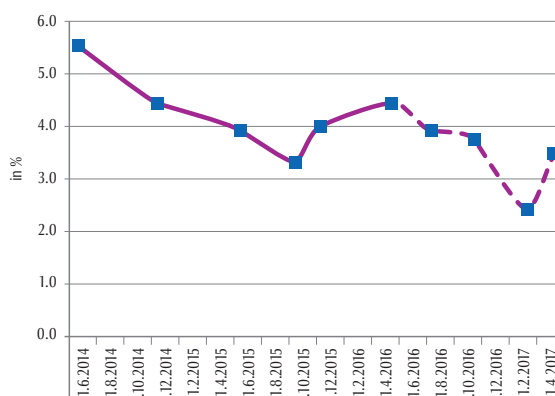
Table 4: Short-Term Primary Market of Public Debt, Wilcoxon Rank-Sum Test

	Republic of Srpska	Federation of Bosnia and Herzegovina	Federation of Bosnia and Herzegovina	Federation of Bosnia and Herzegovina
	6 months Treasury Bills	3 months Treasury Bills	6 months Treasury bills	9 months Treasury bills
time period	01/2015-08/2017	01/2015-08/2017	01/2015-08/2017	01/2015-08/2017
z	2.9	2.42	1.63	1.549
probability > z	0.0037	0.016	0.10	0.12

Source: Author.

The effects of negative remuneration on the long-term primary market are very hard to precisely determine, due to the underdeveloped debt market. We have sufficient data for analysis only for a single part of debt market. Since 2014, the Republic of Srpska has issued eight 5-year bonds in total (Graph 4). By visual inspection alone, we cannot determine without a doubt whether there is a difference in the average yields before and after the negative remuneration entered into force.

Graph 4: Yield to Maturity, 5-Year Bond - Republic of Srpska (primary market)



Source: BLSE (Author).

But, the Wilcoxon rank-sum test shows for certain that these yields are not on average different (Table 5). In both cases, in the long and short sample, we cannot reject the null hypothesis, not even at the level of 10 percent. *P* values are very high, so we have concluded that negative remuneration did not influence yields on the long-term primary market of the Republic of Srpska.

Table 5: Yields on Five-Year Bond Primary Market of Public Debt of the Republic of Srpska, Wilcoxon Rank-Sum Test

	Republic of Srpska	Republic of Srpska
	5-Year Bond	5-Year Bond
time period	01/2014-08/2017	01/2015-08/2017
z	1.26	0.3
probability > z	0.209	0.76

Source: BLSE (Author).

Differentiated Reserve Requirement Rate (*DRRR*)

The model (Table 6) itself explains 86% of variations in long-term deposits' growth rate, and the overall diagnostic is good; the distribution of residual is normal (*JB* statistics), the mean value of residual is around zero, there is no heteroscedasticity, according to the *Q*-statistics, autocorrelation is absent, despite the fact that *DW* statistics (autocorrelation at first lag) show small positive autocorrelation. The constant in the model is omitted for economic rather than for statistical reasons. A model with a constant would not have an economically logical interpretation, because it is unacceptable that, if all the variables are zero, there is still an increase in long-term deposits. So, we can say that estimates of coefficients are unbiased, because all preconditions for BLUE (best linear unbiased estimator) are satisfied. All coefficients, including the dummy variable for the *DRRR* (dummy for macroprudential or *DUM_MPR*), are significant at 5%, or even less (Table 6). If all others are equal, introducing the *DRRR* will increase the long-term deposits' growth rate by 3.4 percentage points (p.p.), which means that, among all chosen independent variables, this one is the most influential. All other regressors, *EURIBOR*, growth rate, short-term deposits and the deposit multiplier, push long-term deposits' growth rate up. Logically, the sign in front of *NPL* is negative, because uncertainty during downturn decreases demand for long-term deposits and vice versa. We can conclude that the *DRRR*, in an environment of other important variables, significantly influences the maturity structure of liabilities i.e. on average it extends the maturity of the banking sector and yields to financial stability. It means that this part of macroprudential regulation enforced by the CBBH was effective.

Table 6: Effects of the *DRRR* on Long-Term Deposits' Growth Rate

	Coefficient	S.E.	T	Prob.
DUM_MPR	3.40**	1.66	2.05	0.05
EURIBOR(-2)	2.65**	0.99	2.67	0.01
NPL(-4)	-0.70**	0.26	-2.66	0.02
GDP_GR(-7)	1.05***	0.17	6.13	0.00
STD_GR(-1)	0.17**	0.08	2.13	0.05
Deposit multiplier multiplier	0.95**	0.40	2.36	0.03
R ²	0.86			
Adjusted R ²	0.83			
DW statistics	1.8			
LM test	0.044(0.84)			
JB statistics	0.63(7.26)			
Mean value of residuals	0.026			
Breusch-Pagan-Godfrey test	7.24(0.337)			
The number of degrees of freedom	20			
Period	2010Q4 – 2017Q1			

Source: BLSE (Author).

Note:

*** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level.

Reserve Requirement

In the models, we used variables in levels, growth rates, as well as lags and moving averages. These series are not cointegrated. The condition for cointegration is that all the variables in the model are $I(1)$, i.e. non-stationary in the level, and, after differentiation, are stationary $I(0)$. Based on the ADF (Augmented Dickey – Fuller test), we determined that this condition was not met and, therefore, no time series adjustment was necessary. In all four models (Table 7 and Table 8) only a few regressors are significant at a 5% level and above. Mostly, the level of significance is below 5%, and even below 1%. The overall goodness of fit, measured by coefficient of determination, is on a high level, above 0.9. The high R^2 is not due to the non-stationarity of the time series, but due to the good specifications of the models. Spurious regression exists if the Durbin-Watson statistics is less than the R^2 , if the value of the t statistics is extremely high, if there is positive autocorrelation, and if the DW is extremely low, which is not the case in the presented specifications. Except for the *ROE* and *LA* (EQ1, EQ2), all regressors have the expected sign, in accordance with economic theory. In all models, the sign of the *RRR* (darkened row) is negative and it takes value in the interval between -0.63 and -0.10. The movements in the loan growth rate and the *RRR* have opposite signs. The smallest model, the fourth one (EQ4), has the best diagnostics, which have passed all expected conditions. Contrary to other models, only the fourth one has not autocorre-

lated at higher lags. In this model, dependent variables besides the *RRR* are: loan growth rate, industrial production growth rate, deposit growth rate, *CPI*, and moving average. All these equations, especially the fourth one, show that the *RRR* produces statistically significant effect (with the expected sign) on loan growth. It means that, as a discretionary monetary policy instrument, the *RRR* has showed efficacy.

Table 7: Reserve Requirement and Loan Growth Rate

	EQ1	EQ2	EQ3	EQ4
	LGR	LGR	LGR	LGR
LGR(-1)	0.69*** (12.68)	0.80*** (15.97)	0.74*** (25.31)	0.73*** (34.22)
ROE		-0.15** (-2.33)		
ROEA	-0.30*** (-2.77)			
IIP_GR		0.06* (2.00)	0.07** (2.40)	0.08** (2.64)
GDP_GR	0.16* (1.84)			
DGR	0.16** (2.33)	0.21*** (8.04)	0.21*** (8.42)	0.25*** (14.77)
CPI	0.29** (2.39)	0.36*** (3.306)	0.55*** (5.87)	0.60*** (8.81)
RRR	-0.63*** (-3.13)	-0.40** (-2.71)		
RRR(-2)				-0.12*** (-10.30)
RRR(-3)			-0.10*** (-3.95)	
LA	0.11*** (2.85)	0.084** (2.50)		
DUM_CRISES	-2.03** (-2.03)			
DUM_CRISES (-2)		-2.5** (-2.08)		
MA(2)				-0.86** (3.07)
Period	2009Q1 – 2017Q1	2007Q3 – 2017Q1	2007Q4 -2017Q1	2007Q3-2017Q1

Source: Author.

Note:

*** Significant at 1% level, ** Significant at 5% level
* Significant at 10% level. The *t* statistic is in parenthesis.

Table 8: Diagnostics

	EQ1	EQ2	EQ3	EQ4
R ²	0.91	0.99	0.99	0.99
Adjusted R ²	0.89	0.98	0.98	0.98
DW statistics	1.60	1.78	1.55	1.65
LM test-first lag	1.40 (0.235)	0.07 (0.79)	1.62 (0.21)	-
Q-statistics	AC at higher lags	AC at higher lags	AC at higher lags	no AC
JB statistics	1.82 (0.4)	0.08 (0.96)	0.29 (0.86)	1.81 (0.407)
Mean value of residuals	0	0	0	0
Breusch-Pagan-Godfrey test	6.75 (0.56)	8.68 (0.394)	2.70 (0.75)	8.12 (0.15)
The number of degrees of freedom	25	31	33	33

Source: Author.

Conclusion

We analyzed the effects of *BH* monetary policy in period Q1 2006 – Q2 2017 by applying four different methodologies. The domestic monetary policy cannot influence either the interest rates or the real effective exchange rate (*REER*). Despite this fact, the monetary conditions, from the industrial production point of view, have been improving since 2014, in comparison with the period after the global economic crisis broke out. The improvement of monetary conditions is the proof that the *REER*, as an automatic monetary policy instrument, can be effective, and that the interest rate channel is partially functioning. The negative remuneration on excess reserves caused negative yields to maturity on short-term public debt, for the first time in *BH* monetary policy history. If maturities of public debt of *bh* entities are higher, the effects of negative remuneration on yields are lower. The differentiated reserve requirement rate (higher on short-term deposits and lower on long-term deposits) yielded to the extension of the banking sector maturity of liabilities. There is a strong negative interdependence between the reserve requirement rate, as an instrument of monetary policy, and credit growth.

The main scientific contribution of the research lies in the exact, empirical, and econometric rejection of the thesis that the CBBH is “an ordinary exchange office” and that it is not able to conduct autonomous, discretionary and effective monetary and macroprudential policies in the currency board. Decision-makers in *BH* should be aware of the effects of monetary policy and its instruments and must insist on their further development, as well as on establishing the responsibility of the CBBH for the economy. Monetary policy

instruments of the CBBH can influence both the real and financial variables in the BH economy.

Building the models (VAR, VECM, SVAR) in order to monitor the effects of BH monetary policy on real and financial variables are some of the directions for future research of this kind. It would also be interesting to isolate the effects of the BH monetary policy on the yield curve in the Republic of Srpska and explain the differences with respect to the yield curve in the Federation of Bosnia and Herzegovina. A scientific step forward could also be accomplished with an explanation of the credit and deposit multiplication in the monetary regime with negative remuneration on excess reserves.

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Istraživanje strukture kapitala građevinskog sektora Republike Srpske

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Prevod
obezbedio
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Rezime: Ovo istraživanje je obuhvatilo 11 preduzeća iz domena građevinskog sektora koja se nalaze u sastavu berzanskog indeksa građevinskog sektora GIRS. Kao zavisna varijabla u modelu korišćen je odnos kratkoročnog duga prema ukupnom zaduženju (SHTDTL). Kao nezavisne varijable korišćene su sledeće varijable: povrat na akcijski kapital (ROE), povrat na aktivu (ROA), fiksna imovina (TOA), tekući racio (CR), tekuća aktiva prema ukupnoj aktivi (CATA), ukupan dug prema ukupnom kapitalu (TDTC) i veličina firme (FS). Period istraživanja pokriva period od 2008. godine, pa do 2018. godine, sa dostupnim podacima na polugodišnjoj osnovi. Ukupan broj opservacija iznosio je 242. U radu su obuhvaćeni i objedinjeni OLS regresioni model (FE model), kao i GLS regresioni model sa slučajnim efektima. Oba modela su se pokazala pogodnim na osnovu rezultata dobijenih putem Hausman testa. Rezultati istraživanja su pokazali da su najjači uticaj na zavisnu varijablu, tj. kratkoročni dug prema ukupnim obavezama zabeležile sledeće nezavisne varijable: tekući racio (CR), ukupan dug prema ukupnom kapitalu (TDTC) kao i povrat na aktivu. Posmatrano sa druge strane, najslabiji uticaj na zavisnu varijablu su imale sledeće varijable: tekuća aktiva prema ukupnoj aktivi (CATA), veličina firme (FS), te povrat na akcijski kapital (ROE).

Ključne reči: leveridž, struktura duga, akcijski kapital, regresiona analiza.

JEL: G31, G32, L74

1. Uvodna razmatranja

Struktura kapitala preduzeća opisuje relativnu kombinaciju različitih vrsta zaduženja, kao što su bankarski krediti hartije od vrednosti ili akcijski kapital. Ukoliko su plaćanja kamate umanjena po osnovu poreza, preduzeće će se više fokusirati na zaduživanje nego na finansiranje po osnovu akcijskog kapitala. I pored toga što poreski štiti podstiče preduzeća da se zadužuju, troškovi bankrota imaju suprotan efekat. Isplata dužničkih obaveza je obavezna, dok je isplata dividendi prepuštena diskrecijskoj upravi. Zajmodavci mogu bankrotirati u slučaju da dužnici ne izvrše na vreme isplatu svojih obaveza, gde se verovatnoća bankrota povećava. Očekuje se da će preduzeća sa većim poslovnim rizikom imati manje zaduženja. Kolateralna vrednost imovine može umanjiti troškove stečaja. Pored toga, veličina preduzeća ili poslovanja je obrnuto proporcionalna sa verovatnoćom bankrota i rizika, jer je za veće firme izvesnija verovatnoća bankrota.

Građevinski sektor igra značajnu ulogu u Republici Srpskoj i zauzima značajno učešće od oko 5% u bruto domaćem proizvodu – BDP (Direkcija za ekonomsko planiranje Bosne i Hercegovine, 2017). Zbog prirode aktivnosti i visokih finansijskih kapaciteta potrebnih za održavanje likvidnosti, te ulaganja u opremu i stanovanje, građevinski sektor je izuzetno zavistan od bankarskih kredita.

Prema Izveštaju Agencije za bankarstvo u Federaciji Bosne i Hercegovine (2018), najveće učešće kredita u granskoj strukturi kredita imale su sledeće grane delatnosti: trgovina (18,4%), proizvodnja (14,9%), ostale aktivnosti¹ sa oko 12,6%, zatim građevinski sektor oko 3,1%, ugostiteljstvo 1,9%, poljoprivreda 1,3%. Sa gledišta nekvalitetnih kredita, najdominantniji udeo nekvalitetnih kredita imali su sledeći sektori aktivnosti: poljoprivredni sektor sa oko 19,4%, građevinski sektor sa oko 16,8%, proizvodni sektor sa oko 12,6%, sektor trgovine sa oko 10,4%, sektor ugostiteljstva 6%, te ostalo sa oko 6,6%.

Preduzeća građevinskog sektora Bosne i Hercegovine imaju poteškoće u dobijanju povoljnijih bankarskih kredita jer su akreditirana kao visoko kreditno rizična prema bankarskom sektoru. Stoga su jedini izvor finansiranja građevinskog sektora bankarski krediti koji nisu u dovoljnoj meri raspoloživi, jer je nerazvijeno tržište kapitala, kao alternativni vid finansiranja, pre svega tržište korporativnih obveznica. Veći broj preduzeća građevinskog sektora Republike Srpske fiksna sredstva finansira iz kratkoročnih kredita i ima pretežno visok nivo zaduženosti, što se ne odražava pozitivno na dugi rok na indikatore profitabilnosti.

Procena nivoa direktnih i indirektnih troškova bankrota kreće se od 4% do 20% trenutne tržišne vrednosti preduzeća. Troškovi bankrota su veći za manja preduzeća, preduzeća sa većim udelom nematerijalne i fiksne imovine, kao i za preduzeća sa bržim rastom (Kolačević i Hreljac, 2012).

Za potrebe istraživanja izabrano je 11 preduzeća građevinskog sektora, koja kotiraju na Banjalučkoj berzi hartija od vrednosti i koja se nalaze u okviru ber-

¹ Ostale aktivnosti uključuju: transport, skladištenje i komunikaciju, finansijsko posredovanje, poslovanje nekretnostima, javnu upravu i odbranu, kao i obavezno socijalno osiguranje.

zanskog indeksa GIRS. Period istraživanja pokriva period od 11 godina, tačnije od 2008, do 2018. Na osnovu datih varijabli sprovedena je panel regresiona analiza, u cilju testiranja uticaja i značaja promenljivih i modela za predviđanje uticaja nezavisnih varijabli na zavisnu varijablu.

Nulta hipoteza podržava Model slučajnih efekata. Sa druge strane, alternativna hipoteza podržava Model fiksnih efekata. Ukoliko je p – vrednost manja od 0,05 tada se nulta hipoteza odbacuje (Chmelarova, 2007). Sledeće hipoteze će biti testirane:

- *H0: Nulta hipoteza: Model slučajnih efekata je odgovarajući.*
- *H1: Alternativna hipoteza: Fixed effect model je odgovarajući.*

Ukoliko je p – vrednost statistički značajna, treba koristiti Model fiksnih efekata. S druge strane, ako p – vrednost nije statistički značajna trebalo bi koristiti Model slučajnih efekata. Test značajnosti izveden je za sve varijable korišćenjem T – testa na nivou značajnosti od 95%. Nulta i prva hipoteza testirane su uz pomoć Hausmanovog testa.

Rad je struktuiran iz pet delova. Prvi deo odnosi se na uvodna razmatranja sa fokusom na opis definicije optimalne strukture kapitala, te uticaja na zaduženje, zatim sledi kratki osvrt na stanje građevinske industrije u Republici Srpskoj. Drugi deo opisuje dosadašnja istraživanja u kontekstu uticaja strukture kapitala na zaduženost i profitabilnost poslovanja. Treći deo opisuje izabranu metodologiju istraživanja, odnosno Model slučajnih efekata i Model fiksnih efekata kroz primenu Hausmanovog testa. Četvrti deo odnosi se na podatke neophodne za analizu. Peti deo elaborira dobijene rezultate istraživanja, kao i određena zapažanja i preporuke.

2. Pregled relevantne literature

Proteklih godina, problem pronalaženja optimalne strukture duga prema akcijskom kapitalu je goruće pitanje u oblasti korporativnih finansija. Imajući u vidu kako unutrašnji i eksterni faktori utiču na sastav finansijske strukture i vrednost preduzeća, u ovom istraživanju testirano je kako preduzeća građevinskog sektora Republike Srpske komponuju strukturu duga i akcijskog kapitala

Marsh (1982) ispituje odnos između duga i akcijskog kapitala u britanskim kompanijama od 1959. do 1974. Rezultati logit analize bazirani na 748 pitanja pokazuju da firme imaju tendenciju da odaberu dug ili akcijski kapital, da bi prešle na prosečni dugoročni omer duga, koji predstavlja optimalni ili ciljani odnos duga. Takođe, rezultati analize pokazuju da odnos između duga i akcijskog kapitala zavisi od trenutnih tržišnih uslova, kao i od istorijskih performansi kompanija.

Bradley i ostali (1984) zaključuju da statička *trade-off* teorija zahtjeva da preduzeća povećavaju svoj dug do nivoa kada se korisnost dodatne jedinice duga izjednačava sa troškovima zaduženja. Preduzeća imaju tendenciju da postignu ovaj statistički optimalan nivo strukture kapitala. Pored toga, ravnoteža između troškova i koristi zaduživanja se takođe određuje odnosom između duga i akcijskog kapitala.

Rajan i Zingales (1995) tvrde da veće kompanije posluju pod uticajem manje asimetričnih informacija, te imaju mogućnost da dobiju i pronađu više informacija o kretanjima na tržištu kapitala. S tim u vezi, velike kompanije su sposobnije da emituju hartije od vrednosti na tržištu kapitala i trebalo bi da imaju manji udeo duga u svojoj strukturi kapitala.

Nivorozhkin (2002) je istraživao uticaj različitih determinanti na strukturu kapitala kompanija iz Mađarske, gde je došao do zaključka da su, u prvim godinama razvoja tržišta kapitala, preduzeća u proizvodnom sektoru više koristila dug za finansiranje svog poslovanja, kao i kompanije sa većim državnim vlasništvom.

Fama i French (2002) su istakli da profitabilnost do određene mere negativno utiče na polugu. Na određenom nivou ulaganja kompanije će prvenstveno koristiti zadržanu zaradu za finansiranje svojih projekata. U trenutku kada potrebe za investiranjem prevaziđu zadržanu zaradu, kompanija emituje dužničke hartije od vrednosti.

Frank i Goyal (2009) istakli su da dinamička *trade-off* teorija ima dobru aproksimaciju za donos između različitih determinanti, tj. između strukture kapitala i leveridža. Rezultati njihovog istraživanja pokazuju da postoji pozitivna povezanost između poluge i veličine firme, fiksne imovine, očekivane inflacije i prosečne industrijske vrednosti. Takođe, pozitivni šokovi zbog profitabilnosti kompanije dovode do povećanja kapitala i smanjenja duga. Koller i ostali (2010), tvrde da se optimalna struktura kapitala razlikuje između preduzeća u zavisnosti od njihovih karakteristika. Oni smatraju da što su povrati preduzeća veći, njihov rast i poslovni rizik su manji, a sa druge strane smatraju da što je veća mogućnost preraspodele sredstava i investicija, poluga bi trebalo da raste.

3. Metodologija istraživanja

Tradicionalni OLS regresioni model predstavlja značajni metod identifikacije i ispitivanja određenih teorija strukture kapitala i faktora koji utiču na strukturu kapitala (Rajan i Zingales, 1995). Lemmon i ostali (2008) smatraju da tradicionalne promene leveridža postaju u velikoj meri nevažne kada se uzmu u obzir nepromenljivi efekti na kompaniju. Campello i Giambona (2010) tvrde da se procene OLS odnose na odnos između osnovnih sredstava i leveridža, gde se može uticati na modeliranje problema kao što je obrnuta proporcionalnost u kontekstu u kojem dug može pomoći kompanijama da steknu više fiksnih sredstava. Prvi pristup se odnosi na upotrebu prvih diferencija (FE pristup) između svake dve uzastopne godine regresije. Stoga su isključene sve promatrane i neobjašnjive varijable koje su pojedinačno specifične i konstantne tokom perioda. FD procenjivač koristi se za rešavanje problema nedostajućih promenljivih u podacima na panelu. Treba napomenuti da FD pristup nije apsolutno koristan jer izaziva gubitak percepcije.

Drugi pristup pomoću Modela fiksnih efekata (FE) zasnovan je na pretpostavci da su nevidljivi faktori ti koji mogu uticati na levu i desnu stranu regresije vremenski vidljivi. Jiraporn i Gleason (2007) istraživali su efekte prava akcionara

na polugu. Slično tome, Frank i Goyal (2009) istražuju uticaj stanja na tržištu akcija i duga, kao i makroekonomska podešavanja na polugu. Stoga, modeli u ovoj studiji koriste model fiksnog efekta (FE) i Model slučajnih efekta (RE). Da bi se postigao bolji povrat posmatranih varijabli, postavljen je sledeći regresioni model:

$$LEVER_{i,t} = \alpha + \alpha_1 TDTC_{i,t} + \alpha_2 QR_{i,t} + \alpha_3 CR_{i,t} + \alpha_4 TOA_{i,t} + \alpha_5 FS_{i,t} + \alpha_6 ROA_{i,t} + \alpha_7 ROE_{i,t} + \varepsilon_{i,t} \quad (1)$$

gde je:

- $TDTC_{i,t}$ – ukupan dug prema ukupnom kapitalu preduzeća i_{th} u periodu t .
- $QR_{i,t}$ – tekući racio preduzeća i_{th} u periodu t .
- $CR_{i,t}$ – tekuća aktiva prema ukupnoj aktivi preduzeća i_{th} u periodu t .
- $TOA_{i,t}$ – fiksna aktiva preduzeća i_{th} u periodu t .
- $FS_{i,t}$ – veličina firme preduzeća i_{th} u periodu t .
- $ROA_{i,t}$ – povrat na aktivu preduzeća i_{th} u periodu t .
- $ROE_{i,t}$ – povrat na akcijski kapital preduzeća i_{th} u periodu t .

Hausman test se takođe naziva i testom specifikacije jer određuje endogene regresore u regresionom modelu. Endogene varijable predstavljaju varijable koje su već otkrivene od strane drugih promenljivih u sistemu. Hausmanov test naziva se i testom za pogrešne specifikacije modela. Kroz panel analizu podataka, Hausmanov test služi da pomogne u odabiru između Modela fiksnih efekata ili Modela slučajnih efekata.

4. Podaci

Podaci su prikupljeni na Banjalučkoj berzi u okviru berzanskog indeksa građevinskog sektora Republike Srpske (GIRS indeks) u čijem sastavu se nalaze građevinska preduzeća. Ova empirijska studija koristi polugodišnje podatke za 11 preduzeća. Period istraživanja obuhvata 11 godina, od 2008. do 2018. Kao zavisna varijabla u modelu koristi se odnos kratkoročnog duga i ukupnih obaveza (STDTL). Sedam nezavisnih varijabli je korišćeno u modelu, kao što su: odnos između ukupnog duga i kapitala (TDTC), fiksna imovina (TOA), veličina preduzeća (FS), tekući racio likvidnosti (CR), tekuća aktiva prema ukupnoj aktivi (CATA), povrat na akcijski kapital (ROE) i povrat na aktivu (ROA). U tabeli 1 date su objašnjavajuće varijable, formule i očekivani efekti zavisnih i nezavisnih varijabli.

Tabela 1: Kratak opis zavisnih i nezavisnih varijabli u modelu

OBJAŠNJENJA VARIJABLI	FORMULA	OČEKIVANI EFEKTI	PODRŽAVAJUĆE TEORIJE
Dug	Kratkoročni dug prema ukupnim obavezama	-	-
Leveridž	Ukupan dug prema ukupnom kapitalu	Negativna kauzalnost (-)	Trade-off teorija
Fiksna aktiva	Fiksna aktiva/Ukupna aktiva	Negativna kauzalnost (-)	Kolateralni prikaz
Veličina firme	ln (Prihoda od prodaje)	Pozitivna kauzalnost (+)	Trade-off teorija
Likvidnost	Tekući racio (Tekuća aktiva/Kratkoročne obaveze)	Negativna kauzalnost (-)	Trade-off teorija
Likvidnost	(Tekuća aktiva/Ukupna aktiva)	Pozitivna kauzalnost(+)	Trade-off teorija
Profitabilnost	Neto dobit/prosečni akcijski kapital (ROE)	Negativna kauzalnost (-)	Trade-off teorija
Profitabilnost	Neto dobit/prosečna aktiva (ROA)	Negativna kauzalnost(-)	Trade-off teorija

Izvor: Proračun autora

Odnos između kratkoročnog duga i ukupnih obaveza (SHTDTL) – Izražava učešće svih oblika kratkoročnog duga u strukturi duga i služi kao zavisna varijabla u modelu (Alihodžić, 2018).

Leveridž (odnos između ukupnog duga i kapitala – TDTC) – Step en zaduženosti pokazuje značaj eksternog finansiranja. Pokazatelji upravljanja dugom se izražavaju u procentima, gde je poželjno da zaduženost preduzeća bude manja od 50%, odnosno da je udeo tuđeg kapitala u ukupnoj bilansnoj strukturi manji od 50%. U praksi mnoga preduzeća posluju sa nivoom zaduženosti mnogo većim od 50%. Preduzeća sa visokim finansijskim leveridžom imaju izvrsne performanse u slučaju opšteg ekonomskog rasta, dok u uslovima recesije mogu imati velike poteškoće (Alihodžić, 2018).

Fiksna aktiva – predstavlja važnu kategoriju bilansa koja može izazvati povećanje zaduženosti u preduzeću. Određene teorije smatraju da postoji pozitivna povezanost između fiksne aktive i leveridža. Veći iznosi materijalne imovine mogu dovesti do povećanja zaduživanja, jer se fiksna imovina može koristiti kao obezbeđenje za dobijanje kredita, što smanjuje troškove bankrota. Takođe, fiksna imovina se može koristiti za smanjenje agencijskih troškova nastalih zbog troškova monitoringa duga, kao i nepovoljnih ulaganja zbog prisustva asimetričnih informacija. Pretpostavka je da bi preduzeća koja imaju veće iznose fiksne imovine, sa većim iznosom kolaterala, trebalo da imaju i veće iznose poluge u svojoj strukturi kapitala (Jensen i Mekling, 1976).

Veličina preduzeća (FS) – Manja preduzeća se uglavnom manje zadužuju kod banaka u poređenju sa većim preduzećima. Ova situacija nastaje iz nekoliko razloga. Osnovni razlog je to što se manja preduzeća mogu suočiti sa asimetričnim informacijama, a banke sa negativnom selekcijom i moralnim

hazardom. Ova situacija je posebno izražena u Bosni i Hercegovini. Takođe, manja preduzeća imaju tendenciju da budu manje diversifikovana u kontekstu dužničkog kapitala u poređenju sa većim preduzećima, što svakako povećava šanse za finansijski neuspeh. Sa druge strane, veća preduzeća imaju relativno niže direktne troškove bankrota (Mc Connell & Pettit, 1984). S tim u vezi, manja preduzeća imaju ograničeni pristup zaduživanju, ili im se nudi naknada po znatno višim troškovima od većih preduzeća, što utiče na to da se ne zadužuju. Veličina preduzeća izračunava se prirodnim logaritmom svih prihoda od prodaje. Zbog toga se očekuje da će veličina preduzeća biti pozitivno korelisana za veća preduzeća koja su više zadužena.

Tekući racio (CR) – meri sposobnost preduzeća da izmiri svoje dospele kratkoročne obaveze ukupno raspoloživim obrtnim sredstvima. Tekući racio izražava se kao brojčana vrednost, a kako se njegova vrednost povećava preduzeće posluje likvidnije, tako da je u mogućnosti da na vreme izmiri kratkoročne obaveze prema poveriocima (Alihodžić, 2018).

Tekuća aktiva prema ukupnoj aktivi (CATA) – Analiza obrtnog kapitala vrši se analizom obima i strukture obrtnog kapitala. Obim obrtnog kapitala determinišu vrsta poslovne delatnosti preduzeća, cena, vreme i korektivne stavke. Dakle, udeo obrtnih sredstava u ukupnoj aktivi, tj. njihova brzina, obim i zadržavanje zavise od sposobnosti i efikasnosti rukovodstva za upravljanje obrtnim sredstvima (Alihodžić, 2018).

Povrat na aktivu (ROA) – predstavlja sposobnost menadžmenta da konvertuje sredstva u zaradu. Neto dobit predstavlja obim zarade, ali ne i koliko banke posluju dobro, posmatrano relativno ili u pogledu njihove veličine. Procenjuje se upoređivanjem banaka različitih veličina (Đukić, 2011).

Povrat na akcijski kapital (ROE) – predstavlja merilo profitabilnosti banaka. Odabrali smo pokazatelj ROE zbog uočenog povećanja osnovnog kapitala banaka na globalnom tržištu i većih kapitalnih potreba. Činjenica je da su mnoge operacije banaka vanbilansne, a ne i bilansne (Drozdowska & Witkowski, 2016). Prema Rappaportu (2016) postoji značajna povezanost između zajma banaka i profitabilnosti.

5. Rezultati

Pre testiranja hipoteza, primarni statistički pokazatelji korelacija i regresija prikazani su u tabelama 2-6. Ukupan broj opservacija je 242 što predstavlja dovoljno reprezentativni uzorak, kako u pogledu broja preduzeća tako i u pogledu vremenskog okvira.

Tabela 2: Deskriptivna statistika između zavisne i nezavisnih varijabli građevinskog sektora Republike Srpske za period: 2008-2018.

Varijable	Broj opservacija	Srednja vrednost	Std. Dev.	Min	Max
SHTDTL	242	67,91066	27,46304	0,38	100,0
TDTC	242	147,8961	185,7829	3,85	913,34
CR	242	2,753058	2,688335	0,37	12,24
CATA	242	51,46488	16,22211	3,98	100,0
TOA	242	47,60273	15,78526	0,00	78,84
FS	242	14,73459	3,804111	0,00	17,985
ROA	242	1,479917	5,567374	-17,14	39,71
ROE	242	1,913636	13,23992	-78,52	77,47

Izvor: Proračun autora (STATA 13.0).

Tabela 2 pokazuje da je varijabla ukupan dug prema ukupnom kapitalu (TDTC) zabeležila najveću volatilnost u pogledu standardne devijacije (186%), zatim kratkoročni dug prema ukupnim obavezama (SHTDTL) (27,46%), tekuća imovina prema ukupnoj imovini (CATA) (16,22%), fiksna imovina (TOA) (15,78%) i povrat na akcijski kapital (ROE) (13,24%). Veliki broj preduzeća građevinskog sektora Republike Srpske ima zaduženje u iznosu većem od 50%, pa čak do nivoa od preko 100% (šest preduzeća). Dugoročno posmatrano, tako visok nivo zaduženosti je znak niske likvidnosti ili čak bankrota koji bi trebalo da bude proglašen, zato što preduzeća dugi niz godina dostižu gubitak iznad visine kapitala. Takođe, mnoga preduzeća građevinskog sektora koriste kratkoročne kredite za finansiranje obrtnih sredstava i delimično fiksnih sredstava, što bi moglo biti signal niske solventnosti i ozbiljnih finansijskih problema. Prosečan udeo fiksne imovine u ukupnoj imovini preduzeća svih 11 preduzeća u periodu od 2008. do 2018. iznosio je 48%, što je tipično za ovu vrstu proizvodne delatnosti.

Tabela 3: Korelaciona matrica (Pearson koeficijent korelacije) između zavisne i nezavisnih varijabli građevinskog sektora Republike Srpske za period: 2008-2018.

Varijable		SHTDTL	TDTC	CR	CATA	TOA	FS	ROA	ROE
SHTDTL	Pearson korelacija	1,000	0,089	-0,046	0,505**	-0,504**	-0,171**	-0,203**	-0,206**
	Sig. (dvokraka)		0,165	0,479	0,000	0,000	0,008	0,002	0,001
	N	242	242	242	242	242	242	242	242
TDTC	Pearson korelacija	0,089	1,000	-0,442**	0,252**	-0,312**	-0,595**	-0,287**	-0,254**
	Sig. (dvokraka)	0,165		0,000	0,000	0,000	0,000	0,000	0,000
	N	242	242	242	242	242	242	242	242
CR	Pearson korelacija	-0,046	-0,442**	1,000	0,161*	-0,162*	0,160*	0,266**	0,163*
	Sig. (dvokraka)	0,479	0,000		0,012	0,012	0,012	0,000	0,011
	N	242	242	242	242	242	242	242	242
CATA	Pearson korelacija	0,505**	0,252**	0,161*	1,000	-0,968**	-0,385**	0,078	0,017
	Sig. (dvokraka)	0,000	0,000	0,012		0,000	0,000	0,226	0,796
	N	242	242	242	242	242	242	242	242
TOA	Pearson korelacija	-0,504**	-0,312**	-0,162*	-0,968**	1,000	0,466**	-0,075	-0,023
	Sig. (dvokraka)	,000	,000	,012	,000		0,000	0,245	0,727
	N	242	242	242	242	242	242	242	242
FS	Pearson korelacija	-,171**	-0,595**	0,160*	-0,385**	0,466**	1,000	0,235**	0,200**
	Sig. (dvokraka)	0,008	0,000	0,012	0,000	0,000		0,000	0,002
	N	242	242	242	242	242	242	242	242
ROA	Pearson korelacija	-0,203**	-0,287**	0,266**	0,078	-0,075	0,235**	1,000	0,914**
	Sig. (dvokraka)	,002	,000	,000	,226	,245	,000		,000
	N	242	242	242	242	242	242	242	242
ROE	Pearson korelacija	-,206**	-,254**	,163*	,017	-,023	,200**	,914**	1
	Sig. (dvokraka)	,001	,000	,011	,796	,727	,002	,000	
	N	242	242	242	242	242	242	242	242
**. Korelacija je značajna na nivou 0,01 (dvokraka).									
*. Korelacija je značajna na nivou 0,05 (dvokraka).									

Izvor: Proračun autora

Najjača negativna korelacija zavisne varijable kratkoročnog duga prema ukupnim obavezama (SHTDTL) zabeležena je sa sledećim nezavisnim varijablama: fiksna aktiva (TOA) (-0,504), zatim povrat na akciji kapital (ROE) (-0,206), povrat na aktivu (ROA) (-0,203), veličina preduzeća (FS) (-0,171) i tekući racio (CR) (-0,04). Varijabla veličine preduzeća je obrnuto proporcionalna prema zavisnoj varijabli kratkoročnih obaveza prema ukupnim obavezama na nivou značaja od 5%. Ovaj rezultat se može objasniti uticajem asimetričnih informacija. S obzirom na okolnost da veća preduzeća posluju sa manje asimetričnim informacijama, imaju priliku da saznaju više o tržištu kredita i kapitala, te su sposobnija da dobiju kredite kao i da izdaju određene dužničke hartije od vrednosti. S tim u vezi, ona imaju manji nivo poluge. Veći broj preduzeća građevinskog sektora Republike Srpske ima visok nivo poluge i duga, pre svega kratkoročnih kredita za finansiranje fiksne imovine, što se dugoročno ogleda u smanjenju pokazatelja profitabilnosti kao što su povrat na akciji kapital i povrat na aktivu.

Tabela 4 prikazuje rezultate regresije fiksnog efekta (FE) između izabranih varijabli u modelu. Ukupan broj opservacija je 242, što čini model reprezentativnim. Empirijska vrednost F- testa za 9 stepeni slobode u brojiocu i 233 u imeniocu iznosila je 19,69. Verovatnoća zasnovana na regresiji fiksnog efekta je 0,0004, što objašnjava da je model veoma značajan. U tabeli 4 može se primetiti da nezavisne varijable (p - vrednost $<5\%$) uglavnom utiču na zavisnu varijablu, tj. kratkoročni dug prema ukupnim obavezama (SHTDTL) kao što su: ukupan dug prema ukupnom kapitalu (TDTC) (0,002), tekući racio likvidnosti (CR) (0,002), fiksna sredstva (TOA) (0,004) i povrat na sredstva (ROE) (0,04). Postoji negativna korelacija između povrata na sredstva i kratkoročnog duga prema ukupnim obavezama (SHTDTL) (-1,407). Dakle, sa povećanjem povrata na sredstva za jednu jedinicu *ceteris paribus* dovodi do smanjenja kratkoročnog duga prema ukupnim obavezama za 1,41 jedinicu.

Svaka varijabla u modelu koja ima VIF vrednost veću od 3 smatra se multikolinearnom, te je time odbačena iz modela. U slučaju multikolinearnosti, koeficijenti varijabli postali su nestabilni, a standardne greške precenjene. Tabela 4 prikazuje dobijene rezultate multikolinearne analize između posmatranih varijabli u modelu.

Tabela 4: Multikolinearna analiza putem faktora inflacije varijanse (VIF)

Varijable	VIF	1/VIF
TDTC	2,07	0,483
CR	2,83	0,353
CATA	1,51	0,662
TOA	2,03	0,493
FS	1,95	0,513
ROA	2,95	0,338
ROE	2,54	0,394

Izvor: Proračun autora (STATA 13.0)

Kao što se može primetiti iz prethodne tabele, svaka pojedinačna nezavisna varijabla ima vrednost koeficijenta VIF manju od 3 ili jednaku 3, ali ne i veću od 3. Jasno je da nema multikolinearnosti između varijabli, tako da je postavljeni model validan.

Tabela 5: Regresija modela fiksnih efekata između zavisne i nezavisnih varijabli građevinskog sektora Republike Srpske za period: 2008 – 2018.

Regresija modela fiksnih efekata					Broj opservacija = 242	
R-sq: u sklopu = 0,3717					Broj grupa = 2	
između =0,000						
ukupno = 0,3717					Ops. prema grupama: min = 121	
pros = 121,0 max = 121 F(9,233) = 19,69 Prob > F = 0,0004						
SHTDTL (zavisna)	Coef.	Std. Err.	t	P>[t]	[95% Conf. Interval]	
TDTC	-0,0336741	0,0110347	-3,05	0,002	-0,0553674	-0,0119804
CR	-2,005471	0,6516175	-3,08	0,002	-3,289286	-0,7216554
CATA	0,036674	0,371222	0,10	0,921	-0,6947066	0,7680546
TOA	-1,144092	0,4042985	-2,83	0,004	-1,940639	-0,3475437
FS	0,7804647	0,5236453	1,49	0,137	-0,25122	1,812149
ROA	-1,406934	0,6751811	-2,08	0,038	-2,737174	-0,0766936
ROE	-0,0160858	0,2753622	-0,06	0,953	-0,5586037	0,5264321
_cons	121,5997	37,49563	3,24	0,001	47,72587	195,4735
sigma_u	0,03311028					
sigma_e	22,138624					
rho	2.237e-06					

Izvor: Proračun autora (STATA 13.0)

Za posmatrani vremenski period, 5 od 11 posmatranih preduzeća u Republici Srpskoj imalo je prosečno zaduženje kratkoročnim kreditima od oko 85% u strukturi ukupnih kredita, ukupnu prosečnu granicu zaduženja od oko 363% što posledično stvara negativan prinos na sredstvima od oko 4%. To je rezultat loše finansijske politike u kontekstu previsokog kratkoročnog zaduživanja za delimično finansiranje fiksnih sredstava, nedostatka strategije za obnovu i ulaganje u propadajuću opremu i mehanizaciju sa druge strane. Negativna povezanost između kratkoročnog duga i fiksne imovine suprotna je rezultatima istraživanja koje su izvršili Campello i Giambona (2010). S tim u vezi, dobijeni rezultati pokazuju da se pojedinačna fiksna sredstva ne mogu koristiti kao značajan kolateral kako bi se povećala sposobnost zaduživanja za veću skupinu posmatranih preduzeća. Stoga su samo ukupna stalna sredstva dobra odrednica za zaduženost.

Tabela 6: Regresija pomoću slučajnih efekata (GLS) regresija između zavisne i nezavisnih varijabli građevinskog sektora Republike Srpske za period: 2008 – 2018.

Slučajni efekat GLS regresija					Broj opservacija = 242	
R-sq: u sklopu = 0,0000					Broj grupa = 2	
između = 0,0000						
ukupno = 0,3717					Ops. prema grupama: min = 121	
pros = 121,0 max = 121 Wald chi2 (7) = 138,45 Prob > chi2 = 0,0004						
SHTDTL (zavisna varijabla)	Coef.	Std. Err.	z	P>[z]	[95% Conf. Interval]	
TDTC	-0,0336739	0,0110111	-3,06	0,002	-0,0552552	-0,0120927
CR	-2,005459	0,6502237	-3,08	0,002	-3,279874	-0,731044
CATA	0,0367084	0,3704223	0,10	0,921	-0,6893059	0,7627227
TOA	-1,144053	0,403427	-2,84	0,003	-1,934755	-0,3533503
FS	0,7804499	0,5225247	1,49	0,135	-0,2436797	1,80458
ROA	-1,406934	0,6737373	-2,09	0,037	-2,727435	-0,0864334
ROE	-0,0160841	0,2747733	-0,06	0,953	-0,5546299	0,5224617
_cons	121,5962	37,41486	3,25	0,001	48,26444	194,928
sigma_u	0,00					
sigma_e	22,138624					
rho	0,00					

Izvor: Proračun autora (STATA 13.0)

Na osnovu GLS regresionog modela sledeće nezavisne varijable (p - vrednost < 5%) su imale značajan uticaj na zavisnu varijablu u modelu. Dakle, nezavisne varijable koje su imale značajan efekat u kontekstu p - vrednosti su sledeće: ukupan dug prema ukupnom kapitalu (TDTC) (0,002), tekući ratio likvidnosti (CR) (0,002), fiksna imovina (TOA) (0,003) i povrat na aktivu (ROA) (0,04). U kontekstu kretanja koe-ficijenata, najslabiji odnos sa zavisnom varijablom su zabeležile sledeće nezavisne varijable: ratio tekuće likvidnosti (CR) (-2,005), zatim prinos na aktivu (ROA) (-1,41), i fiksna imovina (TOA) (-1,144). Povećanje racija tekuće likvidnosti tj. tekućeg racija dovodi do smanjenja zahteva za zaduživanjem i kratkoročnim kreditima. Za veći broj preduzeća građevinskog sektora Republike Srpske povećana likvidnost nije rezultat uspešnog poslovanja već korišćenje kratkoročnih kredita za finansiranje osnovnih sredstava, što svakako negativno utiče na profitabilnost tokom dugoročnog perioda.

Zaključak

U ovom radu osnovno istraživačko pitanje je bilo kako menadžeri građevinskog sektora Republike Srpske komponuju strukturu kapitala posmatranih preduzeća. To praktično znači da je glavno pitanje koje endogene i egzogene varijable utiču na kratkoročni dug prema ukupnim obavezama (SHTDTL) kao zavisnu varijablu. Testiran je uticaj nezavisnih varijabli na zavisnu varijablu korišćenjem OLS regresionog modela (FE) i regresionog modela slučajnih efekata pomoću Hausmanovog testa.

Najsigurniji uticaj putem OLS regresionog modela kao i GLS regresionog modela imale su sledeće varijable: ukupan dug prema ukupnom kapitalu (TDTC), tekući ratio likvidnosti (CR), fiksna aktiva (TOA) i prinos na aktivu (ROA). Sve tri posmatrane varijable su imale negativnu korelaciju sa zavisnom varijablom. Važno je istaknuti da menadžeri građevinskog sektora Republike Srpske ne poštuju pravila finansiranja na način da koriste kratkoročne kredite i pozajmice većim delom za finansiranje fiksnih sredstava i drugim, manjim, delom za finansiranje tekućeg poslovanja, što se na kraju odražava na kratkoročno povećanje profitabilnosti, dok dugoročno stvara neodrživu i negativnu profitabilnost.

U kontekstu značajnosti, i nulta i prva hipoteza imaju određeni uticaj na aproksimaciju zavisne varijable, sa većim naglaskom na nultu hipotezu, odnosno GLS regresioni model, jer na malo bolji način opisuje značaj i uticaj nezavisnih varijabli na zavisnu varijablu u modelu. Dakle, preduzeća građevinskog sektora Republike Srpske uglavnom koriste kratkoročne kredite za finansiranje najznačajnijeg dela svoje imovine, odnosno osnovnih sredstava što za uzvrat dovodi do pada u održavanju dugoročne profitabilnosti i stabilnosti. Dalji razvoj građevinskog sektora u Bosni i Hercegovini zahteva određene podsticajne i druge mere, pre svega od strane države, kako bi građevinski sektor imao pristup povoljnijim zajmovima i određenim subvencijama u kontekstu kamata, s obzirom na prirodu delatnosti građevinskog sektora.

Dalja istraživanja autora o datoj problematici zasigurno se mogu proširiti u zavisnosti od izbora i uključivanja velikog broja nezavisnih varijabli kao i zemalja čija se preduzeća bave sličnim problemima. Dakle, upotreba odgovarajućih varijabli može pružiti osnovu za bolju analizu.

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Dodatak teksta

Tabela 7: Rezultati dobijeni upotrebom Hausman testa

Varijable	b(Fiksno)	B(Random)	(b-B) Razlika	sqrt(diag (V_b-V_B)) S.E.
TDTC	-0,0336741	-0,0336739	-1,96e-07	0,0007214
CR	-2,005471	-2,005459	-0,0000117	0,0425977
CATA	0,036674	0,0367084	-0,0000343	0,0243535
TOA	-1,144092	-1,144053	-0,0000388	0,0265309
FS	0,7804647	0,7804499	0,0000147	0,0342388
ROA	-1,406934	-1,406934	4,19e-07	0,044132
ROE	-0,0160858	-0,0160841	-1,66e-06	0,0179988

Izvor: Proračun autora (STATA 13.0)

$$\chi^2(7) = (b-B)'[(V_b-V_B)^{-1}](b-B)$$

$$= 0,00$$

$$\text{Prob}>\chi^2 = 1,0000$$

Prema rezultatima Hausman testa (p-vrednost > 5%) nulta hipoteza se ne može odbiti, što znači da je model slučajnih efekata primeren u kontekstu objašnjenja uticaja određenih nezavisnih varijabli na zavisnu varijablu.

A Study of the Capital Structure in the Construction Sector of Republika Srpska

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*Translation
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Summary: This research included 11 companies from the construction sector, included in the stock exchange index of the construction sector, GIRS. The following dependent variable was used: short-term debt to total liabilities (STDTL). The following independent variables were used: return on equity (ROE), return on assets (ROA), the tangibility of assets (TOA), current ratio (CR), current assets to total assets (CATA), total debt to total capital (TDTC) and firm size (FS). The research period covered the period from 2008-2018 on a semi-annual basis. The total number of observations was 242. The paper includes the pooled OLS regression model (FE model) and the random-effects GLS regression model. Both models were appropriate for the obtained results through the Hausman test. The results showed that the strongest influence on the dependent variable were the short-term debt to total liabilities (STDTL), which has been achieved by the following independent variables, such as: current ratio (CR), total debt to total capital (TDTC), return on assets (ROA). On the other hand, the following independent variables had the weakest influence on the dependent variable: current assets to total assets (CATA), firm size (FS) and return on equity (ROE).

Keywords: leverage, debt structure, equity, regression analysis.

JEL: G31, G32, L74

1. Introduction

The capital structure of a company describes a relative combination of different types of indebtedness, such as bank loans, securities, or equity. When interest payments are tax deductible, businesses will focus more on debt than on equity. While tax exemptions encourage businesses to borrow, the cost of bankruptcy has the opposite effect. Payment of debt obligations is mandatory, while payment of the dividends is left to the discretion of management. Lenders can fail in bankruptcy in the case that debtors fail to pay their obligations on time and the likelihood of bankruptcy increases. Businesses at higher business risk are expected to have less debt. The collateral value of a property can reduce the cost of bankruptcy. In addition, the size of the business is inversely related to the likelihood of bankruptcy and risk, as larger firms are more likely to go bankrupt.

The construction sector plays a crucial role in Republika Srpska, and takes a significant 5% share in the GDP (B&H Directorate for Economic Planning, 2017). Due to the nature of the activities and high financial capacity needed for maintaining liquidity and investing in equipment and housing, the construction sector heavily depends on bank loans.

According to the Report of the Banking Agency of the Federation of Bosnia & Herzegovina (2018), the following branches of activity had the highest share of loans in the branch structure of loans: trade (18.4%), manufacturing (14.9%), other activities¹ with about 12.6%, then construction sector with about 3.1%, catering 1.9%, agriculture 1.3%. Concerning the aspect of non-performing loans, the most dominant share of non-performing loans are the following small sectors of activity: the agricultural sector with about 19.4%, the construction sector with about 16.8%, the manufacturing sector with about 12.6%, the trade sector with about 10.4%, the hospitality sector 6% and the rest with about 6.6%.

Companies from the construction sector of Bosnia & Herzegovina have difficulties in obtaining favourable bank loans because they are accredited with a high degree of exposure to credit risk for the banking sector. Therefore, the only funding source for the construction sector are insufficiently available loans, because the underdeveloped capital market is, as an alternative form of finance, primarily a corporate bond market. Most companies in the construction sector of Republika Srpska finance fixed assets with short-term loans and have a predominantly high level of indebtedness, which is not positively reflected on the long-term for profitability indicators.

The estimation of the level of direct and indirect bankruptcy costs ranges from 4% to up to 20% of the enterprise's current market value. The costs of bankruptcy are higher for smaller companies, companies with a higher share of intangible and fixed assets, and for companies with faster growth (Kolačević & Hreljac, 2012).

For the purpose of this research, 11 companies from the construction sector,

¹ Other activities include: transportation, storage and communication, financial mediation, dealing in real estate, public government and defense, as well as mandatory social security

listed on the Banja Luka Stock Exchange, which is part of the GIRS Stock Index, have been selected. The research period covers 11 years, from 2008 to 2018. Based on the given variables, a panel regression analysis was carried out to test the influence and significance of variables and models for predicting influence on the dependent variable.

The zero hypothesis supports the random effects model. On the other hand, the alternative hypothesis supports the fixed effects model. If the p - value is less than 0.05 then the zero hypothesis is rejected (Chmelarova, 2007). The following hypotheses will be tested:

- *H0: Zero hypothesis: Random-effect model is appropriate.*
- *H1: First hypothesis: Fixed effect model is appropriate.*

If a p-value is statistically significant, a Fixed effect model should be used. On the other hand, if a p-value is not statistically significant, a Random effect model should be used. The significance test was performed for all variables by using a T-test at a significance level of 95%. The null and the first hypotheses were tested by using the Hausman test.

The paper is structured into five parts. The first part deals with introductory considerations, with a focus on describing the definition of optimal capital structure and the impact on debt, followed by a brief overview of the state of the construction industry in Republika Srpska. The second section describes the research to date in terms of impact of the capital structure on business debt and profitability. The third part describes the chosen research methodology, namely the Random Effect Model and the Fixed Effect Model through the application of the Hausman test. The fourth part deals with the data necessary for the analysis. The fifth part elaborates on the results of the research as well as some observations and recommendations.

2. Literature Review

In corporate finance, the problem of finding the optimum debt-to-equity structure has been a burning issue over the past years. Knowing that internal and external factors influence the composition of the financial structure and the value of the company, the proper compliance of debt and capital structure has been examined, on the example of companies in the construction sector of Republika Srpska.

Marsh (1982) examines the relationship between debt and equities in British companies from 1959 to 1974. The results of a logit analysis of 748 questions show that firms tend to choose debt or equity to move to an average long-term debt ratio, which represents the optimal or target debt ratio. Also, the results of the analysis show that the relationship between debt and equity depends on the current market conditions, as well as the historical performance of the companies.

Bradley et al. (1984) come to the conclusion that the static trade-off theory requires enterprises to increase their debt to the level at which the utility of the additional debt unit equals debt costs. Companies tend to achieve this statically optimal level of capital structure. In addition, the balance between

the costs and benefits of borrowing is also determined by the relationship between debt and equity share.

According to Rajan & Zingales (1995) larger companies operate under the influence of less asymmetric information, and have the ability to obtain and find more information about movements in the capital market. In this regard, large companies are more capable of emitting securities in the capital market, and should have a smaller share of debt in their capital structure.

Nivorozhkin (2002) investigated the influence of different determinants on the capital structure of companies from Hungary, and came to the conclusion that, in the first years of capital market development, enterprises in the manufacturing sector more often used debt to finance their business, just the same as companies with larger state ownership.

Fama & French (2002) pointed out that profitability has, to some extent, a negative impact on leverage. At a certain level of investment, companies will primarily use their retained earnings to fund their projects. At a time when investment needs go beyond retained earnings, the company starts issuing debt securities.

Frank & Goyal (2009) pointed out that the dynamic trade-off theory has a good approximation for relations between different determinants, i.e., between the structure of capital and leverage. The results of their research show that there is a positive link between leverage and firm size, tangibility, expected inflation and average industrial value. Also, positive shocks due to the profitability of the company lead to capital increase and debt reduction. According to Koller et al. (2010), the optimal capital structure differs between enterprises depending on their characteristics. They consider that the higher the returns of enterprises are, their growth and business risk are lower, and on the other hand, the greater the possibility of redistribution of funds and investments is, the leverage should increase.

3. Empirical Methodology

The traditional OLS regression model represents a significant method of identifying and testing certain theories of the capital structure and factors influencing the structure of capital (Rajan & Zingales, 1995). According to Lemmon et al. (2008) traditional leverage shifts become largely irrelevant when taking into account the invariable effects on a company. According to Campello & Giambona (2010) OLS estimations refer to the relationship between fixed assets and leverage, where it can influence modelling issues such as inverse proportionate in the context where debt can help companies acquire more fixed assets. The first approach refers to the use of the first differences (FE approach) between each two consecutive years in regression. Thus, all observed and unexplained variables that are individually specific and constant over time are excluded. The FD estimator is used to solve the problem of missing variables in the panel data. It should be noted that FD approach is not absolutely beneficial as it causes loss of perception.

The second approach using the Fixed Effects Model (FE) is based on the

assumption that invisible factors that can affect the left and right side of the regression are time-invariant. Jiraporn & Gleason (2007) explored the effects of shareholder rights on leverage. Similarly, Frank & Goyal (2009) investigated the impact of stock and debt market conditions, as well as macroeconomic settings on leverage. Therefore, the models in this study use the Fixed Effect Model (FE) and the Random Effects Model (RE). In order to achieve a better return on the observed variables, the following regression model has been set up:

$$LEVER_{i,t} = \alpha + \alpha_1 TDTC_{i,t} + \alpha_2 QR_{i,t} + \alpha_3 CR_{i,t} + \alpha_4 TOA_{i,t} + \alpha_5 FS_{i,t} + \alpha_6 ROA_{i,t} + \alpha_7 ROE_{i,t} + \varepsilon_{i,t} \quad (1)$$

Where:

- $TDTC_{i,t}$ – total debt to total capital of the i^{th} company in period t .
- $QR_{i,t}$ – current ratio of the i^{th} company in period t .
- $CR_{i,t}$ – current assets to total assets of the i^{th} company in period t .
- $TOA_{i,t}$ – tangibility of assets of the i^{th} company in period t .
- $FS_{i,t}$ – firm size of the i^{th} company in period t .
- $ROA_{i,t}$ – return on assets of the i^{th} company in period t .
- $ROE_{i,t}$ – return on equity of the i^{th} company in period t .

The Hausman test called also a specification test because it determines endogenous regressors in the regression model. Endogenous variables have variables that are already detected by other variables in the system. The Hausman test is referred as a test for the wrong specification of the model. Through the panel data analysis, the Hausman test serves to help select between the fixed effects model or the random effects model.

4. Data

Data have been collected from the stock exchange index created in the construction sector at the Banja Luka Stock Exchange (GIRS stock exchange index). This empirical study uses semi-annual data for 11 companies. The research period covers 11 years, i.e., from 2008 to 2018. The dependent variable the ratio of short-term debt to total liabilities (STDTL) was used. Seven independent variables were used in the model, such as: total debt to total capital (TDTC), the tangibility of assets (TOA), firm size (FS), current ratio (CR), current assets/total assets (CATA), return on equity (ROE) and return on asset (ROA). In table 1 the explanatory variables, formulas, and expected effects of dependent and independent variables are given:

Table 1: A Brief Description of the Dependent and Independent Variables in the Model

EXPLANATORY VARIABLES	FORMULA	EXPECTED SIGNS	SUPPORTED THEORIES
Debt	Short term debt to total liabilities	-	-
Leverage	Total debt to total capital	Negative (-)	Trade-off theory
Tangibility of assets	Fixed assets/Total assets	Negative (-)	Collateral view
Firm size	ln (Sales)	Positive (+)	Trade-off theory
Liquidity	Current ratio (Current assets/Short-term liabilities)	Negative (-)	Trade-off theory
Liquidity	(Current assets/Total assets)	Positive (+)	Trade-off theory
Profitability	Net profit/Average equity (ROE)	Negative (-)	Trade-off theory
Profitability	Net profit/Average assets (ROA)	Negative (-)	Trade-off theory

Source: Author's own study

The ratio of short-term debt to total liabilities (SHTDTL) – It expresses the share of all forms of short-term debt in the overall debt structure and serves as a dependent variable in the model (Alihodžić, 2018).

Leverage (total debt to total capital – TDTC) – The degree of indebtedness shows the importance of external financing. Debt management indicators are expressed in percentages, and it is desirable that the indebtedness of the company is less than 50%, that is, the share of foreign capital in the balance sheet structure is less than 50%. In practice, many companies operate with a level of borrowing much higher than 50%. Companies with high financial leverage have excellent performance in the case of general economic growth, while in the conditions of recession they have great difficulties (Alihodžić, 2018).

The tangibility of assets – represents an important balance sheet category that may cause an increase in indebtedness in the enterprise. Certain theories believe there is a positive correlation between the assets tangibility and leverage. Higher amounts of tangible assets can lead to increased indebtedness as tangible assets can be used as collateral for loan approval, which reduces bankruptcy costs. Also, tangible assets can be used to reduce agency costs incurred due to debt monitoring costs, as well as unfavourable investments due to the presence of asymmetric information. The assumption is that companies that have higher amounts of fixed assets with a larger amount of collaterals should consequently have a higher level of leverage in their capital structure (Jensen & Mekling, 1976).

Firm size (FS) - Smaller companies generally use borrow less from banks in comparison to larger enterprises. That is the case for a few reasons. The core reason is that smaller companies can face the problem of asymmetric information, and banks can face negative selection and moral hazard. This

situation is particularly pronounced in Bosnia & Herzegovina. Also, smaller companies tend to be less diversified in terms of debt capital, compared to larger companies, which increases the chances of financial failure. On the other hand, larger enterprises have relatively lower direct costs of bankruptcy (Mc Connell & Pettit, 1984). In this regard, smaller companies have access to less capital, or they are offered substantially higher fees than large companies, which causes them not to borrow. Firm size is calculated by the natural logarithm of sales. Therefore, firm size is expected to be positively correlated with larger companies that borrow more.

Current ratio (CR) – measures the ability of the company to settle its matured short-term liabilities with the total available working capital. The current ratio is expressed as a numerical value, and as its value increases, the enterprise operates with more liquidity, so that it is able to repay short-term liabilities to creditors on time (Alihodžić, 2018).

Current assets total assets (CATA) - The analysis of working capital is done by analysing the volume and structure of working capital. The volume of working capital is determined by the type of business activity, prices, time and corrective items. Therefore, the share of working capital in total assets, i.e. their speed, volume and retention depend on the ability and efficiency of the management to manage working assets (Alihodžić, 2018).

Return on assets (ROA) - It represents the ability of management to convert assets into earnings. Net profit represents the volume of earnings, but not how well the bank operates, in relative terms or in terms of their size. This is assessed by a comparison of the ROA of banks of different sizes (Đukić, 2011).

Return on equity (ROE) - is a measure of the banks' profitability. It was decided to choose ROE due to the observed increase in the equity capital of banks in the global market and higher capital requirements for banks. It is the fact that many of the banks' operations are off-balance, and not on-balance sheet (Drozdowska & Witkowski, 2016). Rappaport (2016) found significant correlation between bank lending and profitability.

5. Results

Before the hypothesis was tested, primary statistic indicators of correlations and regression were shown in the tables 2-6. The total number of observations is 242, which represents a sufficiently representative sample both in terms of the number of companies and in terms of the timeframe.

Table 2: Descriptive Statistics of Dependent and Independent Variables of the Construction Sector in Republika Srpska for the Period: 2008-2018

Variables	Observations	Mean	Std. Dev.	Min	Max
SHTDTL	242	67.91066	27.46304	0.38	100.0
TDTC	242	147.8961	185.7829	3.85	913.34
CR	242	2.753058	2.688335	0.37	12.24
CATA	242	51.46488	16.22211	3.98	100.0
TOA	242	47.60273	15.78526	0.00	78.84
FS	242	14.73459	3.804111	0.00	17.985
ROA	242	1.479917	5.567374	-17.14	39.71
ROE	242	1.913636	13.23992	-78.52	77.47

Source: Calculated by the author (STATA 13.0).

Table 2 shows that the total debt to total capital (TDTC) recorded the highest volatility in terms of standard deviation (186%), followed by the short-term debt to total liabilities (SHTDTL) (27.46%), current assets to total assets (CATA) (16.22%), the tangibility of assets (TOA) (15.78%) and return on equity (ROE) (13.24%). A large number of companies in the construction sector in Republika Srpska are indebted over 50%, even up to over 100% (6 companies). In the long run, such a high level of indebtedness is a sign of low solvency, or even a bankruptcy that should be declared, because such companies have been reaching a loss above the height of their capital for many years. Also, many companies from the construction sector used mostly short-term loans for the financing of working assets, and partly fixed assets, which could be a signal of low solvency and severe financial problems. The average share of tangibility of the assets (TOA) of all 11 companies for the period from 2008 to 2018 is 48%, which is typical for this kind of a productive activity.

Table 3: Correlation Matrix (Pearson Correlation) Between Dependent and Independent Variables of the Construction Sector in Republika Srpska for the Period: 2008-2018

Variables		SHTDTL	TDTC	CR	CATA	TOA	FS	ROA	ROE
SHTDTL	Pearson Correlation	1.000	0.089	-0.046	0.505**	-0.504**	-0.171**	-0.203**	-0.206**
	Sig. (2-tailed)		0.165	0.479	0.000	0.000	0.008	0.002	0.001
	N	242	242	242	242	242	242	242	242
TDTC	Pearson Correlation	0.089	1.000	-0.442**	0.252**	-0.312**	-0.595**	-0.287**	-0.254**
	Sig. (2-tailed)	0.165		0.000	0.000	0.000	0.000	0.000	0.000
	N	242	242	242	242	242	242	242	242
CR	Pearson Correlation	-0.046	-0.442**	1.000	0.161*	-0.162*	0.160*	0.266**	0.163*
	Sig. (2-tailed)	0.479	0.000		0.012	0.012	0.012	0.000	0.011
	N	242	242	242	242	242	242	242	242
CATA	Pearson Correlation	0.505**	0.252**	0.161*	1.000	-0.968**	-0.385**	0.078	0.017
	Sig. (2-tailed)	0.000	0.000	0.012		0.000	0.000	0.226	0.796
	N	242	242	242	242	242	242	242	242
TOA	Pearson Correlation	-0.504**	-0.312**	-0.162*	-0.968**	1.000	0.466**	-0.075	-0.023
	Sig. (2-tailed)	.000	.000	.012	.000		0.000	0.245	0.727
	N	242	242	242	242	242	242	242	242
FS	Pearson Correlation	-.171**	-0.595**	0.160*	-0.385**	0.466**	1.000	0.235**	0.200**
	Sig. (2-tailed)	0.008	0.000	0.012	0.000	0.000		0.000	0.002
	N	242	242	242	242	242	242	242	242
ROA	Pearson Correlation	-0.203**	-0.287**	0.266**	0.078	-0.075	0.235**	1.000	0.914**
	Sig. (2-tailed)	.002	.000	.000	.226	.245	.000		.000
	N	242	242	242	242	242	242	242	242
ROE	Pearson Correlation	-.206**	-.254**	.163*	.017	-.023	.200**	.914**	1
	Sig. (2-tailed)	.001	.000	.011	.796	.727	.002	.000	
	N	242	242	242	242	242	242	242	242
**. Correlation is significant at the 0.01 level (2-tailed).									
*. Correlation is significant at the 0.05 level (2-tailed).									

Source: Calculated by the author

The strongest negative correlation of the dependent variable short-term debt to total liabilities (SHTDTL) was recorded with the following independent variables: tangibility of assets (TOA) (-0.504), return on equity (ROE) (-0.206), return on assets (ROA) (-0.203), firm size (FS) (0.171) and the current ratio (CR) (-0.04). The firm size (FS) was inversely proportional to the short-term debt to total liabilities at a level of significance of 5%. This result can be explained in terms of the impact of asymmetric information. Given that larger companies operate under less asymmetric information, they have the opportunity to find out more about the credit and capital market, and are more capable of obtaining loans, as well as being more capable of issuing certain debt or equity instruments. In this regard, they need to have a lower level of leverage. A large number of companies in the construction sector of Republika Srpska have a high level of leverage and debt, primarily short-term liabilities that direct the financing of fixed assets, which is reflected, in the long run, on a decrease in profitability indicators, such as return on equity and return on assets.

Table 4 shows the results of the fixed effects regression (FE) between the selected variables in the model. The total number of observations is 242, which makes the models representative. The empirical value of the F test for 9 degrees of freedom in the numerator and 233 in the denominator amounted to 19.69. The probability based on the fixed effects regression is 0.0004, which means that the model is very significant. Table 4 shows that independent variables (p -value < 5%) mostly affect the dependent variable short-term debt to total liabilities (STDTL) such as: total debt to total capital (TDTC) (0.002), current ratio (CR) (0.002), the tangibility of assets (TOA) (0.004) and return on assets (ROA) (0.04). There is a negative link between the return on assets (ROA) and the short-term debt to total liabilities (STDTL) (-1.407). The increase of the return on assets (ROA) by one unit, *ceteris paribus*, leads to a decrease of short-term debt to total liabilities (STDTL) by 1.41 units.

Each variable that has a VIF higher than 3 was considered as multi-collinear and was dropped from the model. In the case of multicollinearity, the coefficients of the variables became unstable and standard errors were inflated. Table 4 shows the results of the multi-collinear analysis between the observed variables in the model.

Table 4: Multi-Collinear Analysis via Variance Inflation Factor (VIF)

Variable	VIF	1/VIF
TDTC	2.07	0.483
CR	2.83	0.353
CATA	1.51	0.662
TOA	2.03	0.493
FS	1.95	0.513
ROA	2.95	0.338
ROE	2.54	0.394

Source: Calculated by the author (STATA 13.0)

As it can be seen in the previous table, each individual independent variable has a VIF coefficient value less than 3 or equal to 3, but not more than 3. It is clear that there is no multicollinearity between the variables, so the set model is valid.

Table 5: Fixed Effects Regression Between Dependent and Independent Variables of the Construction Sector of Republika Srpska for the Period: 2008 – 2018

Fixed-effects (within) regression					Number of obs. = 242	
R-sq: within = 0.3717					Number of groups = 2	
between =0.0000						
overall = 0.3717					Obs. per group: min = 121	
avg = 121.0 max = 121 F(9,233) = 19.69 Prob > F = 0.0004						
SHTDTL (dependent)	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
TDTC	-0.0336741	0.0110347	-3.05	0.002	-0.0553674	-0.0119804
CR	-2.005471	0.6516175	-3.08	0.002	-3.289286	-0.7216554
CATA	0.036674	0.371222	0.10	0.921	-0.6947066	0.7680546
TOA	-1.144092	0.4042985	-2.83	0.004	-1.940639	-0.3475437
FS	0.7804647	0.5236453	1.49	0.137	-0.25122	1.812149
ROA	-1.406934	0.6751811	-2.08	0.038	-2.737174	-0.0766936
ROE	-0.0160858	0.2753622	-0.06	0.953	-0.5586037	0.5264321
_cons	121.5997	37.49563	3.24	0.001	47.72587	195.4735
sigma_u	0.03311028					
sigma_e	22.138624					
rho	2.237e-06					

Source: Calculated by the author (STATA 13.0)

During the observed period, 5 out of 11 observed enterprises in Republika Srpska had an average indebtedness with short-term loans of about 85% in the structure of total loans, the total debt burden on total debt averages amounted to about 363%, which consequently creates a negative average return on assets of about 4%. This is a result of poor financial policy in the context of too high short-term borrowing to partially finance fixed assets, and the lack of a strategy for rebuilding and investing in dilapidated machinery, on the other hand. The negative correlation between short-term debt and tangible assets is contrary to the results of the Campello & Giambona survey (2010). In this regard, the obtained results show that individual fixed assets cannot be used as significant collateral in order to increase the borrowing capacity for a larger group of observed enterprises. Therefore, only total tangible assets are an important determinant of indebtedness.

Table 6: Random Effects (GLS) Regression Between Dependent and Independent Variables of the Construction Sector of Republika Srpska for the Period: 2008 – 2018

Random-effects GLS regression					Number of obs. = 242	
R-sq: within = 0.0000					Number of groups = 2	
between = 0.0000						
overall = 0.3717					Obs. per group: min = 121	
avg = 121.0 max = 121 Wald chi2 (7) = 138.45 Prob > chi2 = 0.0004						
SHTDTL (dependent)	Coef.	Std. Err.	z	P>[z]	[95% Conf. Interval]	
TDTC	-0.0336739	0.0110111	-3.06	0.002	-0.0552552	-0.0120927
CR	-2.005459	0.6502237	-3.08	0.002	-3.279874	-0.731044
CATA	0.0367084	0.3704223	0.10	0.921	-0.6893059	0.7627227
TOA	-1.144053	0.403427	-2.84	0.003	-1.934755	-0.3533503
FS	0.7804499	0.5225247	1.49	0.135	-0.2436797	1.80458
ROA	-1.406934	0.6737373	-2.09	0.037	-2.727435	-0.0864334
ROE	-0.0160841	0.2747733	-0.06	0.953	-0.5546299	0.5224617
_cons	121.5962	37.41486	3.25	0.001	48.26444	194.928
sigma_u	0.00					
sigma_e	22.138624					
rho	0.00					

Source: Calculated by the author (STATA 13.0)

Based on the GLS regression model, the following independent variables (p - value < 5%) had a significant influence on the dependent variable in the model. Therefore, the independent variables that had a significant effect in the context of p -value were as follows: total debt to total capital (TDTC) (0.002), current ratio (CR) (0.002), the tangibility of assets (TOA) (0.003) and return on assets (ROA) (0.04). In terms of coefficient movements, the weakest correlations with the dependent variable were recorded by the following independent variables: current ratio (CR) (-2.005), followed by the return on assets (ROA) (-1.41) and tangibility of assets (TOA) (-1.14). The increase of current assets indicators, i.e. current ratio (CR) leads to a reduction in borrowing requirements and short-term loans. For a large number of companies within the construction sector, the increased current liquidity is not a result of successful business, but of the use of short-term loans to finance fixed assets, which negatively affects the profitability over the long term.

Conclusion

This paper investigated the question of how company managers in the construction sector of Republika Srpska compose the capital structure. It means that the main question of the paper was which endogenous and exogenous variables affect short-term debt to total liabilities (STDTL) as a dependent variable. The effect of the independent variables on the dependent variable using the Pooled OLS regression model (FE) model and the Random-effects GLS regression model were used by using the Hausman test.

The most significant impact through the OLS Regression Model and GLS Regression model had the following variables: total debt to total capital (TDTC), current ratios (CR), the tangibility of assets (TOA) and return on assets (ROA). All three variables had a negative correlation with the dependent variable. It is important to note that the managers of the construction sector of the Republic of Srpska do not respect the rules of financing by using short-term loans and borrowings partly for financing fixed assets and other smaller part for current operations, which in the end reflects a short-term increase in profitability, while long-term negative and unsustainable profitability.

In terms of significance, both zero and the first hypotheses have some influence on the approximation of the dependent variable, with a greater emphasis on the zero hypothesis, i.e. the GLS regression model, because it describes in a slightly better way the significance and influence of the independent variables on the dependent variable. The companies within the construction sector of Republika Srpska mainly use short-term loans to finance the riskiest part of their assets, i.e. fixed assets, which in turn leads to a decline in maintenance of long-term profitability and stability. Further development of the construction sector in Bosnia & Herzegovina requires some incentive and other measures, primarily by the state, in order for the construction sector to have access to more favourable loans and certain interest rate subsidies, given the nature of the construction sector.

Further research by the authors on the given subject can certainly be expanded depending on the selection and inclusion of a large number of independent variables, as well as countries whose enterprises tackle similar problems. So, the use of appropriate variables can provide the basis for a better analysis.

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Appendix

Table 7: Results Obtained Using the Hausman Test

Variables	b(Fixed)	B(Random)	(b-B) Difference	sqrt(diag (V_b-V_B)) S.E.
TDTC	-0.0336741	-0.0336739	-1.96e-07	0.0007214
CR	-2.005471	-2.005459	-0.0000117	0.0425977
CATA	0.036674	0.0367084	-0.0000343	0.0243535
TOA	-1.144092	-1.144053	-0.0000388	0.0265309
FS	0.7804647	0.7804499	0.0000147	0.0342388
ROA	-1.406934	-1.406934	4.19e-07	0.044132
ROE	-0.0160858	-0.0160841	-1.66e-06	0.0179988

Source: Calculated by the author (STATA 13.0)

$$\chi^2(7) = (b-B)'[(V_b-V_B)^{-1}](b-B)$$

$$= 0.00$$

$$\text{Prob}>\chi^2 = 1.0000$$

According to the results of the Hausman test ($p\text{-value} > 5\%$), the zero hypothesis cannot be rejected, which means that the random effect model is appropriate in terms of the explanation of the influence of certain independent variables on the dependent variable.

Otkupom starog srebrnog novca do novih kovanica od 50 dinara

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Rezime: Zakon o kovanju srebrnog novca, donet 14.8.1932. godine, precizno je određivao količinu, tehničke parametre i izgled buduće kovanice od 50 dinara. Kako bi se obezbedilo 190 tona potrebnog srebra za kovanje ovog novca, ministar finansija i Ministarstvo finansija bili su prinuđeni da u kratkom periodu izdaju tri rešenja koja su se odnosila na cenu i listu srpskih i stranih predratnih kovanica od srebra predviđenih za otkup. U Kraljevskoj kovnici u Londonu, iskovano je 5,5 miliona komada ovog srebrnjaka, a isto toliko je iskovano i u Kovnici AD u Beogradu. Graver aversa je Ričard Plaht (Richard Placht), a reversa Jozef Princ (Josef Prinz). Težina kovanice je 23g, sa prečnikom od 36mm. Na aversu je profil kralja Jugoslavije, Aleksandra I, kao i godina 1932. Na reversu je grb Kraljevine Jugoslavije i njegova nominalna vrednost. Po obodu je utisnut natpis: „Bog čuva Jugoslaviju“. Kovanica je puštena u opticaj 23.1.1933. godine, a povučena u periodu od 16.8.1939. do 16.2.1940. godine.

Ključne reči: 50 dinara, srebrni novac, kovanje, ministar finansija, Ministarstvo finansija, Kraljevska kovnica, Kralj Aleksandar I, grb, Kraljevina Jugoslavija.

JEL: N14



Pripreme za izradu kovanice od 50 dinara u srebru koja na sebi ima utisnutu 1932. godinu bile su već unapred trasirane zahvaljujući Zakonu o kovanju srebrnog novca. Ovaj Zakon, donet 14. avgusta 1932. godine na Bledu, precizno je određivao količinu, tehničke parametre i izgled kovanice od 50 dinara. I pored toga, Ministarstvo i ministar finansija su, u periodu pripreme za izradu ovog novca, morali da donesu tri rešenja kako bi se, sa uspehom, obezbedilo 190 tona srebra koje je potrebno za njegovo kovanje.

Pomenutim Zakonom, ministar finansija je bio ovlašćen da: odredi ostatak sadržine legure (pored propisanog učešća srebra od 750/1000), zaključi ugovor o kovanju i da srebro nabavi od stanovništva u zemlji i inostranstvu. Ministar finansija, Milorad Đorđević, rešenjem koje je objavljeno 31. avgusta 1932. godine, nalaže Narodnoj banci da počne sa otkupom predratnog srpskog novca od 1 dinara po ceni od 2,50 dinara po komadu. Novim rešenjem Ministarstva finansija od 2. septembra 1932. godine omogućava se Narodnoj banci da otkupljuje i drugi predratni srpski, ali i inostrani srebrni novac. Za srpski predratni srebrni novac ponuđeno je, po komadu: za 5 dinara – 13,40 dinara; za 2 dinara – 5 dinara; za 1 dinar – 2,50 dinara i za 50 para – 1,25 dinara. Na listi otkupa, po istim cenama, nalazile su se i sledeće inostrane predratne kovanice od srebra: francuski franak, italijanska lira, rumunski lej, bugarski lev, grčka drahma, austro-ugarska kruna, austrijska forinta, talir Marije Terezije, crnogorski perper, nemačka marka i ruska rublja iskovana pre i posle 1886. godine. Zbog slabog odziva stanovništva, ministar finansija donosi još jedno, treće rešenje kojim se cena kupovine ovih kovanica povećava za 20% uz proširenje liste za otkup predratnog turskog srebrnog novca - medžedije i groša. Povećanje cene otkupa srebrnih kovanica omogućilo je planiranu nabavku srebra. Ministar finansija tek tada donosi četvrto rešenje, koje je objavljeno 17. juna 1933. godine, u kome nalaže Narodnoj banci da obustavi dalju kupovinu srebrnog novca.

Brojni domaći i strani autori kataloga novca smatraju da je u Kraljevskoj kovnici u Londonu, bez kovničke oznake, iskovano 5,5 miliona komada srebrnog novca od 50 dinara i da je isto toliko iskovano u Beogradu, sa natpisom Kovanica AD na aversu, ispod lika kralja Aleksandra Karađorđevića. Svih 11 miliona komada srebrnjaka primljeno je u Narodnu banku 5. avgusta 1933. godine. Rashodi nastali prilikom otkupa srebra, izrade pločica od legura srebra i bakra, izrade modela i alata za kovanje, pakovanja, prepakivanja, transporta i osiguranja teretili su državni budžet. Zbog toga je u korist budžeta uplaćen ukupni prihod, odnosno nominalna vrednost iskovanog novca.

Kao što je već istaknuto, Zakonom iz 1932. godine precizirana je količina kovanica od 50 dinara u srebru, kao i njihovi tehnički parametri i izgled. Težina kovanice je 23g sa tolerancijom od $\pm 2\%$ i sa prečnikom od 36mm. Sadržaj legure je 75/1000 srebro i 250/1000 bakar.

Na aversu je reljefni profil kralja, a unaokolo natpis „ALEKSANDAR I KRALJ JUGOSLAVIJE“. Po ivici novčića je krug od tačkica. Na reversu je grb Kraljevine Jugoslavije, sa leve strane brojevi 1 i 9, a sa desne 3 i 2, što predstavlja godinu kovanja. Ispod grba je data njegova nominalna vrednost: 50 dinara. Po obodu je utisnut natpis: „Bog čuva Jugoslaviju“. Postoje dva tipa ovih kovanica po

načinu kako se čita ovaj natpis. Naime, kod prvog tipa obodni natpis se čita sa lica, a kod drugog tipa sa naličja novca.

Graver aversa bio je Ričard Plaht (4.1.1880, Hrastava, Češka – 2.2.1962, Beč, Austrija) koji je akademiju likovnih umetnosti započeo u Pragu, a završio u Beču. Bio je dugogodišnji graver u Kovnici u Beču gde se zaposlio 1904. godine. Uglavnom je radio na portretima kovanica, značaka i medalja. Graver reversa bio je Jozef Princ, austrijski vajar poznat po izradi medalja i metalnog novca. Pre ove kovanice od srebra uradio je i avers za 5, 10 i 25 para Kraljevine SHS koje na sebi nose godinu 1920.

Kovanice od 50 dinara u srebru Narodna banka je puštala u opticaj sukcesivno od 23. januara 1933. godine. Njihovo povlačenje odvijalo se od 16. avgusta 1939. do 16. februara 1940. godine, pri čemu su zamenjivane za novoiskovan novac. Njihova zamena kod Narodne banke i drugih državnih ustanova omogućena je još šest meseci nakon ovog roka.

Graveri

Papirni i kovani novac, osim svoje osnovne funkcije, čine nezaobilazni deo istorije, kulture i umetnosti vremena i zemalja u kojem su nastajali. Izrada novca je dugotrajan proces koji počinje skicom grafičara ili slikara, koja potom mora biti usvojena kao idejno rešenje od strane nadležnih institucija države. Nakon toga, u procesu izrade, neophodno je da se ispune i svi ostali zahtevi koji podrazumevaju sadržaj i poruku novčanice, kao i stapanje umetničkog dela sa svim elementima sigurnosti i zaštite. Ovo se, u najvećoj meri, odnosi na izradu papirnog novca, ali se na isti način tretira i izrada metalnog novca.

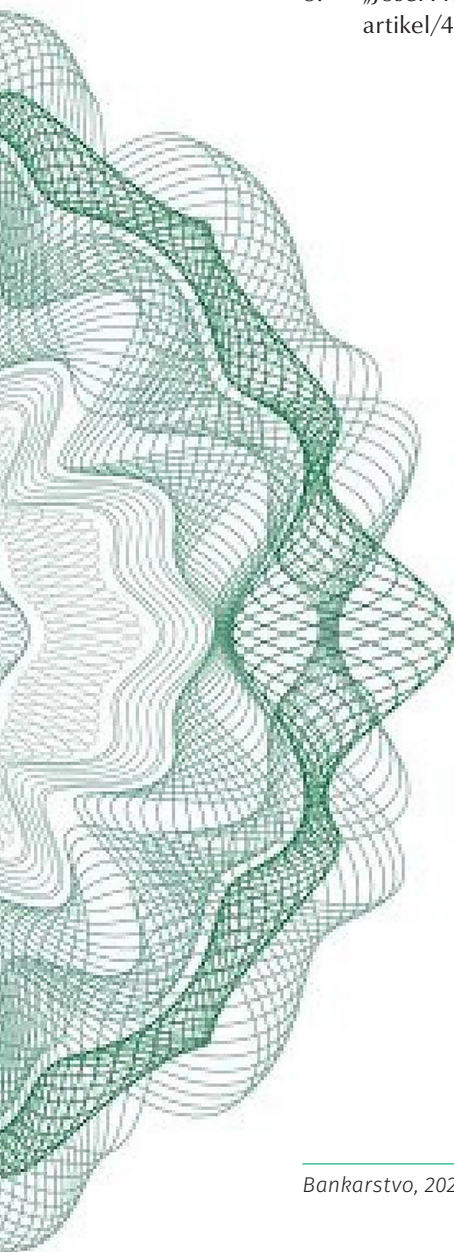
Kod papirnih novčanica Kraljevine SHS i Kraljevine Jugoslavije najčešće srećemo oznake FEC - izradio i SC - rezao, gde su data i imena nosilaca njihovih likovnih rešenja. To su bili poznati umetnici i graveri koji su radili ili sarađivali sa institucijama u kojima su se izrađivale domaće i strane novčanice.

Kod pojedinih domaćih kovanica nalazimo imena gravera. Primera radi, 50 para, 1 i 2 dinara i zlatnik od 20 dinara iz 1925. godine na licu imaju ispisano ime A. Patey. Na ostalim kovanicama u periodu od nastanka Kraljevine SHS do 1932. godine (za vreme Kraljevine Jugoslavije) ne nalazimo imena gravera, ali su na osnovu pouzdanih izvora ona ipak poznata. Oni su, takođe, u zemljama za koje su obavljali graverske poslove bili cenjeni umetnici:

- Jozef Princ, graver aversa na kovanicama od 5, 10 i 25 para iz 1920. godine i reversa na 50 dinara iz 1932. godine;
- Adolf Hofman, graver reversa na kovanicama od 5, 10 i 25 para iz 1920. godine;
- Ogust Patej (Auguste Patey), graver kovanica od 50 para, 1 i 2 dinara i zlatnika od 20 dinara iz 1925. godine;
- Persi Metkaf (Percy Matcalfe), graver kovanice od 10 i 20 dinara iz 1931. godine;
- Ričard Plaht (Richard Placht), graver aversa kovanice od 50 dinara iz 1932. godine.

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Redeeming Old Silver Coins for the Purpose of Minting New 50-Dinar Coins

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Summary: The Law on Minting Silver Coins, adopted on 14 August 1932, specifically defined the quantity, technical parameters and appearance of the future 50-dinar coin. In order to secure the 190 tonnes of silver needed for minting these coins, the Minister of Finance and the Ministry of Finance were forced to produce three decisions in a short time frame, pertaining to the prices and lists of Serbian and foreign pre-war silver coins which were meant to be redeemed. The Royal Mint in London made 5.5 million pieces of this silver coin, while the same quantity was minted in the Belgrade mint Kovnica AD. The engraver of the obverse was Richard Placht, while the reverse was engraved by Josef Prinz. The coin weighs 23g, with a diameter of 36mm. The obverse features the profile of Aleksandar I, the King of Yugoslavia, and the year 1932. The reverse shows the coat of arms of the Kingdom of Yugoslavia and the coin's nominal value. The rim is engraved with the inscription: "God Save Yugoslavia". The coins were released into circulation on 23 January 1933, and they were withdrawn in the period from 16 August 1939 to 16 February 1940.

Keywords: 50 dinars, silver coins, minting, the Minister of Finance, the Ministry of Finance, the Royal Mint, King Aleksandar I, coat of arms, the Kingdom of Yugoslavia.

JEL: N14



The preparations for the minting of silver coins bearing the year 1932 were outlined in advance by the Law on Minting Silver Money. This Law, adopted on 14 August 1932, in Bled, precisely defined the quantity, technical parameters and the appearance of the 50-dinar coin. Nonetheless, the Ministry and the Minister of Finance had to pass three decisions during the coins' production process, in order to successfully secure the 190 tonnes of silver necessary for the minting of the coins.

The Aforementioned Law authorised the Minister of Finance to: define the remaining contents of the alloy (aside from the already defined share of silver set to 750/1000), conclude an agreement on the minting, and to procure the silver from citizens in the country and abroad. Mr Milorad Đorđević, Minister of Finance, passed a decision published on 31 August 1932, ordering the National Bank to begin redeeming Serbian pre-war 1-dinar coins, at a price of 2.50 dinars per coin. A new decision of the Ministry of Finance from 2 September 1932 enabled the National Bank to redeem other pre-war silver coins, both Serbian and foreign. For Serbian pre-war silver coins, the following amounts were offered, per piece: for a 5-dinar coin – 13.40 dinars; for a 2-dinar coin – 5 dinars; for a 1-dinar coin – 2.50 dinars and for a 50-para coin – 1.25 dinars. The redemption list also featured the following foreign pre-war silver coins, at the same prices: French franc, Italian lira, Romanian leu, Bulgarian lev, Greek drachma, Austro-Hungarian crown, Austrian forint, Maria Theresa's thaler, Montenegrin perper, German mark and Russian rouble minted before or after 1886. Due to insufficient response, the Minister of Finance adopted a third decision, as well, increasing the redemption value of these coins by 20%, while also expanding the list with Turkish pre-war silver coins – medžidija and groschen. Increasing the redemption value of silver coins enabled the planned procurement of silver. Only then did the Minister of Finance pass the fourth decision, published on 17 June 1933, ordering the National Bank to cease the redemption of silver coins.

Many local and foreign coin catalogue authors believe that the Royal Mint in London produced 5.5 million pieces of 50-dinar silver coins with no minting mark, while the same number of these coins was minted in Belgrade, bearing the inscription Kovnica AD below the profile of king Aleksandar Karađorđević. All 11 million silver coins were received by the National Bank on 5 August 1933. The expenses originating from the redemption of silver, the making of silver and copper alloy plates, models and minting tools, packaging, repackaging, transportation and insurance burdened the state budget. Hence, total revenue, i.e. the nominal value of the minted coins, was paid to the budget.

As was already pointed out, the Law from 1932 defined the number of 50-dinar silver coins, and their technical parameters and appearance. A coin's weight is 23g, with a $\pm 2\%$ tolerance and a diameter of 36mm. The structure of the alloy is 17/1000 silver and 250/1000 copper.

The obverse features a relief profile of the king, circled by the inscription "ALEKSANDAR I KING OF YUGOSLAVIA". The rim of the coin features a circle of dots. The reverse bears the coat of arms of the Kingdom of Yugoslavia, with the numerals 1 and 9 on the left side, and 3 and 2 on the right, signifying the year of minting. Below the coat of arms is the coin's nominal value: 50 dinars. The edge of the coin is engraved with the inscription: "God Save Yugoslavia".

There are two types of coins, differing in the way this inscription is read. Namely, on the first type the inscription can be read from the obverse side, while the inscription on the other type can be read from the reverse side.

The engraver of the obverse was Richard Placht (4.1.1880, Chrastava, Czech Republic – 2.2.1962, Vienna, Austria), who started studying at the Academy of Fine Arts in Prague, and finished his studies in Vienna. For many years he was an engraver at the mint in Vienna where he had started working in 1904. He mostly made portraits for coins, badges and medals. The engraver of the reverse was Josef Prinz, an Austrian sculptor famous for making medals and coins. Before working on this silver coin, he made the reverse of the 5-, 10- and 25-para coins of the Kingdom of Serbs, Croats and Slovenes bearing the year 1920.

The 50-dinar silver coins were successively released into circulation by the National Bank, in the period starting from 23 January 1933. Their withdrawal was taking place between 16 August 1939 and 16 February 1940. These coins could still be replaced at the National Bank and other state institutions for an additional six months after the expiration of this deadline.

The Engravers

Banknotes and coins, beside their basic function, also signify an important part of the contemporary history, culture and art of the countries where they were created. The production of money is a time-consuming process which begins with a sketch of an engraver or painter, which then needs to be approved as a solution by the competent state institutions. Then, during the production process, all other requirements need to be fulfilled regarding the structure and message of the banknote or coin, as well as the integration of the art piece with all security and protection elements. This largely pertains to the production of banknotes, but the minting process is treated in the same manner.

When it comes to the banknotes produced in the Kingdom of SCS and the Kingdom of Yugoslavia, we often come across the abbreviations FEC – made by and SC – cut by, where the names of the people who made the art are also given. These were famous artists and engravers who worked or cooperated with the institutions that produced domestic or foreign banknotes.

Certain coins feature the names of their engravers. For example, the 50-para coins, 1- and 2-dinar coins and the 20-dinar gold coin from 1925 bear the name A. Patey on the obverse. Other coins made from the founding of the Kingdom of SCS until 1932 (during the Kingdom of Yugoslavia) do not feature the names of their engravers, but they are still known, based on reliable sources. These engravers were, also, respected artists in the countries where they worked:

- Josef Prinz, engraver of the obverse of the 5-, 10- and 25-para coins from 1920, and the reverse of the 50-dinar coin from 1932;
- Adolf Hoffman, engraver of the reverse of the 5-, 10- and 25-para coins from 1920;
- Auguste Patey, engraver of the 50-para, 1- and 2-dinar coins and the 20-dinar gold coin from 1925;
- Percy Matcalfe, engraver of the 10- and 20-dinar coins from 1931;
- Richard Placht, engraver of the obverse of the 50-dinar coin from 1932.

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Razvojna ekonomija u borbi protiv siromaštva

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Rezime: Iskorenjivanje siromaštva u svim oblicima jedan je od osnovnih ciljeva održivog razvoja Ujedinjenih nacija. U tom kontekstu, ne iznenađuje odluka Švedske kraljevske akademije nauka da Nobelovu nagradu u oblasti ekonomije za 2019. godinu dodeli ekonomistima koji su svoje istraživačke napore usmerili upravo u ovom pravcu. Nagradu su, naime, osvojili Abidžit Banerdži, Ester Diflo i Majkl Kremer, „za svoj eksperimentalni pristup ublažavanju globalnog siromaštva“. Izučavajući različite faktore svakog pojedinačnog problema, kao i ponašanje subjekata u prirodnoj sredini, metodom randomizovanih kontrolisanih ispitivanja (*randomized controlled trials* – RCTs), ovo troje naučnika došlo je do konkretnih, praktično primenljivih zapažanja. Kombinacija ovih uvida sa razumevanjem lokalnog i institucionalnog konteksta pruža solidne smernice za razvojne politike i povećava sposobnost međunarodnih razvojnih organizacija i institucija da u postavljenim rokovima zabeleže vidljiv učinak u ublažavanju globalnog siromaštva.

Ključne reči: Abidžit Banerdži, Ester Diflo, Majkl Kremer, Nobelova nagrada, razvojna ekonomija, siromaštvo, Ujedinjene nacije, Svetska banka, održivi razvoj, eksperimentalni pristup, obrazovanje.

JEL: O10, O12, I38

Iskorenjivanje siromaštva u svim oblicima jedan je od osnovnih ciljeva održivog razvoja Ujedinjenih nacija. Kako se navodi na samom početku agende čija je realizacija predviđena do 2030. godine, neophodno je „mobilisati resurse iz različitih izvora, uključujući unapređenu razvojnu saradnju, kako bi se obezbedila adekvatna i predvidljiva sredstva za zemlje u razvoju, naročito one najmanje razvijene, u cilju implementacije programa i politika za eliminisanje siromaštva u svim njegovim dimenzijama“ (UN 2030 Agenda for Sustainable Development). Poslednjih decenija, zahvaljujući aktivnostima na kreiranju međunarodnih okvira i politika, zabeležen je izvestan napredak u pogledu iskorenjivanja siromaštva. Prema podacima iz 2015. godine 10 procenata svetske populacije živelo je na ili ispod globalne granice siromaštva sa manje od 1,9 američkih dolara dnevno. U poređenju sa 16% iz 2010. godine odnosno 36% iz 1990. godine, ovo je ohrabrujuć podatak, ali treba imati u vidu usporavanje silaznog trenda i činjenicu da ostaje ogroman prostor za napredak. Geografski posmatrano, od 736 miliona ljudi koji žive u ekstremnom siromaštvu polovina ih je grupisana u samo pet zemalja (po opadajućem redosledu): Indiji, Nigeriji, Demokratskoj republici Kongo, Etiopiji i Bangladešu. Ovo su ujedno i najnaseljenije zemlje južne Azije i supsaharske Afrike, dva regiona u kojima zajedno živi 85 odsto siromašnih na celom svetu (Katayama R, Wadhwa D, 2019).

Merenje je u ovom kontekstu posebno važno, budući da pruža uvid u to koje strategije za ublažavanje siromaštva daju konkretne rezultate. Osim toga, merenje pomaže zemljama u razvoju da ocene efikasnost pojedinih programa i usmere svoje razvojne strategije u ekonomskom okruženju koje se rapidno menja. Na osnovu raspoloživih merenja i Svetska banka je 2013. godine postavila i usvojila novi cilj – da broj ljudi koji žive ispod granice siromaštva sa 1,9 američkih dolara dnevno do 2030. godine bude manji od 3 procenta.

U svetlu navedenog, ne iznenađuje odluka Švedske kraljevske akademije nauka da Nobelovu nagradu u oblasti ekonomije za 2019. godinu dodeli ekonomistima koji su svoje istraživačke napore usmerili upravo u ovom pravcu. Nagradu su, naime, osvojili Abidžit Banerdži, Ester Diflo i Majkl Kremer, „za svoj eksperimentalni pristup ublažavanju globalnog siromaštva“. Istaknuti razvojni ekonomisti poslednje dve decenije posvetili su eksperimentima na terenu, shvativši da je umesto sveobuhvatnog, teorijskog pristupa neophodno problem razložiti na činioce i fokusirano pratiti manje segmente na način sličan onome koji se koristi u kliničkim studijama u medicini. Izučavajući različite faktore svakog problema, kao i ponašanje subjekata u prirodnoj sredini, metodom randomizovanih kontrolisanih ispitivanja (*randomized controlled trials – RCTs*), Banerdži, Diflo i Kremer došli su do konkretnih, praktično primenljivih zapažanja. Na ovaj način, osim što su transformisali razvojnu ekonomiju, ostvarili su veliki doprinos u samim sredinama u kojima su eksperimenti izvođeni, a i šire, postavivši standarde za primenu ovakvih programa i na drugim lokacijama koje pogađaju slični problemi.

Novi pristup i rana istraživanja

Nakon što je postao svestan da teorija može da ukaže na izvesne podsticaje, ali ne i da pruži odgovor na pitanje koliko su oni zaista moćni u praksi, Majkl Kremer okrenuo se empirijskom pristupu koji vodi ka čvrstim, nedvosmislenim zaključcima o kauzalitetu. Svoja rana istraživanja on je sredinom devedesetih godina prošlog veka započeo u zapadnoj Keniji, gde je u saradnji sa jednom nevladinom organizacijom sproveo prve eksperimentalne programe u oblasti obrazovanja i školskog sistema. Prof. Banerdži i prof. Diflo ubrzo su se pridružili i istraživanja proširili na državne škole u Indiji.

Imajući u vidu da u siromašnim zemljama deca često u školu odlaze praznog stomaka, kao i da su udžbenici retkost, Banerdži, Diflo i Kremer su u svojim prvim studijama pokušali da odgovore na pitanja poput toga koje vrste intervencija, uz minimalan trošak, dovode do boljih rezultata u obrazovanju. Drugim rečima, da li bi učenici ostvarivali bolje rezultate ukoliko bi tokom nastave koristili više udžbenika ili dobijali besplatan obrok. Na osnovu početnih premisa, škole koje su učestvovalе u eksperimentima, bile su podeljene u grupe, tako da su u jednim učenicima dobijali dodatna nastavna sredstva, a u drugim besplatnu užinu. Istraživanja su, međutim, pokazala da nijedan od ovih faktora nije značajnije uticao na promenu rezultata koje su učenici ostvarivali, te da je jedini pozitivan efekat primećen kod onih učenika koji su i inače najbolji u razredu. Na ovaj način su, daljim prilagođavanjem varijabli, istraživači došli do važnog zaključka da u siromašnim zemljama problem u školstvu nije manjak nastavnih sredstava, već činjenica da nastava nije u dovoljnoj meri prilagođena potrebama i intelektualnim mogućnostima učenika.

Posledično, Banerdži i Diflo fokusirali su se na eksperimente u kojima su u školama u Indiji

Abdul Latif Jameel Poverty Action Lab, skraćeno J-PAL, globalni je istraživački centar sa sedištem u Masačusetsu koji su 2003. godine osnovali profesori Abidžit Banerdži, Ester Diflo i Sendhil Mulenejtan. Centar organizuje i sprovodi aktivnosti podrške evaluacijama na terenu kako bi se pronašli odgovori na ključna pitanja u adresiranju problema siromaštva širom sveta. Sa ovim ciljem J-PAL uspostavlja saradnju i izgrađuje partnerstva sa državnim institucijama, nevladinim organizacijama, donatorima i ostalim stakeholderima kako bi se zajedničkim snagama generisala nova istraživanja, razmenila znanja i efektivni programi realizovali na većem broju učesnika. Do 2018. godine programi koje su istraživači ocenili kao najučinkovitije obuhvatili su više od 400 miliona ljudi u najsiromašnijim delovima sveta.

Ovaj istraživački centar organizovan je po regionalnim kancelarijama, ali i prema sektorskim programima, koji pokrivaju osam oblasti: poljoprivredu, kriminal, obrazovanje, energetiku i ekologiju, finansije, zdravstvo, tržište rada, političku ekonomiju i upravljanje. J-PAL mrežu čini 190 pridruženih profesora koji su do danas sprovedi više od 948 evaluacija u 81 zemlji, dok je obuku centra za izvođenje ovih evaluacija prošlo preko 1500 ljudi.

angažovani saradnici u nastavi koji su vodili dopunske časove za decu sa posebnim potrebama. Rezultati su nedvosmisleno ukazivali na činjenicu da je targetiranje najslabijih učenika efektivna mera i na kratak i na srednji rok. Kao drugi način da se dodatno motivišu i sami nastavnici iskristalisalo se zapošljavanje na određeno vreme, po ugovoru koji bi se produžavao u zavisnosti od konkretnih rezultata koje nastavnik ostvari u radu sa učenicima.

Pored školskog i obrazovnog sistema, Banerđi, Diflo i Kremer sprovodili su eksperimentalne programe u siromašnim zemljama i u drugim oblastima. Oslanjajući se na centralne koncepte biheviornalne ekonomije i uzimajući u obzir uslovljenost čovekovih razmišljanja, postupaka i procesa odlučivanja samim siromaštvom, oni su kroz studije na terenu objasnili zašto kenijski poljoprivrednici kupuju premalo veštačkog đubriva i ne koriste mehanizaciju, zašto se zagađena voda u Keniji ne tretira razblaženim hlorom, zašto se jako malo dece u Indiji vakciniše protiv smrtonosnih bolesti iako je vakcina besplatna i određenim danima lako dostupna, kao i zašto se HIV tako brzo širi među mladim ljudima u Nigeriji. Posvećenost troje profesora i njihov rad na terenu omogućili su ogroman napredak u konkretnoj regulativi kojom se kompenzuju i prevazilaze otpor i predrasude pojedinaca na način kojim se vidno poboljšava kvalitet njihovog života (Hoff, 2019).

Promena u kulturi ekonomskih istraživanja

Razvojna ekonomija sistematično izučava strukturna ograničenja koja siromaštvo nameće procesu odlučivanja u sredini u kojoj su informacije nepotpune (The Committee, 2019b). Banerđi, Diflo i Kremer transformisali su ovu granu ekonomije primenivši mikroekonomski pristup kako bi razumeli različite aspekte širih (makroekonomskih) problema. Ono što je njihovim istraživanjima, međutim, omogućilo i eksternu validnost jeste njihova skalabilnost, odnosno mogućnost da se njihovi rezultati validno primene i u drugim, širim kontekstima. Tako su eksperimentalni programi koji su nakon višegodišnjih evaluacija u školama zabeležili pozitivne srednjeročne rezultate primenjivani i u većim regionima i grupama. Primera radi, pojedini uspešni modeli implementirani su u preko 100 hiljada škola u 13 regiona u Indiji, čime je obuhvaćeno 5 miliona dece.

Iako sami istraživači ne mogu da kontrolišu niti utiču na to u kojoj će se meri informacije prikupljene kroz njihove eksperimente kasnije zaista i inkorporirati u realne politike, ovi podaci nesumnjivo svedoče o ogromnom naučnom doprinosu koji su ostvarili Banerđi, Diflo i Kremer. S druge strane, neke studije imale su više nego direktan uticaj na nivou politika, te je tako Svetska zdravstvena organizacija, u skladu sa rezultatima relevantnih istraživanja na temu zdravstvenog sistema, izdala preporuku da se lekovi besplatno distribuiraju za preko 800 miliona dece školskog uzrasta koja žive u oblastima u kojima preko 20 procenata njih boluje od nekog tipa infekcije izazvane crevnim parazitima (The Committee, 2019a).

Dodatno, istraživanja i rezultati do kojih su došli Banerđi, Diflo i Kremer poslužili su kao izuzetan podsticaj za ostale naučnike i istraživače, a mnoge organizacije posvećene borbi protiv siromaštva počele su da sistematično

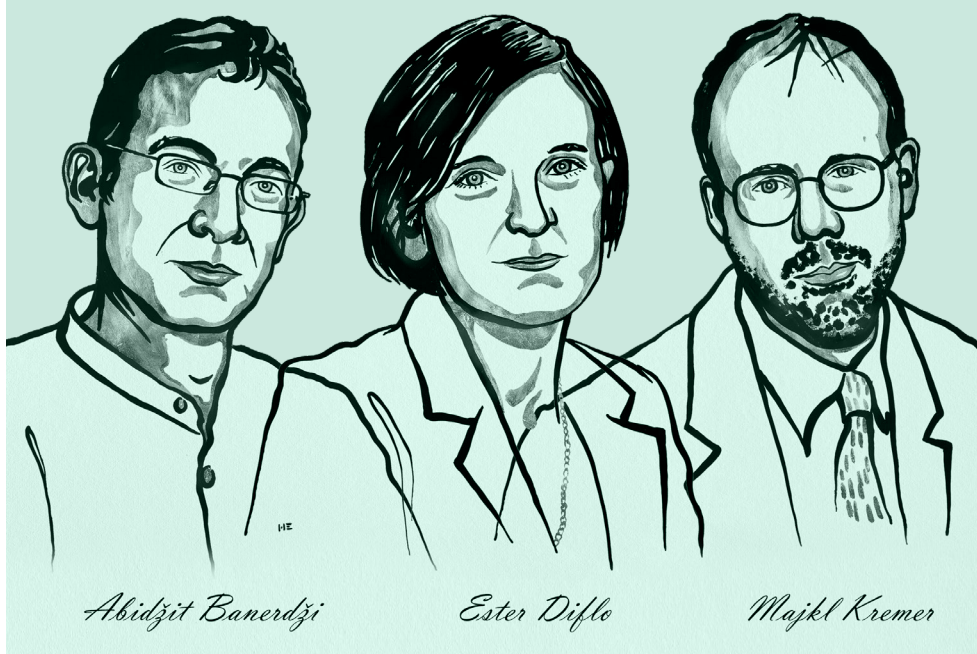
evaluiraju nove predloge na osnovu eksperimenata i da koriste zaključke iz tih evaluacija u svom radu i odlučivanju. Drugim rečima, pristup koji je razvilo ovo troje naučnika omogućio je uvid u nove i postojeće programe koji su osmišljeni tako da kontinuirano poboljšavaju uslove života za najugroženije. Kombinacija ovih uvida sa razumevanjem lokalnog i institucionalnog konteksta pruža solidne smernice za razvojne politike i povećava sposobnost međunarodnih razvojnih organizacija i institucija da u postavljenim rokovima zabeleže vidljiv učinak u ublažavanju globalnog siromaštva.

Abidžit Banerdži rođen je 1961. godine u Indiji. Doktorsku titulu stekao je 1988. godine odbranivši tezu na Univerzitetu Harvard. Kao profesor ekonomije radi na Masačusetskom institutu za tehnologiju (MIT), Kembriđž, SAD.

Ester Diflo takođe predaje na MIT-u, kao profesor razvojne ekonomije i ublažavanja siromaštva. Ona je svoju doktorsku tezu, pod mentorstvom profesora Banerdžija, odbranila na ovom Institutu 1999. godine. Rođena u Francuskoj 1972. godine, Ester je najmlađi dobitnik Nobelove nagrade za ekonomiju, od kada je ona ustanovljena 1968. godine. Ujedno, Ester je tek druga žena kojoj je Švedska kraljevska akademija nauka dodelila ovo prestižno priznanje, nakon Elinor Ostrom, laureatkinje iz 2009. godine.

Majkl Kremer je Njujorčanin, rođen 1964. godine. Doktorirao je 1992. godine na Univerzitetu Harvard, gde je i zaposlen kao profesor društava u razvoju.

Svo troje laureata autori su brojnih studija, udžbenika i radova objavljenih u vodećim naučnim časopisima, kao i nosioci velikog broja međunarodnih priznanja za svoj, mahom zajednički, naučno-istraživački rad.



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2. Katayama R, Wadhwa D. (2019), Half of the World's Poor Live in Just 5 Countries, <<https://blogs.worldbank.org/opendata/half-world-s-poor-live-just-5-countries>> (accessed on 8 April 2020)
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7. United Nations, Transforming our World: the 2030 Agenda for Sustainable Development, <https://www.un.org/ga/search/view_doc.asp?symbol=A/RES/70/1&Lang=E> (accessed on 10 April 2020)

Development Economics in the Fight Against Poverty

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Summary: Eradicating poverty in all its forms is one of the fundamental goals of the United Nations' plan for sustainable development. In this context, it is not surprising that the Swedish Royal Academy of Sciences has decided to award the 2019 Nobel Prize in Economic Sciences to the economists who have focused their research efforts in this direction. Namely, Abhijit Banerjee, Esther Duflo and Michael Kremer won the award "for their experimental approach to alleviating global poverty". By examining the different factors of each individual problem, as well as the behaviour of subjects in the natural environment, using the method of randomised controlled trials (RCTs), these three scientists came to concrete, practically applicable observations. The combination of these insights and an understanding of the local and institutional context provides solid guidance for development policies and enhances the capacity of international development organisations and institutions to record a visible impact in alleviating global poverty within the set deadlines.

Keywords: Abhijit Banerjee, Esther Duflo, Michael Kremer, the Nobel Prize, development economics, poverty, the United Nations, the World Bank, sustainable development, experimental approach, education.

JEL: O10, O12, I38

Eradicating poverty in all its forms is one of the fundamental goals of the United Nations' plan for sustainable development. As stated at the beginning of its 2030 Agenda, it is necessary to "ensure significant mobilization of resources from a variety of sources, including through enhanced development cooperation, in order to provide adequate and predictable means for developing countries, in particular least developed countries, to implement programmes and policies to end poverty in all its dimensions" (UN 2030 Agenda for Sustainable Development). In recent decades, due to activities undertaken in order to create international frameworks and policies, there has been some progress in eradicating poverty. According to the 2015 data, 10% of the world's population lived at or below the global poverty line with less than US \$ 1.9 a day. Compared to 16% in 2010 and 36% in 1990, this is encouraging, but one should keep in mind the deceleration of the downward trend and the fact that plenty of room for progress still remains. Geographically, out of the 736 million people living in extreme poverty, half are grouped in only five countries (in descending order): India, Nigeria, Democratic Republic of Congo, Ethiopia and Bangladesh. They also happen to be the most populous countries of South Asia and Sub-Saharan Africa, the two regions that together account for 85 percent of the world's poor (Katayama R, Wadhwa D, 2019).

Measurement is particularly important in this context, as it provides insight into which poverty reduction strategies deliver solid results. In addition, collecting data helps developing countries evaluate the effectiveness of individual programs and direct their development strategies in a rapidly changing economic environment. Based on the available data, the World Bank has also set and adopted a new goal in 2013 - to keep the number of people living below the poverty line with US \$ 1.9 per day below 3 percent by 2030.

In light of the above, it is not surprising the Royal Swedish Academy of Sciences decided to award the 2019 Nobel Prize in Economic Sciences to the economists who have directed their research efforts in this very direction. Namely, the award was given to Abhijit Banerjee, Esther Duflo and Michael Kremer "for their experimental approach to alleviating global poverty". These prominent development economists have devoted the last two decades to field experiments, having realised that, instead of opting for a comprehensive, theoretical approach, it is necessary to break down the problem into different factors and focus on smaller segments, in a manner similar to that used in clinical medicine research. By studying the various factors of each problem, as well as the behaviour of subjects in the natural environment, using the method of randomised controlled trials (RCTs), Banerjee, Duflo, and Kremer came to concrete, practically applicable observations. Thus, in addition to transforming the development economics, they have made a major contribution in the very environments in which the experiments were performed and beyond, setting the standards for the implementation of such programs in other locations that are likewise affected by similar problems.

New Approach and Early Stages of Research

After becoming aware that, while theory could point to certain incentives, it cannot answer the question of how effective those incentives really are in practice, Michael Kremer turned to an empirical approach that leads to solid, unambiguous conclusions about causality. He began his early research in the mid-1990s in western Kenya, where, in collaboration with an NGO, he conducted the first experimental programs in the field of education and the school system. Banerjee and Duflo soon joined in and expanded their research to include public schools in India.

Bearing in mind that, in poverty-stricken countries, children often go to school hungry, while textbooks are rare, Banerjee, Duflo and Kremer, in their first studies, tried to answer questions such as: what types of interventions, with minimal cost, lead to better results in education. In other words, would students be better off using more textbooks or receiving a free meal during schooltime. Based on the initial premise, the schools participating in the experiments were divided into groups, so that in one group students would receive additional teaching aids and, in the other, a free snack. Research has, however, shown that none of these factors significantly instigated a change in the students' results, and that the only positive effect was observed in students who were already at the top of the class. In this way, by further adjusting the variables, the researchers came to the important conclusion that, in poverty-stricken countries, the problem in education is not the lack of teaching resources, but the fact that teaching is not sufficiently adapted to the needs and intellectual abilities of the students.

Consequently, Banerjee and Duflo focused on experiments in which teaching associates were hired at schools in India to provide supplementary classes for children with special needs. The results clearly indicated that targeting the

Abdul Latif Jameel Poverty Action Lab, abbreviated J-PAL, is a Massachusetts-based global research centre founded in 2003 by Professors Abhijit Banerjee, Esther Duflo, and Sendhil Mullainathan. The Centre organises and implements field evaluation support activities to find key answers to addressing poverty worldwide. To this end, J-PAL establishes cooperation and builds partnerships with state institutions, non-governmental organisations, donors and other stakeholders in order to jointly generate new research, exchange of knowledge and effective programs for more participants. By 2018, the programs rated as most effective by researchers have covered more than 400 million people in the poorest parts of the world.

This research centre is divided into regional offices, and into different sectorial programs, covering eight areas: agriculture, crime, education, energy and ecology, finance, health, labour market, political economy and governance. The J-PAL network consists of 190 associate professors who have conducted over 948 evaluations in 81 countries to date, while more than 1500 people have been trained by the centre to perform these evaluations.

poorest students was an effective measure, both in the short and medium term. Another way to motivate the teachers themselves proved to be part-time employment, under a contract that would be extended depending on the specific results the teacher achieved while working with students.

In addition to the school and education systems, Banerjee, Duflo, and Kremer conducted experimental programs in poverty-stricken countries in other areas as well. Drawing on the central concepts of behavioural economics, and taking into account the fact that human thinking, actions and decision-making processes are conditioned by poverty, they have explained through field studies why Kenyan farmers buy too little artificial fertiliser and use no mechanisation, why Kenya's polluted water is not treated with diluted chlorine, why few children in India get vaccinated against deadly diseases, even though the vaccine is free and, on certain days, easily available, and why HIV is spreading so quickly among young people in Nigeria. The commitment of the three professors and their work in the field "made possible large advances in real-world policies to offset individuals' biases in ways that made their lives much better" (Hoff, 2019).

Change in the Economic Research Culture

Development economics "systematically explores the structural constraints that poverty imposes on decision-making in an environment where information is incomplete" (The Committee, 2019b). Banerjee, Duflo and Kremer transformed this branch of economics by applying a microeconomic approach to understand the various aspects of broader (macroeconomic) problems. What also granted their research external validation was its scalability, i.e. the ability for the results to be validly applied in other, broader, contexts. Thereby, experimental programs which, after years of evaluations in schools, recorded positive medium-term results were also applied in larger regions and groups. For example, some successful models have been implemented in over 100,000 schools in 13 regions in India, having reached 5 million children.

Although the researchers themselves cannot control or influence the extent to which the information gathered through their experiments will later be incorporated into real policies, these data undoubtedly testify to the huge scientific contributions made by Banerjee, Duflo and Kremer. On the other hand, some studies have had a strong direct impact at the policy level. For instance, in accordance with the results of relevant research concerning the health system, the World Health Organisation has issued a recommendation that medicines should be distributed free of charge to over 800 million schoolchildren living in areas where more than 20 percent of them have a specific type of parasitic worm infection (The Committee, 2019a).

Banerjee, Duflo, and Kremer's research and results have served as an exceptional incentive for other scholars and researchers, while many organisations dedicated to combating poverty have begun to systematically evaluate new proposals based on experiments, and to draw conclusions from these evaluations in their work and decision making. In other words, the approach devel-

oped by these three scholars has provided insight into both new and existing programs designed to continually improve the living conditions for the most vulnerable groups. The combination of these insights and an understanding of the local and institutional context provides solid guidance for development policies, and enhances the capacity of international development organisations and institutions to achieve a visible impact in alleviating global poverty within the set deadlines.

Abhijit Banerjee was born in 1961 in India. He obtained his doctorate in 1988 defending his thesis at Harvard University. As a Professor of Economics, he works at the Massachusetts Institute of Technology (MIT), Cambridge, USA.

Esther Duflo also teaches at MIT, as a Professor of Development Economics and Poverty Alleviation. She defended her PhD thesis under the mentorship of Professor Banerjee, at this Institute, in 1999. Born in France in 1972, Esther is the youngest person to have received the Nobel Prize in Economic Sciences, since it was established back in 1968. At the same time, Esther is the second woman ever to have received this prestigious recognition from the Royal Swedish Academy of Sciences, after Elinor Ostrom, a 2009 laureate.

Michael Kremer is a New Yorker, born in 1964. He received his PhD in 1992 from Harvard University, where he also works as a Professor of Developing Societies.

All three laureates are authors of numerous studies, textbooks and papers published in leading scientific journals, as well as holders of a large number of international awards for their, largely collaborative, scientific and research work.



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BEOGRADSKA BERZA
BELGRADE STOCK EXCHANGE

Barometar / Barometer

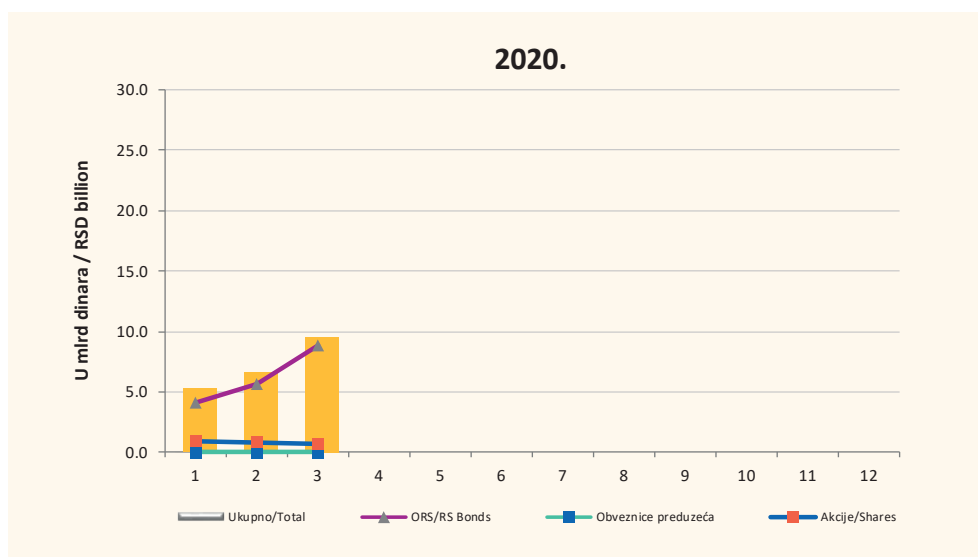
JANUAR 2020 – MART 2020. /
JANUARY 2020 – MARCH 2020

1. PROMET / TURNOVER

Mesec/Month	Listing	Open Market	Regulisano tržište/ Regulated market	MTP/MTF	Ukupno/Total	Broj transakcija/ Number of transactions
Mart 2020. / March, 2020	9.030.036.635	131.788.131	9.161.824.766	267.102.814	9.428.927.580	2.180
Februar 2020. / February, 2020	5.854.541.955	538.203.366	6.392.745.321	80.558.729	6.473.304.050	1.718
Januar 2020. / January, 2020	4.298.544.657	66.229.693	4.364.774.350	687.189.262	5.051.963.612	1.826
Decembar 2019. / December, 2019	9.839.474.538	23.568.588	9.863.043.126	43.301.493	9.906.344.619	2.222
Novembar 2019. / November, 2019	26.582.250.140	2.803.970.842	29.386.220.982	298.387.620	29.684.608.602	2.506
Oktober 2019. / October, 2019	1.402.760.533	194.835.647	1.597.596.180	341.111.753	1.938.707.933	3.532
Septembar 2019. / September, 2019	8.504.327.210	101.386.268	8.605.713.478	36.937.388	8.642.650.866	2.135
Avgust 2019. / August, 2019	3.504.384.758	255.696.664	3.760.081.422	24.852.548	3.784.933.970	1.733
Jul 2019. / July, 2019	6.709.126.278	162.146.479	6.871.272.757	222.682.301	7.093.955.058	2.330
Jun 2019. / June, 2019	7.141.912.667	529.604.390	7.671.517.057	94.454.739	7.765.971.796	1.970
Maj 2019. / May, 2019	3.775.163.952	817.617.151	4.592.781.103	116.358.783	4.709.139.886	2.852
April 2019. / April, 2019	6.527.827.401	73.603.893	6.601.431.294	131.165.952	6.732.597.246	3.894
Ukupno 12 meseci / 12-Month Total*	93.170.350.724	5.698.651.112	98.869.001.836	2.344.103.382	101.213.105.218	28.898

*RSD

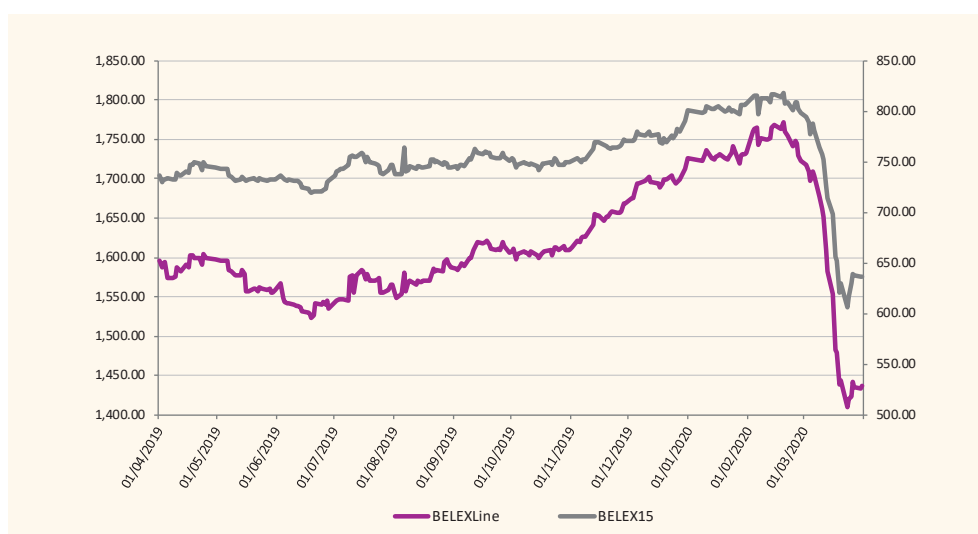
Grafikon / Graph 1: Promet / Turnover



2. INDEKSI / INDICES

		BELEX15	BELEXline
Januar/Mart 2020. January/March 2020	Poslednja vrednost / Last value	636,53	1.436,13
	Promena (abs) / Change (abs)	-165,16	-290,69
	Promena (%) / Change (%)	-20,60%	-16,83%
	Najviša vrednost / Maximum value	818,75	1.771,27
	Najniža vrednost / Minimum value	605,30	1.409,41
	Istorijski max / History maximum value	3.335,2	5.007,34
	Istorijski min / History minimum value	347,46	841,99
	Vrednost prometa / Value of turnover	814.606.792	899.372.935

Grafikon / Graph 2: Indeksi / Indices



**3. TRŽIŠNA KAPITALIZACIJA /
MARKET CAPITALISATION**

	Januar / January	Februar / February	Mart / March
Ukupna tržišna kapitalizacija/ Total market capitalisation	570.118.908	561.639.946	496.571.500
Regulisano tržište/Regulated Market	328.362.432	320.178.810	255.930.694
Listing	245.359.117	235.946.324	183.344.065
Prime Listing – akcije/ Prime Listing – shares	184.107.101	176.738.604	135.575.073
Standard Listing – akcije/ Standard Listing – shares	61.252.016	59.207.720	47.768.992
Open Market	83.003.315	84.232.486	72.586.629
MTP/MTF	241.756.476	241.461.136	240.640.806
BELEX15	257.443.175	249.082.094	195.209.427
BELEXline	305.163.919	294.978.399	234.497.188

*u hiljadama RSD / in RSD thousands

**4. UČEŠĆE STRANIH INVESTITORA /
FOREIGN INVESTORS PARTICIPATION**

	Učešće stranih investitora / Foreign Investors Participation		
Januar/Mart 2020. January/March 2020	FIS	total	29,73%
		b-FIS	11,92%
		s-FIS	47,54%
	FIB		13,92%
	FIT		15,67%



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