

# Istraživanje strukture kapitala građevinskog sektora Republike Srpske

Almir Alihodžić, Ekonomski fakultet, Univerziteta u Zenici  
email: almir.dr2@gmail.com

*Prevod  
obezbedio  
autor*

**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 aktivni (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 aktivni (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 aktivnosti<sup>1</sup> 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-

<sup>1</sup> Ostale aktivnosti uključuju: transport, skladištenje i komunikaciju, finansijsko posredovanje, poslovanje nekretninama, 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:

- $H_0$ : Nulta hipoteza: Model slučajnih efekata je odgovarajući.
- $H_1$ : 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 strukturiran 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 povrti 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)** – Stepenn 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 akcijski 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 akcijski 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 koeficijenata, 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.

Najsignifikantniji 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	$\sqrt{\text{diag}(V_b - V_B)}$ 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

Almir Alihodžić, Faculty of Economics, University of Zenica  
email: almir.dr2@gmail.com

*Translation  
provided by  
the author*

**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 activities<sup>1</sup> 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,

<sup>1</sup> 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]	
TDC	-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 (TDC) (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 <sub>b</sub> -V <sub>B</sub> )) 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)

$$\text{chi2}(7) = (b-B)'[(V_b - V_B)^{-1}](b-B)$$

$$= 0.00$$

$$\text{Prob} > \text{chi2} = 1.0000$$

According to the results of the Hausman test ( $p$ -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.