

Primljeno: 23.03.2022.
Odobreno: 06.05.2022.

DOI: 10.5937/bankarstvo2201100R

UTICAJ INTELEKTUALNOG KAPITALA NA FINANSIJSKE PERFORMANSE: STUDIJA SLUČAJA FINANSIJSKOG SEKTORA SRBIJE

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Rezime:

Iako postoji mnogo radova koji ispituju uticaj intelektualnog kapitala (IK) na performanse finansijskih institucija, gotovo da nema radova koji tretiraju tržišta u razvoju. Prema saznanjima autora, niko u Srbiji nije proučavao efekte IK na finansijske institucije koje posluju u finansijskom sektoru. Ovaj sektor je izuzetno značajan za srpsku privredu, jer je vodeći sektor u kome se najviše iskorišćavaju efekti savremenih informacionih tehnologija i u kome se teži da se novi klijenti privuku nuđenjem inovativnih rešenja i usluga. Stoga je cilj ovog rada da identifikuje i analizira uticaj IK na finansijske performanse, kako bi se odgovorilo da li uticaj IK na finansijske performanse finansijskih institucija koje posluju na tržištima u razvoju ima isti značaj kao uticaj na finansijske institucije koje posluju na razvijenim tržištima, a koje karakteriše visok stepen inovativnosti i IT opreme. Dobijeni rezultati pokazuju da ljudski i angažovani kapital imaju statistički značajan uticaj na finansijske performanse, dok strukturalni kapital nema.

Keywords: Intelektualni kapital; nematerijalna ulaganja; HCE; SCE; CEE; VAIC

JEL klasifikacija: M41, O34, C23

Uvod

U Za razliku od industrijske ere, u informacionoj eri značajno raste vrednost fizički nematerijalnih resursa, a nematerijalna imovina postaje glavni izvor konkurentske prednosti (Ivanović et al. 2021). Ovo je naročito važno za finansijski sektor, koji je usled povećanja konkurencije pod stalnim pritiskom da radi na razvoju novih usluga, finansijskih instrumenata, tehnika, strategija i finansijskog inženjeringa. U ovakvim okolnostima neophodno je da se maksimalno iskoristi ljudski kapital. Međutim, sa druge strane neprestani tehnološki razvoj utiče da na to da su finansijske institucije primorane da budu efikasne u eksploataciji i svojih fizičkih resursa, ali i da koriste svoj imidž i reputaciju i sl. u privlačenju novih klijenata. Kako su ovo elementi intelektualnog kapitala (IK), otuda se nameće potreba da se ispita značaj IK na uspeh poslovanja finansijskih institucija. Kako je ovakva vrsta istraživanja bila retka za srpski finansijski sektor, to je cilj da se ovakvo istraživanje sprovede na primeru finansijskih institucija koje posluju u Republici Srbiji.

Cilj ovog rada je da se identifikuju i analiziraju efekti ključnih komponenti IK na finansijske performanse, kako bi se odgovorilo da li uticaj IK, odnosno njegovi elementi imaju isti uticaj na finansijske performanse finansijskih institucija koje posluju na tržištima u razvoju kao na performanse finansijskih institucija koje posluju na razvijenim tržištima.

Rad je strukturiran na sledeći način. Prvi deo rada je uvodnog karaktera. U drugom delu rada prikazani su rezultati dosadašnjih istraživanja u ovoj oblasti. Treći deo rada posvećen je analizi teorijske osnove za merenje efekata IK na finansijske performanse, gde su prikazani metodologija i uzorak podataka, kao i rezultati originalnog empirijskog istraživanja. Četvrti deo rada je završnog karaktera i u njemu se sumiraju nalazi i izlažu se zaključci ovog istraživanja.

Pregled literature

Različite studije koje se bave finansijskim sektorom ukazuju na to da je uticaj IK od velikog značaja za postizanje finansijskih performansi preduzeća. Mahesh et al. (2012) ispitali su uticaj IK na 40 kompanija sa najvećom tržišnom kapitalizacijom u finansijskom sektoru Australije, u periodu 2006-2008 godine. Njihovi nalazi ukazuju da kod investicionih kompanija, vrednost koeficijenta dodane vrednosti intelektualnog kapitala (VAIC) je veća zbog višeg nivoa efikasnosti ljudskog kapitala (HCE) u poređenju sa bankama i osiguravajućim društvima. U osiguravajućim kompanijama, vrednost VAIC je niža jer su više fokusirane na fizički kapital, a manje na ljudski i strukturni kapital. Prema ovoj studiji, samo efikasnost angažovanog kapitala (CEE) ima značajan i pozitivan uticaj na ROA, dok je uticaj efikasnost strukturalnog kapitala (SCE) beznačajan. Goh (2005) je sproveo istraživanje uticaja efikasnosti IC kod komercijalnih banaka u Maleziji, u periodu od 2001. do 2003.godine. Zaključio je da kreiranje vrednosti zavisi isključivo od HCE. Al-Musalli i Ku Ismail (2014) sproveli su studiju u kojoj su analizirali banke u Saudijskoj Arabiji, u periodu od 2008. do 2010. godine. Prema ovoj studiji, kreiranje vrednosti zavisi, takođe, od HCE, što pozitivno utiče na finansijske performanse. Kaupelite i Kairite (2016) su se, takođe, bavili bankarskim sektorom i analizirali uticaj IK na finansijski učinak 118 banaka (52 male i 66 velikih), u periodu od 2005. do 2014. godine. Autori zaključuju da je IK imao negativan uticaj na finansijske performanse kod velikih banaka nakon finansijske krize, dok je imao negativan uticaj na male banke, pre finansijske krize. Prema ovoj studiji, male banke bi imale veću finansijsku korist od efikasne eksploatacije IK, nego velike banke. Nalazi njihovog istraživanja, takođe, impliciraju da velike banke treba da ulažu u strukturni kapital, dok male banke treba da ulažu u ljudski

kapital. Jafarnežad i Tabari Jadolahzade (2016) sprovedli su studiju, u periodu od 2009 do 2013, na primeru banaka koje su kotirane na berzi u Teheranu. Rezultati njihovog istraživanja su pokazali da je IK pozitivno uticao na finansijske performanse banaka. Takođe, otkrili su da je IK imao najveći uticaj na stopu prinosa na aktivu, prinos na kapital i zaradu po akciji. Meles et al. (2016) istraživali su uticaj IK na finansijske performanse na uzorku od 5749 komercijalnih banaka u Sjedinjenim Američkim Državama, u periodu 2005. do 2012. godine. Efikasnost IK je merena korišćenjem VAIC modela, dok je finansijski učinak meren kroz prinos na aktivu (ROA) i prinos na kapital (ROE). Rezultati pokazuju da HCE pozitivno utiče na oba pokazatelja finansijskog učinka banaka, dok SCE nema značajan uticaj. Autori su zaključili da veće vrednosti VAIC rezultiraju poboljšanim finansijskim performansama banaka. Ozkan i dr. (2017) su posmatrali 44 banke u Turskoj, u periodu od 2005. do 2014. godine. Posmatrajući komponente VAIC, autori zaključuju da CEE i HCE imaju pozitivan uticaj na finansijske performanse banaka, pri čemu CEE ima veći uticaj od HCE. Javed i Jahan (2017) posmatrali su pakistansku berzu (komercijalne banke, mikrofinansijske i investicione banke). Došli su do spoznaje da efikasnost ljudskog kapitala značajno utiče na finansijske performanse mikrofinansijskih i investicionih banaka, dok komercijalne banke poboljšavaju svoje finansijske performanse kroz efikasnu eksploataciju strukturnog kapitala. Tran i Vo (2018) su sprovedli studiju u kojoj su posmatrali banke na Tajlandu u periodu od 1997. do 2016. godine. Rezultati njihovog istraživanja pokazuju da profitabilnost banaka primarno zavisi od efikasnosti upotrebe finansijskog kapitala. Poh et al. (2018) ispitivali su uticaj IK na finansijske performanse lokalnih banaka u Maleziji, u periodu od 2011. do 2016. i od 2007. do 2016. godine. Rezultati regresione analize, koju su sprovedli, ukazuju na to da sve komponente IK imaju uticaj na pokazatelje finansijskog poslovanja banke. Otkrili su da značaj komponenti IK variraju u zavisnosti od perioda posmatranja.

Alipour (2012) je analizirao uticaj IK na performanse 39 osiguravajućih kompanija u Iranu u periodu od 2005 do 2007. godine. Rezultati istraživanja su otkrili da VAIC i njegove komponente imaju značajan pozitivan uticaj na profitabilnost osiguravajućih kompanija. Lu et al. (2014) sprovedli su istraživanje na primeru 34 kineske kompanije za životno osiguranje u periodu od 2006. do 2010. godine. Otkrili su da sve komponente IK utiču na poslovanje osiguravajućih društava, ali da najveći uticaj ima HCE. Hidaia et al. (2016) su u svojoj studiji ispitivali odnos između IK i finansijskih performansi na uzorku od 9 indonežanskih osiguravajućih kompanija, koje su kotirane na berzi. Istraživanje su sprovedli za period od 2009. do 2013. godine. Rezultati njihove analize potvrđuju da postoji pozitivan uticaj IK na finansijske performanse ovih kompanija. Arifa i Ahmar (2016) ispitali su, na uzorku od 10 osiguravajućih kompanija, efekte VAIC i njegovih komponenti na ROA i ROE u Indoneziji za period 2010-2013. godine. Rezultati njihovog istraživanja pokazuju da HCE i CEE pozitivno utiču na ROA i ROE, dok SCE nema značajan uticaj. Nourani et al. (2017) su ispitali uticaj IK na performanse osiguravajućih kompanija u Maleziji i došli do zaključka da IK nema značajan uticaj na finansijske performanse ovih kompanija.

Ono što je zajedničko ovim studijama jeste da ne postoji saglasnost o tome koja komponenta IK ima najveći uticaj na finansijske performanse banaka. Postavlja se pitanje koja je ključna komponenta IK, koja ima najveći uticaj finansijske performanse finansijskih institucija koje posluju u Republici Srbiji.

Metodologija istraživanja i empirijski rezultati

Kao što je već spomenuto u prethodnim delovima rada, glavni cilj jeste da se ispita uticaj VAIC i njegovih komponenti, HCE, SCE i CEE na finansijske performanse institucija koje posluju na tržištima u razvoju. HCE predstavlja koeficijent efikasnosti ljudskog kapitala koji se može definisati kao

kombinovanje ljudskih sposobnosti za rešavanje poslovnih problema. Čine ga četiri komponente: 1) elementi koje svaki zaposleni unosi u radni proces (inteligencija, energija, entuzijazam, iskustvo, veštine, emotivna inteligencija i sl.), 2) sposobnosti učenja (unapređenje, inteligencija i kreativnost), 3) sposobnost delovanja (konverzija podataka i informacija za akciju) i 4) motivacija (podela informacija i znanja i razvoj timskog duha i ciljne orijentacije). SEC je koeficijent strukturalnog kapitala koji se može definisati kao skup nematerijalne imovine i znanja koji proizilaze iz organizacionih procesa u vlasništvu i vlasništvu preduzeća iako zaposleni napuštaju preduzeće. CEE je koeficijent efikasnosti upotrebe angažovanog kapitala koji se može definisati kao uloženi kapital. Matematički ovi koeficijenti se mogu iskazati na sledeći način:

$$VAIC = HCE + SCE + CEE \quad (1)$$

$$HCE = \frac{VA}{HC} \quad (2)$$

$$SCE = \frac{VA - HC}{VA} \quad (3)$$

$$CEE = \frac{VA}{CE} \quad (4)$$

Pri čemu su:

VA	-	Dodata vrednost - zbir operativne dobiti, troškova rada, otpisane vrednosti i amortizacije
HC	-	Plate i druga lična primanja
CE	-	Fizički i finansijski kapital
HEC	-	Efikasnost ljudskog kapitala
SCE	-	Efikasnost strukturnog kapitala
CEE	-	Efikasnost uloženog kapitala

Istraživanje je sprovedeno na primeru finansijskog sektora Republike Srbije. U radu se ispituje uticaj komponenti VAIC na jedan od ključnih indikatora finansijskih performansi finansijskih institucija, a to je ROE. Matematički model se može prikazati na sledeći način, uz napomenu da je reč o linearnom modelu panel podataka:

$$ROE_{i,t} = \alpha_i + \beta X_{i,t} + \varepsilon_{i,t} \quad (5)$$

pri čemu je $ROE_{i,t}$ prinos na kapital i -te jedinice posmatranja u trenutku (t) , $X_{i,t}$ je $1 \times k$ vektor nezavisnih promenljivih (HCE , SCE , CEE), dok je α_i je $k \times 1$ vektor parametara. α_i je vremenski nepromenljiva i specifična za svaku jedinicu posmatranja komponenta, dok $\varepsilon_{i,t}$ predstavlja grešku modela specifičnu za svaku jedinicu posmatranja u periodu t . Imajući u vidu ovakvu specifikaciju modela

(1), za potrebe analize korišćen je metoda Fiksni efekti za ocenu parametara modela (1). Pored glavnih varijabli, u model su uključene i tri kontrolne varijable, što je u skladu sa preovlađujućom literaturom. Kontrolne varijable su: veličina finansijske institucije (VEL), koja predstavlja logaritam iznosa ukupne aktive, starost finansijske institucije (AGE), koja predstavlja prirodni logaritam broja godina od osnivanja kompanije i koeficijent leveridža (LEV).

Upotreba analize panel podataka omogućava kontrolu pristrasnosti, koju generiše potencijalna heterogenost (Radivojević & Jovović, 2017). U radu se koriste izbalansirani panel podaci. Panel se sastoji iz 22 banke, 12 osiguravajućih društava, 6 lizing kompanija i 6 brokerskih društava. Podaci su prikupljeni od HR sektora ovih kompanija, za period od 2011. do 2018. godine.

U tabeli 1 prikazani su rezultati destruktivne statistike za izabrane varijable.

Tabela 1. Rezultati deskriptivne analize izabranih varijabli

Variable	Observ.	Mean	St. Dev.	Min	Max
HCE	368	1.540	2.390	-11.30	18.80
SCE	368	0.614	2.421	-9.610	38.90
CEE	368	0.100	0.513	-3.510	3.400
ROE	368	-0.025	0.411	-2.480	0.325
VEL	368	13.40	2.990	18.20	22.11
AGE	368	2.910	0.448	0.410	3.960
LEV	368	0.544	0.313	0.004	2.981

Izvor: (Autori)

Kao što se može videti iz tabele 1, prosečna vrednost HCE u posmatranom periodu iznosi 1.540, uz izraženu neravnotežu između institucija u pogledu raspona HCE. U posmatranom periodu HCE se kreće od -11.300 do 18.800. Prosečna vrednost HCE je značajno niža u poređenju sa vrednostima ove komponente koju su predstavili Alipur, (2012), Mahesh et al. (2013), Al-Musalli & Ismail (2014), Lu et al. (2014), Ozkan et al. (2017), Javed & Jahan, (2017), Arifa & Ahmar (2016) i Melesu et al. (2016), ali veća od vrednosti HCE, koju su predstavili Tran & Vo (2018). U slučaju SCE prisutan je još veći disparitet. Vrednost ove varijable kreće se od -9.610 do 38.900, dok je prosečna vrednost SCE iznosi 0.614, što je slično rezultatima istraživanja Mahesh et al. (2013), Al-Musalli & Ku Ismail (2014), Ozkan et al. (2017) i Javed & Jahan (2017), ali i veće od zabeleženih vrednosti kod Melesu et al. (2016). Nasuprot ovome, vrednost SCE je niža od vrednosti koje su prijavili Alipur (2012); Arifa & Ahmar (2016) i Tran & Vo (2018). Prosečna vrednost CEE je oko 0.100, a njegova vrednost se kretala od -3.510 do 3.400. Vrednost ovog elementa niža je od one koja je zabeležena u finansijskom sektoru u Australiji (Mahesh et al., 2013), Pakistanu (Javed & Jahan, 2017), Kini (Lu et al. (2014) ili Indoneziji (Arifa & Ahmar, 2016), ali je znatno veća od vrednosti koju je ostvario finansijski sektori u turskoj Turska (Ozkan et al., 2017) ili na Tajlandu (Tran & Vo, 2018).

Vrednost standardnih devijacija za HCE i SCE iznose 2.390, odnosno 2.421, što implicira relativno veliku varijabilnost. S druge strane, vrednost standardne devijacije za CEE od 0.513 ukazuje na relativno nisku varijabilnost u pogledu vrednosti ovog koeficijenta po godinama.

Prosečna vrednost ROE je približno -0.025, što znači da su posmatrane kompanije u posmatranom periodu, u proseku, ostvarile negativne finansijske rezultate. Podaci pokazuju relativno visok disparitet između finansijskih institucija u pogledu ovog indikatora performansi. Njegova vrednost se kretala u rasponu od -2.480 do 0.325. Visoka standardna devijacija ROE može se tumačiti kao posledica velikih oscilacija u finansijskim performansama odabranih institucija. Prosečna vrednost LEV je približno 0.554, što implicira da svoja poslovanja uglavnom finansiraju iz duga. Međutim, visoka vrednost standardne devijacije LEV, takođe ukazuje na velike razlike između kompanija. Vrednost ovog indikatora kreće se od 0.04 do 2.981. To ukazuje na nejednakost u finansijskoj moći izabranih kompanija, što je bilo i očekivano, jer panel čine i velike banke, ali male brokerske kuće. Vrednost varijable VEL je velika jer se u panelu nalaze najveće banke i investicioni fondovi koji posluju u Srbiji. Visoka vrednost standardne devijacije ukazuje na postojanje velikih razlika u finansijskoj snazi između odabranih kompanija. Slično je i sa varijablom AGE. Panel uključuje banke sa dugom tradicijom, ali finansijske institucije koje su relativno nedavno osnovane.

Kako prvi korak u radu sa vremenskim serijama podrazumeva testiranje stacionarnosti panel podataka, to je testirano prisustvo jediničnog korena primenom Choi-meta test. Rezultati testa prikazani u tabeli 2.

Tabela 2. Test jediničnog korena

Varijable	Choi meta test		
	Test	Vrednost	p-value
HCE	Inverse $\chi^2(94)$	171.315	0.000
	Inverse normal test	-3.152	0.001
	Logit test: t(239)	-2.624	0.005
SCE	Inverse $\chi^2(94)$	495.655	0.000
	Inverse normal test	-7.833	0.000
	Logit test: t(239)	-17.072	0.000
CEE	Inverse $\chi^2(94)$	271.896	0.000
	Inverse normal test	-5.749	0.000
	Logit test: t(239)	-7.690	0.000
ROE	Inverse $\chi^2(94)$	374.578	0.000
	Inverse normal test	-5.555	0.000
	Logit test: t(239)	-11.729	0.000
VEL	Inverse $\chi^2(94)$	461.783	0.000
	Inverse normal test	-5.085	0.000
	Logit test: t(239)	-14.359	0.000
AGE	Inverse $\chi^2(94)$	631.784	0.000
	Inverse normal test	-7.688	0.000
	Logit test: t(239)	-22.030	0.000
LEV	Inverse $\chi^2(94)$	626.648	0.000
	Inverse normal test	-10.116	0.000
	Logit test: t(239)	-23.207	0.000

Izvor: (Autori)

Kao što se može videti iz tabele 2, nijedna serija nema problem sa nestacionarnošću. Kako naredni korak u radu sa podacima panela podrazumeva analiza korelacione matrice, to je u sledećem koraku izvršeno. Rezultati su prikazani u tabeli 3.

Tabela 3. Matrica korelacije i VIF koeficijenata

HCE	SCE	CEE	ROE	VEL	AGE	LEV		VIF
1,000	-0,140	0,381	0,461	0,193	0,161	-0,109	HCE	1,701
	1,000	-0,084	-0,202	0,024	0,098	0,162	SCE	1,011
		1,000	0,755	-0,311	-0,225	-0,214	CEE	1,323
			1,000	-0,111	0,172	-0,313	ROE	-
				1,000	0,320	0,711	VEL	1,137
					1,000	0,091	AGE	2,211
						1,000	LEV	1,553

*Napomena: VIF koeficijent izračunat na osnovu procene jednačine (1) korišćenjem OLS metode.
Izvor: (Autori)*

Rezultati prikazani u tabeli 3 ukazuju na to da ne postoji jaka korelacija između bilo koja dva para varijabli. Iz tog razloga nijedna varijabla nije isključena iz daljeg istraživanja. Analiza je dalje sprovedena ispitivanjem prisustva multikolinearnosti. Iako ne postoji jaka korelacija između varijabli, ne veća od 0.8, u radu je urađen test multikolinearnosti. U tu svrhu korišćen je test faktora inflacije varijanse (VIF). Rezultati ovog testa prikazani su u drugom delu tabele 3. Kao što se i moglo očekivati, nema multikolinearnosti između izabranih varijabli.

U tabeli 4 prikazani su rezultati ocene parametara modela (5) dobije primenom metoda Fiksni efekata.

Tabela 4. Ocene parametara modela (5)

	Koeficijent	Std. greška	t-ratio	p-vrednost
konstanta	-1,383	0,243	-5,686	0,0001***
HCE	0,050	0,007	6,930	0,0001***
SCE	-0,004	0,004	-1,028	0,305
CEE	0,659	0,041	16,170	0,0001***
VEL	0,045	0,011	3,935	0,000***
AGE	0,083	0,037	2,265	0,024**
LEV	-0,111	0,057	-1,956	0,051*
LSDV R ² : 0,752			Within R ² : 0,709	
Log-likelihood: 127,986			Akaike kriterijum: -149,972	
Zajednički test izabranih regresora: F(6, 323) = 131,021 (1,98e-083)				
Test različitih odsečaka: F(46, 323) = 3,043 (4,50e-009)				
Hausman-ov test: H = 27,4548 (0,0001)				

*Napomena: *, **, *** odnosi se na nivo poverenja 1%, 5% i 10%.
Veštačke varijable su izostavljene
Izvor: (Autori)*

Budući da veštačka varijabla nije uključena u model, Within R2 je prava pokazatelj validnosti modela. Kako vrednost ovog pokazatelja iznosi oko 0,709, to znači da je oko 71%, varijacija u zavisnoj varijabli objašnjeno korišćenjem u model uključenih nezavisnih varijabli. U prilog dobro specificiranom modelu jeste i p-vrednost zajedničkog testa izabranih regresora, koja je manje od 5%, što znači da beta koeficijenti nisu jednaki nuli, ali imaju uticaj na zavisnu promenljivu. Drugim rečima, to znači da su u modelu odabrane prave varijable. Test za različite odsečke otkriva da finansijske kompanije imaju svoje specifičnosti koje utiču na finansijske performanse, kao što su organizaciona klima i kultura, kvalitet menadžmenta, averzija prema riziku, način upravljanja ljudskim resursima itd. Sve ove karakteristike utiču na rezultate poslovanja izabranih kompanija. Ovo opravdava primenu FE modela. Takođe, Hausmanov test opravdava primenu ovog procenitelja. Rezultati FE ukazuju da su HCE i CEE značajne varijable, ali nije pronađena statistički značajna veza između SCE i ROE. Drugim rečima, rezultati pokazuju da postoji pozitivna i značajna korelacija između HCE i CEE i ROE. Zapravo, rezultati impliciraju da će za svaki porast u efikasnosti upotrebe ljudskog kapitala od 1% uticati na povećanje ROE za oko 0,05%, dok će svako povećanje u CIE od 1% dovesti do povećanja finansijskog učinka odabranih kompanija za oko 0,66%. Ovi nalazi su u skladu sa istraživanjima koja su sprovedi Arifa & Ahmar (2016), Jafarnezhad & Iadollahzade (2016), Meles et al. (2016); Ozkan et al. (2017), Tran & Vo (2018), Poh et al. (2018).

Veličina kompanije ima značajan i pozitivan uticaj na ROE, što znači da se finansijske performanse ovih institucija poboljšavaju sa povećanjem njihove veličine, izražene kroz vrednost ukupne aktive. Ovakav nalaz je i očekivan kada se ima u vidu odnos između profitabilnosti i veličine, iskazane kroz vrednost aktive, finansijskih institucija koje posluju u Republici Srbiji. Rezultati ukazuju da starost ovih kompanija ima značajan uticaj na njihove finansijske performanse. Rezultati ukazuju ne negativan uticaj leveridža na finansijske performanse poslovanja ovih institucija. Međutim, ovaj nalaz u suprotnosti je sa teorijskim postulatima finansijskog leveridža, prema kojima svako povećanje duga će dovesti do povećanja stope prinosa na sopstveni kapital. Stoga prilikom, tumačenja ovog nalaza treba biti oprezan i uzeti u obzir strukturu panel podataka.

Imajući u vidu da je starost preduzeća značajna komponenta, postavlja se pitanje da li se specifičnosti preduzeća tokom vremena menjaju. FE ocenjivač je koristan kada svaka kompanija ima jedinstvene karakteristike koje su skrivene i konstantne tokom vremena (tzv. neopažena vremenski invarijantna heterogenost). Međutim, da bi se ispitalo da li jedinstvene karakteristike finansijskih institucija variraju tokom vremena, u jednačinu (5) uključene su vremenske lažne varijable. Otuda, model (5) postaje:

$$ROE_{i,t} = \alpha_{i,t} + \beta X_{i,t} + \varepsilon_{i,t} \quad (6)$$

Rezultati ocene parametara modela (6), takođe dobijene primenom FE ocenjivača su prikazane u tabeli 5.

Tabela 5. *Ocene parametara modela (6)*

	Koeficijent	Std. greška	t-ratio	p-vrednost
konstanta	-1,449	0,244	-5,931	0,0001***
HCE	0,048	0,007	6,648	0,0001***
SCE	-0,004	0,004	-0,977	0,329
CEE	0,661	0,041	16,300	0,0001***
VEL	0,045	0,011	3,985	0,000***
AGE	0,088	0,037	2,411	0,016**
LEV	-0,126	0,057	-2,219	0,027**
dt2	0,037	0,038	0,959	0,338
dt3	0,093	0,038	2,446	0,015**
dt4	0,075	0,038	1,958	0,051*
dt5	0,105	0,038	2,759	0,006***
dt6	0,042	0,038	1,093	0,275
dt7	0,033	0,038	0,854	0,394
dt8	0,037	0,035	0,979	0,328
LSDV R ² : 0,760			Within R ² : 0,72	
Log-likelihood: 134,940			Akaike kriterijum: -149,828	
Zajednički test izabranih regresora: F(6, 316) = 128,802 (8,3e-083)				
Test različitih odsečaka: F(46, 316) = 3,37 (5,27e-009)				
Wald-ov test: χ^2 (7) = 11,862 (0,105)				

Izvor: (Autori)

Rezultati potvrđuju gore navedene nalaze i ukazuju da nema vremenskog efekta. Ovo ukazuje na validnost izabranog ocenjivača i potvrđuje početnu pretpostavku u vezi vremenski nepromenljivih efekata. Da bi se dobile robusne procene i potvrdili nalazi, model (5) je procenjen metodom lažnih promenljivih najmanjih kvadrata (LSDV). Rezultati ovog ocenjivača dati su u prilogu i takođe potvrđuju prethodno iznete nalaze.

Zaključak

U ovom radu se ispituje uticaj IK, odnosno njenih ključnih komponenti, u skladu sa VAIC modelom, na performanse finansijskih institucija koje posluju u Republici Srbiji, kako bi se odgovorilo na pitanje da li IK i njegove komponente imaju isti uticaj i značaj na performanse ovih institucija, kao kod finansijskih institucija koje posluju na razvijenim tržištima, koja imaju visok stepen inovativnosti, kreativnosti i primene savremenih IT.

U radu je korišćena analiza panel podataka. Za ocenu parametara modela korišćena FE metoda. Da bi se dobile robusne procene, korišćen je LSDV ocenjivač panel podataka. Rezultati ukazuju da su HCE i CEE značajne varijable, ali nije pronađeno da postoji statistički značajna veza između SCE i ROE. Drugim rečima, rezultati pokazuju da postoji pozitivna i značajna korelacija između HCE i CIE i ROE. Zapravo, rezultati govore da će za svaki porast HCE od 1% stopa ROE porasti za oko 0,05%, dok će svako povećanje u CIE od 1% dovesti do povećanja finansijskih performansi odabranih kompanija za oko 0.66%. Ovi nalazi su u skladu sa istraživanjima koja su sprovedi Arifa & Ahmar (2016), Jafarnezhad & Iadollahzade (2016), Meles et al. (2016), Ozkan i dr. (2017), Tran & Vo (2018), Poh et al. (2018).

Rezultati istraživanja otkrivaju da veličina finansijskih institucija ima značajan i pozitivan uticaj na ROA, što znači da se finansijske performanse mogu poboljšati povećanjem veličine kompanija, iskazane kroz vrednost ukupne aktive. To je razumljivo kada se uzme u obzir odnos između profitabilnosti i veličine finansijskih institucija, iskazanih kroz vrednost ukupne aktive, koje posluju u Republici Srbiji. Starost je takođe varijabla koja značajno utiče na finansijske performanse. Imajući u vidu strukturu panel podataka, nalaz vezan za uticaj leveridža na finansijske performanse zahteva dublju analizu.

Literatura

1. Agostini L., Nosella, A., Filippini, R. (2017). Does intellectual capital allow improving innovation performance? A quantitative analysis in the SME context. *Journal of Intellectual Capital* 18(2), 400-418.
2. Alipour, M. (2012). The effect of intellectual capital on firm performance: an investigation of Iran insurance companies. *Measuring Business Excellence* 16(1), 53-66.
3. Al-Musalli M.A., Ku Ismail N.I. (2014). Intellectual capital and its effect on financial performance of banks: evidence from Saudi Arabia. *Procedia e Social and Behavioral Sciences* 164, 201-207.
4. Arifa P.A., Ahmar N. (2016). The effect of intellectual capital on the financial performance of insurance companies listed on the Indonesia Stock Exchange (ISE). *The Indonesian Accounting Review* 6(1), 45-54.
5. Chan K.H. (2009). Impact of intellectual capital on organisational performance: An empirical study of companies in the Hang Seng Index (Part 1 & 2). *The Learning Organization* 16(1), 4-21.
6. Choong K.K. (2008). Intellectual capital: definitions, categorization and reporting models", *Journal of Intellectual Capital* (9)4, 609-638.
7. Cardoza K., Basara, J. Cooper, L., Conroy R. (2006). The power of intangible assets: an analysis of the S&P 500. *Les Nouvelles*.
8. Chu K.W.S., Chan H.K., Wu, W.W.Y. (2011). Charting intellectual capital performance of the gateway to China", *Journal of Intellectual Capital* 12(2), 249-276.
9. Goh P.C. (2005). Intellectual capital performance of commercial banks in Malaysia. *Journal of Intellectual Capital* 6(3), 385-396.

10. Hidayat C., Putong I., Puspokusumo, R. (2016). The Interrelationship between Intellectual Capital and Financial Performance: A Case Study of Indonesian Insurance Companies. *Pertanika Journal of Social Sciences & Humanities* 24, 83-97.
11. Ivanovic T., Maksimovic G., Mandaric, M., Radivojevic, N., Jovic, M. (2021). The impact of intellectual capital on the financial performance of agricultural enterprises: evidence from the West Balkans Counties. *Custos e @gronegocio on line* 17(2), 350-376.
12. Javed, I., Jahan, Z. (2017). Corporate Governance, Intellectual Capital and Financial Performance of Banks listed in Pakistan Stock Exchange. *Pakistan Administrative Review* 1(3), 175-196.
13. Jafarnezhad M., Tabari Y. (2016). The Effect of Intellectual Capital on Financial Performance: Evidence from Iranian Banks Listed in Tehran's Stock Exchange. *International Journal of Management, Accounting and Economics* 3(1), 1-14.
14. Kaupelytė, D. and Kairytė, K. (2016). Intellectual capital efficiency impact on european small and large listed banks financial performance. *International Journal of Management, Accounting and Economics* 3(6), 367-377.
15. Khalique M., Bontis N., Abdul, J., Abu, S., Isa, H. (2015). Intellectual capital in small and medium enterprises in Pakistan. *Journal of Intellectual Capital* 16(1) 224-238.
16. Lu W.M., Wang W.K, Kweh, Q. L. (2014). Intellectual capital and performance in the Chinese life insurance industry. *Omega* 42(1), 65-74.
17. Mahesh J., Daryll C., Jasvinder, S., Monika, K. (2013). Intellectual capital and financial performance: an evaluation of the Australian financial sector. *Journal of Intellectual Capital* 14(13), 266-285.
18. Meles A., Porzio C., Sampagnaro, G., Verdoliva, V. (2016). The impact of the Intellectual Capital Efficiency on Commercial Banks Performance: Evidence from the US. *Journal of Multinational Financial Management* 36, 64-74.
19. Mohamed, I.A.H. (2017). Methods of measuring intellectual capital and the efficiency of investment it: advantages and disadvantages. *Analytical comparative study. Imperial journal of Interdisciplinary research* 3(2), 1083-1092.
20. Nourani M., Chandran V., Kweh, Q. L., Lu, W.M. (2017). Measuring Human, Physical and Structural Capital Efficiency Performance of Insurance Companies. *Social Indicators Research* 137(1), 281-315.
21. Ozkan N., Cakan, S., Kayacan M. (2017). Intellectual capital and financial performance: A study of the Turkish Banking Sector. *Borsa Istanbul Review* 17(3), 190-198.
22. Osinski M., Selig M.P., Matos, F., Roman D.J. (2017). Methods of evaluation of intangible assets and intellectual capital. *Journal of Intellectual Capital* 18(3), 470-485.
23. Pasher, E., Ronen T. (2011). *The Complete Guide to Knowledge Management-A Strategic Plan to Leverage Your Company's Intellectual Capital*. John Wiley & Sons, Inc., Hoboken, New Jersey.
24. Pulic A. (1998). Measuring the performance of intellectual potential in knowledge economy". In 2nd McMaster World Congress on Measuring and Managing Intellectual Capital by the Austrian Team for Intellectual Potential.
25. Radivojevic N., Jovovic, J. (2017). Examining of determinants of non-performing loans. *Prague Economic Paper* 26(3). 300-316.

26. Sidharta I., Affandi, A. (2016). The Empirical Study on Intellectual Capital Approach toward Financial Performance on Rural Banking Sectors in Indonesia. *International Journal of Economics and Financial Issues* 6(3), 1247-1253.
27. Sullivan P.H. (2000). *Value-Driven Intellectual Capital: How to Convert Intangible Corporate Assets into Market Value*, Wiley, New York.
28. Poh T.L., Adem K., Siti Nur Iqmal, I. (2018). On intellectual capital and financial performances of banks in Malaysia. *Cogent Economics & Finance* 6(1), 1-15.
29. Teo S., Reed, K.K., Ly, K. (2014). Human resource involvement in developing intellectual capital", *The Service Industries Journal* 34(15), 1219-1233.
30. Tran D.B. Vo, D.H. (2018). Should bankers be concerned with Intellectual capital? A study of the Thai banking sector. *Journal of Intellectual Capital* 19(5), 897-914.
31. Yanga J., Brashear, T., Asare, A. (2015). The value relevance of brand equity, intellectual capital and intellectual capital management capability. *Journal of Strategic Marketing* 23(6), 543-559.

Appendix

Tabela 1A. *Ocene parametara modela (1) dobijene primenom LSDV ocenjivača*

	Koeficijent	Std. greška	t-ratio	p-vrednost
konstanta	-1.604	0.285	-5.633	<0.0001
HCE	0.050	0.007	6.930	<0.0001
SCE	-0.004	0.004	-1.028	0.305
CEE	0.659	0.041	16.170	<0.0001
VEL	0.045	0.011	3.935	0.000
AGE	0.083	0.037	2.265	0.024
LEV	-0.111	0.057	-1.956	0.051
du_1	0.134	0.135	0.990	0.323
du_2	0.481	0.124	3.865	0.000
du_3	0.471	0.126	3.746	0.000
du_4	0.404	0.126	3.209	0.002
du_5	0.530	0.127	4.156	<0.0001
du_6	0.359	0.109	3.294	0.001
du_7	0.467	0.121	3.868	0.000
du_8	0.172	0.122	1.409	0.160
du_9	0.133	0.106	1.256	0.210

du_10	0.081	0.103	0.790	0.430
du_11	0.279	0.107	2.615	0.009
du_12	0.307	0.107	2.877	0.004
du_13	0.221	0.106	2.090	0.037
du_14	0.303	0.109	2.793	0.006
du_15	0.353	0.107	3.300	0.001
du_16	0.497	0.131	3.784	0.000
du_17	0.299	0.130	2.303	0.022
du_18	0.451	0.128	3.524	0.001
du_19	0.291	0.110	2.657	0.008
du_20	0.203	0.104	1.955	0.052
du_21	0.194	0.108	1.798	0.073
du_22	-0.225	0.098	-2.301	0.022
du_23	-0.041	0.102	-0.4000	0.689
du_24	0.121	0.099	1.220	0.223
du_25	0.349	0.112	3.125	0.002
du_26	-0.005	0.104	-0.050	0.960
du_27	0.227	0.103	2.218	0.027
du_28	0.371	0.108	3.431	0.001
du_29	0.154	0.097	1.579	0.115
du_30	0.032	0.096	0.336	0.737
du_31	0.062	0.098	0.629	0.530
du_32	0.148	0.096	1.544	0.124
du_33	0.135	0.096	1.414	0.158
du_34	0.175	0.098	1.791	0.074
du_35	0.171	0.099	1.719	0.087
du_36	0.232	0.102	2.264	0.024
du_37	0.220	0.102	2.159	0.032
du_38	0.238	0.100	2.375	0.018
du_39	0.282	0.100	2.827	0.005
du_40	0.222	0.099	2.236	0.026
du_41	0.165	0.096	1.717	0.087
du_42	0.133	0.102	1.301	0.194
du_43	0.179	0.101	1.773	0.077
du_44	0.169	0.099	1.695	0.091
du_45	0.166	0.100	1.670	0.096
du_46	0.081	0.096	0.840	0.401
R ² :0.752				

Izvor: (Autori)

Received: 23.03.2022
Approved: 06.05.2022

DOI: 10.5937/bankarstvo2201100R

THE IMPACT OF INTELLECTUAL CAPITAL ON FINANCIAL PERFORMANCE – CASE STUDY: THE SERBIAN FINANCIAL SECTOR

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Abstract:

Although there are many papers that examine the impact of intellectual capital on the performance of financial institutions, there are almost no papers that deal with developing markets. According to the author's knowledge, no one in Serbia has studied the effects of IC on financial institutions operating in the financial sector. This sector is extremely important for the Serbian economy since it is the leading sector in which the effects of modern information technologies are the most exploited and in which competitiveness is pursued by attracting new clients, by offering innovative solutions and services. Hence, the aim of this paper is to identify and analyze the IC's impact on financial performance in order to answer whether the impact of IC on the financial performance of financial institutions operating in developing markets has the same importance as the impact on financial institutions operating on developed markets, characterized by a high degree of innovation and IT equipment. The obtained results show that human and engaged capital have a statistically significant impact on financial performance, while structural capital does not.

Keywords: Intellectual capital; Intangible assets; HCE; SCE; CEE; VAIC; financial performance; financial sector; Serbia.

JEL classification: M41, O34, C23

Introduction

Unlike the industrial era, the value of physically intangible resources is growing significantly in the information age, and intangible assets are becoming the main source of competitive advantage (Ivanović et al. 2021). This is particularly important for the financial sector, which is under constant pressure to work on the development of new services, financial instruments, techniques, strategies, and financial engineering due to increased competition. In such circumstances, it is necessary to make the most of human capital. However, on the other hand, the constant technological development influences the fact that financial institutions are forced to be efficient in the exploitation of their physical resources, but also to use their image and reputation and the like, in attracting new customers. As these are elements of Intellectual Capital (IC), there is a need to examine the importance of IC on the business success of financial institutions. As this type of research was rare for the Serbian financial sector, the goal is to conduct this kind of research on the example of financial institutions operating in the Republic of Serbia.

The aim of this paper is to identify and analyze the effects of key components of IC on financial performance, to answer whether the impact of IC or elements of IC have the same impact on the financial performance of financial institutions operating in emerging markets as on the performance of financial institutions in developed markets.

The paper is structured as follows. The first part of the paper is of introductory character. The second part of the paper presents the results of previous research in this field. The third part of the paper is devoted to the analysis of the theoretical basis for measuring the effects of IC on financial performances, where the methodology and data sample, as well as the results of the original empirical research, are presented. The fourth part of the paper is a summary, as it summarizes the findings and outlines the conclusions of this study.

Literature Review

Different studies dealing with the financial sector are indicative of the fact that the impact of IC is of great importance for achieving the financial performance of the company. Mahesh et al. (2012) examined the impact of IC on 40 companies with the largest market capitalization in the financial sector of Australia in the period 2006-2008. With investment companies, the VAIC value is higher due to the higher level of human capital efficiency (HCE) in comparison with banks and insurance companies. In insurance companies, the VAIC (Value Added Intellectual Coefficient) value is lower because they are more focused on physical capital rather than on human and structural ones. According to this study, only the efficiency of employed capital (CEE) has a significant and positive impact on ROA, while the impact of SCE is insignificant. Goh (2005) conducted a study of the impact of IC efficiency in commercial banks in Malaysia, in the period from 2001 to 2003. He concluded that value creation depends exclusively on HCE. Al-Musalli and Ku Ismail (2014) conducted a study in which they analyzed banks in Saudi Arabia in the period 2008-2010. According to this study, also, value creation depends on HCE which positively affects financial performance. Kaupelytė and Kairytė (2016) also dealt with the banking sector and analyzed the impact of IC on the financial performance of 118 banks (52 small and 66 large) in the period from 2005 to 2014. The authors conclude that IC had a negative impact on the financial performance of large banks after the financial crisis, while it had a negative impact on small banks before the financial crisis. According to this study, small banks would

have a greater financial benefit from IC than large banks. The findings of their research also imply that large banks should invest in structural capital, while small banks should invest in human capital. Jafarnezhad and Tabari Yadollahzade (2016) conducted a study in the period from 2009 to 2013 at the Stock Exchange in Tehran observing banks. The results showed that the intellectual capital had a positive effect on the financial performance of banks listed on Tehran Stock Exchange. They also found that IC had the greatest impact on the rate of return on assets, return on equity and earnings per share. Meles et al. (2016) investigated the impact of IC on financial performance on a sample of 5749 commercial banks in the United States in the period from 2005 to 2012. The IC efficiency was measured using the VAIC model, while financial performance was measured through return on assets (ROA) and return on equity (ROE). The results show that HCE has a positive effect on both financial performance indicators, while the SCE does not have a significant impact. The authors concluded that higher VAIC values result in improved financial performance of banks. Ozkan et al. (2017) had observed 44 banks in Turkey in the period from 2005 to 2014. By observing VAIC components, the authors conclude that CEE and HCE have a positive impact on the financial performance of banks, with CEE having a greater impact than HCE. Javed and Jahan (2017) observed the Pakistan Stock Exchange (commercial banks, microfinance and investment banks). They came to the realization that human capital efficiency significantly effects financial performance in Microfinance and investment banks, whereas commercial banks improve their financial performance through structural capital efficiency. Tran and Vo (2018) did a study where they observed banks in Thailand between 1997 and 2016. The results show that bank profitability is driven mainly by capital employed efficiency to make a profit. Poh et al. (2018) examined the impact of IC on the financial performance of local banks in Malaysia in the period from 2011 to 2016 and from 2007 to 2016. The results of the regression analysis they conducted indicate that all components of the IC have an impact on the bank's financial performance indicators. They found that the importance of IC components on bank performance varies depending on the observation period.

Alipour (2012) analyzed the impact of IC on the performance of 39 insurance companies in Iran in the period 2005-2007. years. The results of the research revealed that VAIC and its components have a significant positive impact on the profitability of insurance companies. Lu et al. (2014) conducted a study on the example of 34 Chinese life insurance companies in the period 2006-2010. years. They found that all components of IC affect the business of insurance companies, but that HCE has the greatest impact. Hidaïat et al. (2016) in their study examined the relationship between IC and financial performance on a sample of 9 listed Indonesian insurance companies. The research was conducted for the period from 2009 to 2013. The results of their analysis confirm that there is a positive impact of IC on the financial performance of these companies. Arifa and Ahmar (2016) examined on a sample of 10 insurance companies, the effects of VAIC and its components on ROA and ROE in Indonesia for the period 2010-2013. years. The results of their research show that HCE and CEE have a positive effect on ROA and ROE, while SCE has no significant impact. Nourani et al. (2017) examined the impact of IC on the performance of insurance companies in Malaysia and concluded that IC does not have a significant impact on the financial performance of these companies.

What these studies have in common is that there is no agreement on which component of IC has the greatest impact on banks' financial performance. The question is which is the key component of IC, which has the greatest impact on the financial performance of financial institutions operating in the Republic of Serbia.

Methodology Research and the Empirical Results

As mentioned in previous sections, the main objective is to examine the impact of VAIC and its components, HCE, SCE and CEE, on the financial performance of institutions operating in emerging markets. HCE is a human capital coefficient that can be defined as a combination of human capabilities to solve business problems. It consists of four components: 1) elements that each employee brings to the work process (intelligence, energy, enthusiasm, experience, skills, emotional intelligence, etc.), 2) learning abilities (improvement, intelligence, and creativity), 3) ability to act (conversion of data and information for action) and 4) motivation (sharing of information and knowledge and development of team spirit and goal orientation). SEC is a structural capital ratio that can be defined as a set of intangible assets and knowledge arising from organizational processes owned and owned by an enterprise even though employees leave the enterprise. CEE is the coefficient of efficiency of the use of engaged capital, which can be defined as invested capital. Mathematically, these coefficients can be expressed as follows:

$$VAIC = HCE + SCE + CEE \quad (1)$$

$$HCE = \frac{VA}{HC} \quad (2)$$

$$SCE = \frac{VA - HC}{VA} \quad (3)$$

$$CEE = \frac{VA}{CE} \quad (4)$$

Where:

VA = Value added - sum of operating profit, labor costs, written off value and depreciation

HC = Plate and other personal income

CE = Physical and financial capital

HEC = Human capital efficiency

SCE = Efficiency of structural capital

CEE = Efficiency of employed capital

The research was conducted on the example of the financial sector of the Republic of Serbia. The key components of VAIC are HCE, SCE and CEE. Their impact on one of key indicator of financial performances of financial institutions, ROE, have been studies, which mathematically may be expressed by following the linear model for panel data:

$$ROE_{i,t} = \alpha_i + \beta X_{i,t} + \varepsilon_{i,t} \quad (5)$$

Where $_{ROE_i,t}$ is the observation on the dependent variable for cross-sectional unit i in period t , X_{it} is a $1 \times k$ vector of independent variables (HCE, SCE, CEE) observed for unit i in period t , β is a $k \times 1$ vector of parameters. The α_i is a unit-specific and time-invariant component and $\epsilon_{i,t}$ an observation specific error to unit i in period t . The α_i are then treated as fixed parameters (in effect, unit-specific y-intercepts). For this reason, the model is estimated by static panel data estimator. Precisely, the Fixed effects estimator was used. In addition to these major variables, three control variables are included in our model, which is in line with the prevailing literature. Control variables are: the size of financial institution (VEL), which represents logarithm of amount of total assets, the age of financial institution (AGE), which represents the natural logarithm of the number of years since the company was founded and Leverage ratio (LEV).

Using panel data techniques enables the control of the bias generated by potential heterogeneity (Radivojevic, Jovovic, 2017). In the paper authors used balanced panel data consists of 22 banks, 10 insurance companies, 2 investment funds, 6 leasing companies and 7 brokerage companies. The data was collected from HR department of these companies, for period from 2011 to 2018 years.

A summary of the descriptive statistics of collected data given in Table 1

Table 1. *Descriptive Statistics of Collected Data*

Variable	Observ.	Mean	St. Dev.	Min	Max
HCE	368	1.540	2.390	-11.30	18.80
SCE	368	0.614	2.421	-9.610	38.90
CEE	368	0.100	0.513	-3.510	3.400
ROE	368	-0.025	0.411	-2.480	0.325
VEL	368	13.40	2.990	18.20	22.11
AGE	368	2.910	0.448	0.410	3.960
LEV	368	0.544	0.313	0.004	2.981

Source: (Authors)

As can be seen from Table 1, the average HCE value in the observed period is 1.540, with a pronounced imbalance between the company in terms of height HCE, in the range from -11.30 to 18.80. The obtained value of HCE is significantly lower in comparison with the values of this component reached by Mahesh et al. (2013), Al-Musalli & Ismail (2014), Ozkan et al. (2017), Javed & Jahan, (2017), Alipour, (2012), Arifa & Ahmar (2016) and similar to Meles et al. (2016), Lu et al. (2014), and higher than the value of HCE in Tran & Vo (2018). In the case of SCE, an even higher disparity is present, ranging from -9.61 to 38.90, while the average value is 0.614, which is similar to the results of the research carried out by Mahesh et al. (2013); Al-Musalli & Ku Ismail (2014), Ozkan et al. (2017), Javed & Jahan (2017), and greater than the recorded values in Meles et al. (2016), Lu et al. (2014). In contrast, value of SCE is lower than values reported by Tran & Vo (2018), Alipour (2012), Arifa & Ahmar (2016). The average value of the CEE was 0.100, and the value of this coefficient ranged from -3.510 to 3.400. CEE of the Serbian financial sector is lagging behind the value achieved by financial sector in Australia (Mahesh et al., 2013); Pakistan (Javed & Jahan, 2017), China (Lu et al. (2014), Indonesia (Arifa & Ahmar, 2016), but it is significantly higher than the value achieved by the financial sectors in Turkey, Turkey (Ozkan et al., 2017) or Thailand (Tran & Vo, 2018).

The value of standard deviations for HCE and SCE is 2.390, or 2.421, respectively, which implies relatively high variability in the amount of these components over the observed eight-year period. On the other hand, the value of standard deviation for CEE of 0.513 indicates relatively low variability in terms of the value of this coefficient by years.

The average value of the ROE is -0.025 approximately, which means that these companies gather recorded negative financial results in the observed period. However, the ROE illustrates a relatively high disparity between financial institutions, taking value ranging from -2.480 to 0.325. High standard deviation of dependent variable can be interpreted as consequence of great oscillations in financial performances of the selected companies. The average value of the LEV is 0.554 approximately, which means that companies mainly finance their operations from debt. However, the high value of standard deviation of the LEV, also points to large differences between companies. The value of this indicator ranges from 0.04 to 2.981. This points to the inequity in the financial power of companies, which was expected, because the panel consists as well as large banks, but small brokerage houses. The value of the VEL variable is large because the panel contains the largest banks and investment funds which operating in Serbia. A high value of standard deviation indicates the existence of large differences in the financial strength between selected companies. It is similar to the variable AGE. The panel includes banks with a long tradition, but financial institutions that are relatively recently founded.

First step in deals with time series is check the panel stationary by using a unit root test for stationary. For that purpose, in the paper, were used the Choi meta-tests. The results of the test shown in table 2.

Table 2. Panel Unit Root Test

Variable	Choi meta-tests		
	Test	Score	p-value
HCE	Inverse $\chi^2(94)$	171.315	0.000
	Inverse normal test	-3.152	0.001
	Logit test: t(239)	-2.624	0.005
SCE	Inverse $\chi^2(94)$	495.655	0.000
	Inverse normal test	-7.833	0.000
	Logit test: t(239)	-17.072	0.000
CEE	Inverse $\chi^2(94)$	271.896	0.000
	Inverse normal test	-5.749	0.000
	Logit test: t(239)	-7.690	0.000
ROE	Inverse $\chi^2(94)$	374.578	0.000
	Inverse normal test	-5.555	0.000
	Logit test: t(239)	-11.729	0.000
VEL	Inverse $\chi^2(94)$	461.783	0.000
	Inverse normal test	-5.085	0.000
	Logit test: t(239)	-14.359	0.000
AGE	Inverse $\chi^2(94)$	631.784	0.000
	Inverse normal test	-7.688	0.000
	Logit test: t(239)	-22.030	0.000
LEV	Inverse $\chi^2(94)$	626.648	0.000
	Inverse normal test	-10.116	0.000
	Logit test: t(239)	-23.207	0.000

Source: (Authors)

As it can be seen from table 2, None of the series has a problem with non-stationarity. The next step in dealing with panel data is analysing the correlation matrix, which is given in table 3.

Table 3. *The Correlation Matrix and VIF Coefficients*

HCE	SCE	CEE	ROE	VEL	AGE	LEV		VIF
1.000	-0.140	0.381	0.461	0.193	0.161	-0.109	HCE	1.701
	1.000	-0.084	-0.202	0.024	0.098	0.162	SCE	1.011
		1.000	0.755	-0.311	-0.225	-0.214	CEE	1.323
			1.000	-0.111	0.172	0.313	ROE	-
				1.000	0.320	0.711	VEL	1.137
					1.000	0.091	AGE	2.211
						1.000	LEV	1.553

*Note: VIF coefficient calculated based on estimation of equation (1) using by OLS method.
 Source: (Authors)*

The results are shown in Table 3 point out that there is no strong correlation between any two pairs of variables. For this reason, no variable is excluded from further research. The analysis was further carried out by examining the presence of multicollinearity. Although there is no strong correlation between variables, not more than 0.8, a multicollinearity test was performed in the paper. For this purpose, the Variance Inflation Factors test was used. The results of this test are shown in the second part of Table 3. As could be expected, there is no multicollinearity between the variables.

The results of the Fixed effects estimator are presented in Table 4.

Table 4. *The Estimates of model (5) parameters*

	Coefficient	Std. Error	t-ratio	p-value
const	-1.383	0.243	-5.686	0.0001***
HCE	0.050	0.007	6.930	0.0001***
SCE	-0.004	0.004	-1.028	0.305
CEE	0.659	0.041	16.170	0.0001***
VEL	0.045	0.011	3.935	0.000***
AGE	0.083	0.037	2.265	0.024**
LEV	0.111	0.057	-1.956	0.051*
LSDV R-squared: 0.752			Within R-squared: 0.709	
Log-likelihood: 127.986			Akaike criterion: -149.972	
Joint test on named regressors: F(6, 323) = 131.021 (1.98e-083)				
Test for differing group intercepts: F(46, 323) = 3.043 (4.50e-009)				
Hausman test statistic: H = 27.4548 (0.0001)				

*Note: *, **, *** indicate significance on 1%, 5% and 10% respectively. Dummies for unite effects are omitted.*

Source: (Authors)

Since no dummy variable for unit is included in the model, Within R-squared is a real R-squared measure. Value of the Within R-squared is 71% approximately. It means that about 71% the variation of dependent variable may explain using by independent variables in the regression model. The p-value of Joint test on named regressors is less than 5%, which means that the beta coefficients are not equal to zero, but they have an impact on the dependent variable. In other words, this means that the right variables are selected in the model. Test for differing group intercepts reveals that financial companies have their own specificities that affect to financial performances, such as organizational climate and culture, management still, risk aversion, way of HR management etc. All these features affect the results. This justifies the application of the FE model. Also, the Hausman test justifies the application of this estimator. The results of the FE estimator point out that HCE and CEE are significant variables, but we did not find a statistically significant relationship between SCE and ROE. Other words, the results show to exist a positive and significant correlation between HCE and CEE and ROE. Actually, results imply that for every 1% increase of HCE, the ROE rate will rise approximately by 0.05%, while any increase in the CEE of 1% will lead to increase of the financial performance of the selected companies by about 0.66%. These findings are in line with research were conducted by Arifa & Ahmar (2016), Jafarnezhad & Yadollahzade (2016), Meles et al. (2016), Ozkan et al. (2017), Tran & Vo (2018); Poh et al. (2018).

The size of the company has a significant and positive impact on ROA, which means that financial performance is enhanced by increasing the size of a firm, measured through total assets. This is understandable when we take into account the relationship between profitability and the size of the assets of financial institutions operating in Serbia. Age of companies have significant effects on financial performance. The results indicate a negative impact of leverage on the financial performance of these institutions. However, this finding contradicts the theoretical postulates of financial leverage, according to which any increase in debt will lead to an increase in the rate of return on equity. Therefore, when interpreting this finding should be careful and take into account the structure of the panel data.

Bearing in mind that the age of the company is a significant component, the question arises as to whether the company's specificities vary over time. The FE estimator is useful when each company has unique characteristics that are both unmeasurable and constant over time (also known by the sounding phrase, 'unobserved time-invariant heterogeneity'). However, in order to examine whether the unique characteristics of the units vary over time, equation (5) is included in the time dummy variables. The model becomes:

$$ROE_{i,t} = \alpha_{i,t} + \beta X_{i,t} + \varepsilon_{i,t} \quad (6)$$

The model (6), also, was estimated by the FE estimator. The results are given in Table 5.

Table 5. *Estimates of Model (6) Parameters*

	Coefficient	Std. Error	t-ratio	p-value
const	-1.449	0.244	-5.931	0.0001***
HCE	0.048	0.007	6.648	0.0001***
SCE	-0.004	0.004	-0.977	0.329
CEE	0.661	0.041	16.300	0.0001***
VEL	0.045	0.011	3.985	0.000***
AGE	0.088	0.037	2.411	0.016**
LEV	0.126	0.057	-2.219	0.027**
dt2	0.037	0.038	0.959	0.338
dt3	0.093	0.038	2.446	0.015**
dt4	0.075	0.038	1.958	0.051*
dt5	0.105	0.038	2.759	0.006***
dt6	0.042	0.038	1.093	0.275
dt7	0.033	0.038	0.854	0.394
dt8	0.037	0.035	0.979	0.328
LSDV R-squared: 0.760			Within R-squared: 0.72	
Log-likelihood: 134.940			Akaike criterion: -149.828	
Joint test on named regressors: F(6, 316) = 128.802 (8.3e-083)				
Test for differing group intercepts: F(46, 316) = 3.37 (5.27e-009)				
Wald joint test on time dummies: χ^2 (7) = 11.862 (0.105)				

Source: (Authors)

The results confirm the above findings and indicate that there is no time effect. This indicates the severity of the selected assessor and confirms the initial assumption of time-invariant effects. In order to obtain robust estimates and confirm the findings, the model (5) was estimated by the Least Squares Dummy Variables method. The results of this appraisers were given appendix. The results confirm the above findings.

Conclusion

In this paper, we examined the impact of IC, i.e., its key components, (in accordance with the VAIC model) on the performance of financial institutions operating in Serbia in order to answer whether the IC and its key components have the same influence and importance on the performance of these institutions, as financial institutions operating in developed markets that have a high degree of innovation, creativity and the application of modern IT.

The analysis of the panel data was used in the paper, while the FE method was used to evaluate the model. In order to obtain robust estimates, we used the LSDV estimator. The results point out that HCE and CEE are significant variables, but we did not find a statistically significant relationship between SCE and ROE. Other words, the results show to exist a positive and significant correlation between HCE and CEE and ROE. Actually, results imply that for every 1% increase of HCE, the ROE rate will rise approximately by 0.05%, while any increase in the CEE of 1% will lead to increase of the financial performance of the selected companies by about 0.66%. These findings are in line with research conducted by Arifa & Ahmar (2016), Jafarnezhad & Yadollahzade (2016), Meles et al. (2016), Ozkan et al. (2017), Tran & Vo (2018) i Poh et al. (2018).

The size of the company has a significant and positive impact on ROA, which means that financial performance is enhanced by increasing the size of a firm, measured through total assets. This is understandable when we take into account the relationship between profitability and the size of the assets of financial institutions operating in Serbia. Age of companies have significantly affected financial performance. Given the structure of panel data, the finding related to the impact of leverage on financial performance requires deeper analysis.

References

1. Agostini L., Nosella, A., Filippini, R. (2017). Does intellectual capital allow improving innovation performance? A quantitative analysis in the SME context. *Journal of Intellectual Capital* 18(2), 400-418.
2. Alipour, M. (2012). The effect of intellectual capital on firm performance: an investigation of Iran insurance companies. *Measuring Business Excellence* 16(1), 53-66.
3. Al-Musalli M.A., Ku Ismail N.I. (2014). Intellectual capital and its effect on financial performance of banks: evidence from Saudi Arabia. *Procedia e Social and Behavioral Sciences* 164, 201-207.
4. Arifa P.A., Ahmar N. (2016). The effect of intellectual capital on the financial performance of insurance companies listed on the Indonesia Stock Exchange (ISE). *The Indonesian Accounting Review* 6(1), 45-54.
5. Chan K.H. (2009). Impact of intellectual capital on organisational performance: An empirical study of companies in the Hang Seng Index (Part 1 & 2). *The Learning Organization* 16(1), 4-21.
6. Choong K.K. (2008). Intellectual capital: definitions, categorization and reporting models", *Journal of Intellectual Capital* (9)4, 609-638.
7. Cardoza K., Basara, J. Cooper, L., Conroy R. (2006). The power of intangible assets: an analysis of the S&P 500. *Les Nouvelles*.
8. Chu K.W.S., Chan H.K., Wu, W.W.Y. (2011). Charting intellectual capital performance of the gateway to China", *Journal of Intellectual Capital* 12(2), 249-276.
9. Goh P.C. (2005). Intellectual capital performance of commercial banks in Malaysia. *Journal of Intellectual Capital* 6(3), 385-396.
10. Hidayat C., Putong I., Puspokusumo, R. (2016). The Interrelationship between Intellectual Capital and Financial Performance: A Case Study of Indonesian Insurance Companies. *Pertanika Journal of Social Sciences & Humanities* 24, 83-97.

11. Ivanovic T., Maksimovic G., Mandaric, M., Radivojevic, N., Jovic, M. (2021). The impact of intellectual capital on the financial performance of agricultural enterprises: evidence from the West Balkans Counties. *Custos e @gronegócio on line* 17(2), 350-376.
12. Javed, I., Jahan, Z. (2017). Corporate Governance, Intellectual Capital and Financial Performance of Banks listed in Pakistan Stock Exchange. *Pakistan Administrative Review* 1(3), 175-196.
13. Jafarnezhad M., Tabari Y. (2016). The Effect of Intellectual Capital on Financial Performance: Evidence from Iranian Banks Listed in Tehran's Stock Exchange. *International Journal of Management, Accounting and Economics* 3(1), 1-14.
14. Kaupelytė, D. and Kairytė, K. (2016). Intellectual capital efficiency impact on european small and large listed banks financial performance. *International Journal of Management, Accounting and Economics* 3(6), 367-377.
15. Khalique M., Bontis N., Abdul, J., Abu, S., Isa, H. (2015). Intellectual capital in small and medium enterprises in Pakistan. *Journal of Intellectual Capital* 16(1) 224-238.
16. Lu W.M., Wang W.K, Kweh, Q. L. (2014). Intellectual capital and performance in the Chinese life insurance industry. *Omega* 42(1), 65-74.
17. Mahesh J., Daryll C., Jasvinder, S., Monika, K. (2013). Intellectual capital and financial performance: an evaluation of the Australian financial sector. *Journal of Intellectual Capital* 14(13), 266-285.
18. Meles A., Porzio C., Sampagnaro, G., Verdoliva, V. (2016). The impact of the Intellectual Capital Efficiency on Commercial Banks Performance: Evidence from the US. *Journal of Multinational Financial Management* 36, 64-74.
19. Mohamed, I.A.H. (2017). Methods of measuring intellectual capital and the efficiency of investment it: advantages and disadvantages. *Analytical comparative study. Imperial journal of Interdisciplinary research* 3(2), 1083-1092.
20. Nourani M., Chandran V., Kweh, Q. L., Lu, W.M. (2017). Measuring Human, Physical and Structural Capital Efficiency Performance of Insurance Companies. *Social Indicators Research* 137(1), 281-315.
21. Ozkan N., Cakan, S., Kayacan M. (2017). Intellectual capital and financial performance: A study of the Turkish Banking Sector. *Borsa Istanbul Review* 17(3), 190-198.
22. Osinski M., Selig M.P., Matos, F., Roman D.J. (2017). Methods of evaluation of intangible assets and intellectual capital. *Journal of Intellectual Capital* 18(3), 470-485.
23. Pasher, E., Ronen T. (2011). *The Complete Guide to Knowledge Management-A Strategic Plan to Leverage Your Company's Intellectual Capital*. John Wiley & Sons, Inc., Hoboken, New Jersey.
24. Pulic A. (1998). Measuring the performance of intellectual potential in knowledge economy". In 2nd McMaster World Congress on Measuring and Managing Intellectual Capital by the Austrian Team for Intellectual Potential.
25. Radivojevic N., Jovovic, J. (2017). Examining of determinants of non-performing loans. *Prague Economic Paper* 26(3). 300-316.
26. Sidharta I., Affandi, A. (2016). The Empirical Study on Intellectual Capital Approach toward Financial Performance on Rural Banking Sectors in Indonesia. *International Journal of Economics and Financial Issues* 6(3), 1247-1253.
27. Sullivan P.H. (2000). *Value-Driven Intellectual Capital: How to Convert Intangible Corporate Assets into Market Value*, Wiley, New York.

28. Poh T.L., Adem K., Siti Nur Iqmal, I. (2018). On intellectual capital and financial performances of banks in Malaysia. *Cogent Economics & Finance* 6(1), 1-15.
29. Teo S., Reed, K.K., Ly, K. (2014). Human resource involvement in developing intellectual capital", *The Service Industries Journal* 34(15), 1219-1233.
30. Tran D.B. Vo, D.H. (2018). Should bankers be concerned with Intellectual capital? A study of the Thai banking sector. *Journal of Intellectual Capital* 19(5), 897-914.
31. Yanga J., Brashear, T., Asare, A. (2015). The value relevance of brand equity, intellectual capital and intellectual capital management capability. *Journal of Strategic Marketing* 23(6), 543-559.

Appendix

Table 1A. *The Estimates of model (5) parameters using LSDV*

	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>	
const	-1.604	0.285	-5.633	<0.0001	***
HCE	0.050	0.007	6.930	<0.0001	***
SCE	-0.004	0.004	-1.028	0.305	
CEE	0.659	0.041	16.170	<0.0001	***
VEL	0.045	0.011	3.935	0.000	***
AGE	0.083	0.037	2.265	0.024	**
LEV	0.111	0.057	-1.956	0.051	*
du_1	0.134	0.135	0.990	0.323	
du_2	0.481	0.124	3.865	0.000	***
du_3	0.471	0.126	3.746	0.000	***
du_4	0.404	0.126	3.209	0.002	***
du_5	0.530	0.127	4.156	<0.0001	***
du_6	0.359	0.109	3.294	0.001	***
du_7	0.467	0.121	3.868	0.000	***
du_8	0.172	0.122	1.409	0.160	
du_9	0.133	0.106	1.256	0.210	
du_10	0.081	0.103	0.790	0.430	
du_11	0.279	0.107	2.615	0.009	***
du_12	0.307	0.107	2.877	0.004	***
du_13	0.221	0.106	2.090	0.037	**
du_14	0.303	0.109	2.793	0.006	***

du_15	0.353	0.107	3.300	0.001	***
du_16	0.497	0.131	3.784	0.000	***
du_17	0.299	0.130	2.303	0.022	**
du_18	0.451	0.128	3.524	0.001	***
du_19	0.291	0.110	2.657	0.008	***
du_20	0.203	0.104	1.955	0.052	*
du_21	0.194	0.108	1.798	0.073	*
du_22	-0.225	0.098	-2.301	0.022	**
du_23	-0.041	0.102	-0.4000	0.689	
du_24	0.121	0.099	1.220	0.223	
du_25	0.349	0.112	3.125	0.002	***
du_26	-0.005	0.104	-0.050	0.960	
du_27	0.227	0.103	2.218	0.027	**
du_28	0.371	0.108	3.431	0.001	***
du_29	0.154	0.097	1.579	0.115	
du_30	0.032	0.096	0.336	0.737	
du_31	0.062	0.098	0.629	0.530	
du_32	0.148	0.096	1.544	0.124	
du_33	0.135	0.096	1.414	0.158	
du_34	0.175	0.098	1.791	0.074	*
du_35	0.171	0.099	1.719	0.087	*
du_36	0.232	0.102	2.264	0.024	**
du_37	0.220	0.102	2.159	0.032	**
du_38	0.238	0.100	2.375	0.018	**
du_39	0.282	0.100	2.827	0.005	***
du_40	0.222	0.099	2.236	0.026	**
du_41	0.165	0.096	1.717	0.087	*
du_42	0.133	0.102	1.301	0.194	
du_43	0.179	0.101	1.773	0.077	*
du_44	0.169	0.099	1.695	0.091	*
du_45	0.166	0.100	1.670	0.096	*
du_46	0.081	0.096	0.840	0.401	
R-squared		0.752	Adjusted R-squared		0.712

Source: (Autors)