

Primljeno: 22.07.2021.
Odobreno: 01.02.2022.

DOI: 10.5937/bankarstvo2104036R

KOMPARATIVNA ANALIZA UTICAJA VELIČINE BILANSNE SUME NA POSLOVANJE BANAKA U REPUBLICI SRBIJI U PERIODU PRE I TOKOM PANDEMIJE COVID-19

Dr Željko Račić, Visoka poslovna škola strukovnih studija
u N. Sadu, profesor strukovnih studija
email: raciczeljko@gmail.com

Dr Branka Paunović, Visoka poslovna škola strukovnih studija
u N. Sadu, profesor
email: brankapaunovic1711@gmail.com

Rezime

Cilj rada je da analizira uticaj veličine banaka koje posluju u Republici Srbiji na osnovne pokazatelje njihovog poslovanja i da oceni da li je pandemija Covid-19 promenila prirodu i intenzitet tog uticaja. Istraživanje je izvršeno na reprezentativnom uzorku od dvadeset i tri domaće banke. Zaključci rada su bazirani na rezultatima primene statičkih panel regresionih modela i odnose se na vremenski period od drugog kvartala 2014. godine do trećeg kvartala 2021. godine. Na osnovu rezultata istraživanja se može zaključiti da su tokom pandemije veće banke smanjile nivo kreditne aktivnosti i povećale nivo likvidnosti u odnosu na manje banke. To nije uticalo na njihovu profitabilnost, što znači da veće banke, kao i u periodu pre pandemije, ostvaruju više stope prinosa na kapital u odnosu na svoje manje konkurente. Takođe, istraživanje je rezultiralo ocenom da su tokom pandemije veće banke smanjile udeo kapitala u bilansnoj sumi u odnosu na manje banke, ali ne u meri koja ugrožava stabilnost bankarskog sektora.

Ključne reči: bankarski sektor Republike Srbije; veličina bilansne sume banaka; likvidnost banaka; profitabilnost banaka; kreditna aktivnost banaka; solventnost banaka; koncentracija bankarskog sektora; pandemija Covid-19; statički panel regresioni modeli

JEL klasifikacija: G21, M41, C33, C65

Uvod

Osnovna uloga banaka je da obezbede privredni rast i razvoj posredstvom brzog i efikasnog protoka novčanih sredstava između suficitarnih i deficitarnih transaktora na tržištu. Stoga je stabilnost bankarskog sektora u svim zemljama u konstantnom fokusu regulatora. Jedan od najvažnijih i najbolje regulisanih segmenata bankarskog poslovanja je održavanje nivoa konkurencije na bankarskom tržištu, koji se meri Herfindahl–Hirschman indeksom (u daljem tekstu HHI indeks). U poslednjih nekoliko godina u bankarskom sektoru Srbije je primetan trend smanjenja broja banaka, kao i raslojavanje u smislu dominacije najvećih pet banaka u odnosu na ostatak sektora (Filipović i saradnici, 2016).

Primarni cilj rada je da oceni da li varijacije u visini bilansnih suma banaka koje posluju u Republici Srbiji (u daljem tekstu banke) utiču na njihovu likvidnost, kreditnu aktivnost, profitabilnost i nivo kapitala (solventnost). Takođe, cilj rada je da oceni da li je tokom pandemije Covid-19 (u daljem tekstu pandemija) došlo do promene prirode i intenziteta tog uticaja u odnosu na period pre proglašenja pandemije. Analiza i izvedeni zaključci rada su bazirani na primeni statičkih panel regresionih modela. Zaključci rada se odnose na vremenski period između drugog kvartala 2014. godine i trećeg kvartala 2021. godine.

Nakon uvodnog dela i pregleda literature koja analizira uticaj veličine banaka na različite aspekte poslovanja, dat je kratak osvrt na odnos veličine banaka i koncentracije na domaćem bankarskom tržištu. U nastavku rada je prikazana metodologija koja je korišćena u istraživanju, kao i karakteristike uzorka na osnovu kog je istraživanje sprovedeno. U poslednjem delu rada je izvršena analiza dobijenih ocena regresionih koeficijenata, na osnovu kojih su izvedeni prikazani zaključci rada.

Pregled literature

Uticaj veličine banaka na različite aspekte njihovog poslovanja, predmet je mnogih istraživanja širom sveta. Na osnovu sumiranja i analize njihovih rezultata, stiče se opšti utisak da veće banke posluju stabilnije i da pružaju doprinos sveopštem razvoju tržišta na kojima posluju (Adusei, 2015). Razlog za to pretežno leži u činjenici da veće banke imaju mogućnost da u većoj meri koriste ekonomiju obima i ekonomiju okvira (Bikker i saradnici, 2006). Međutim, svest o tome da nestabilnost banaka može da ugrozi sigurnost svakog finansijskog sistema (Kamani, 2021), često dovodi do toga da su velike banke protežirane od strane države. Zaštita velikih banaka od bankrotstva od strane države, poznatija je kao „too big to fail“ koncept, čija primena često dovodi do tzv. agencijskog problema i rasta njihove izloženosti različitim oblicima rizika (Virginie, 2015), (Račić, 2013b).

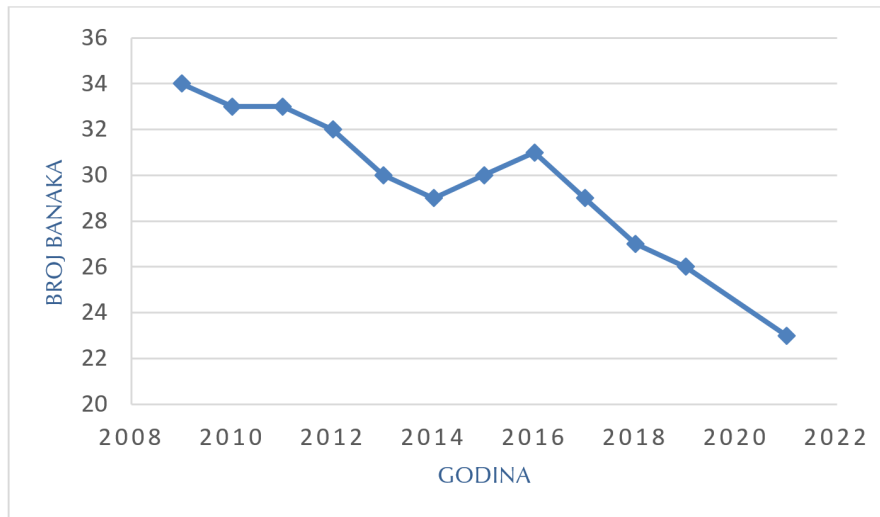
U zavisnosti od geografskog područja i vremenskog intervala obuhvaćenog istraživanjem, variraju i ocene uticaja veličine banaka na njihove poslovne pokazatelje. Tako veličina bilansne sume u većini slučajeva determiniše njihovu likvidnost (Virginie, 2015), s tim što veće banke pretežno drže manje novčanih sredstava, oslanjajući se na sekundarne rezerve likvidnosti (Račić, 2018). Što se tiče uticaja veličine banaka na profitabilnost, većina istraživanja ocenjuje da rast bilansne sume podstiče profitabilnost (Ozcan i saradnici, 2018). Međutim, postoje i ona koja ocenjuju da na tržištima nerazvijenih zemalja i zemalja u razvoju ne postoji statistički značajna veza između veličine i profitabilnosti banaka (Al-Harbi, 2019), kao i ona koja zaključuju da rast bilansne sume utiče na smanjenje pokazatelja profitabilnosti (Muzammil & Siddiqui, 2020). Pored toga, treba istaći i to da nekolicina istraživanja pronalazi negativnu vezu između veličine banaka i stope adekvatnosti kapitala (Račić, 2018).

S obzirom da se rad bavi uticajem pandemije na poslovanje banaka, važno je ukazati na činjenicu da malobrojna istraživanja na ovu temu svedoče da pandemija značajno determiniše različite aspekte njihovog poslovanja i da intenzitet tog uticaja zavisi od faktora kao što su fokus banaka na implementaciju strategije vođstva u troškovima (Vasić, 2020a), stepen digitalizacije poslovanja (Vasić, 2020b), struktura finansijskog tržišta u smislu institucionalnog okruženja i važećeg regulatornog okvira, zatim nivo razvijenosti tržišta dužničkih hartija od vrednosti, kao i odgovor javnog zdravstvenog sistema na pojavu pandemije (Colak & Öztekin, 2021).

Odnos veličine banaka i koncentracije u bankarskom sektoru Republike Srbije

U periodu nakon 2000. godine, značajan broj stranih banaka je proširio poslovanje na finansijsko tržište Republike Srbije. Međutim, uticaj veličine samog tržišta i činjenica da se tranzicija domaće privrede odvija sporije u odnosu na prvobitna očekivanja, rezultiraju postepenim smanjenjem broja banaka na tržištu (Stojmenović, 2021). Na grafikonu 1 je dat prikaz kretanja broja banaka na tržištu Republike Srbije.

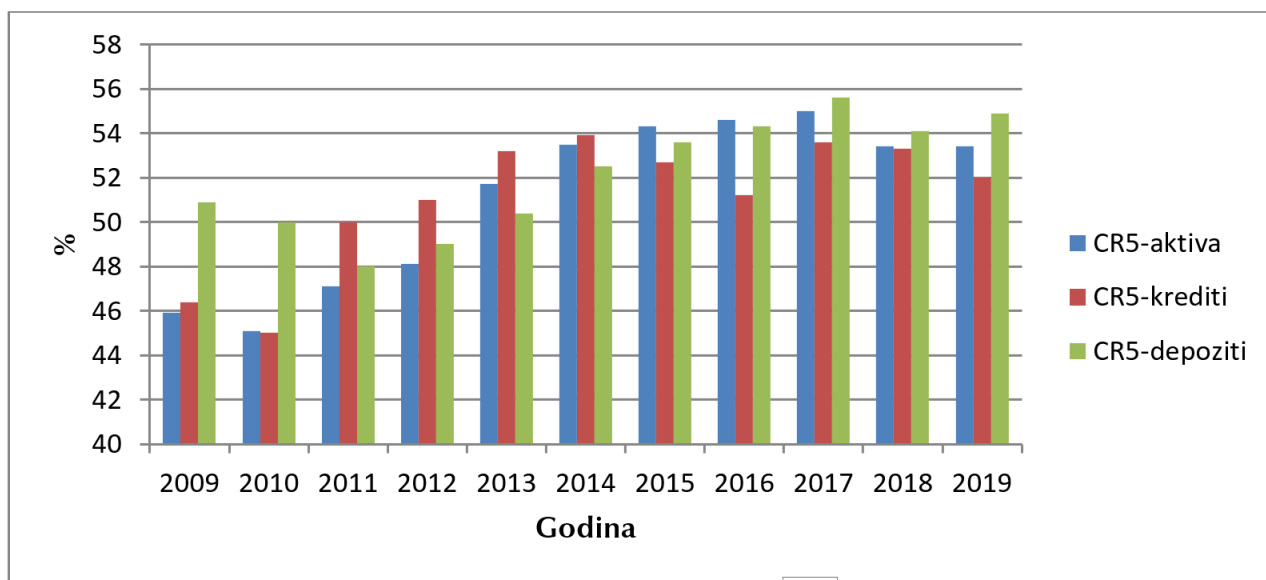
Grafikon 1: Kretanje broja banaka na tržištu Republike Srbije



Izvor: Prikaz autora na osnovu podataka Narodne banke Srbije (www.nbs.rs)

Trenutno na domaćem tržištu posluju dvadeset i tri banke, što ukazuje na visok nivo razvijenosti konkurencije. Tome u prilog ide i konstantno niska vrednost HHI indeksa aktive, koja je na kraju 2019. god. iznosila 840. Međutim, potencijalnu pretnju stabilnosti i daljem razvoju konkurencije na domaćem bankarskom tržištu predstavljaju visoke vrednosti pokazatelja koncentracije pet najvećih banaka (u daljem tekstu CR5 indeks), koje ukazuju na to da pet najvećih banaka u Srbiji zauzima preko 50% udela u ukupnoj aktivi, depozitima i kreditnim plasmanima (Stojmenović, 2021). Kretanje vrednosti CR5 indeksa na domaćem bankarskom tržištu, prikazano je na grafikonu 2.

Grafikon 2: Kretanje CR5 indeksa aktive, kredita i depozita



Izvor: Prikaz autora na osnovu podataka Narodne banke Srbije (www.nbs.rs)

Imajući u vidu činjenicu da na bankarskom tržištu u Srbiji, kao i u regionu, postoji jasan trend smanjenja broja banaka i njihovog raslojavanja prema kriterijumu veličine (Jović, 2006), želja autora je bila da se ispita priroda i intenzitet uticaja veličine bilansne sume na osnovne pokazatelje bankarskog poslovanja, sa posebnim osvrtom na uticaj pandemije na to pitanje.

Uzorak i metodologija istraživanja

Uzorak koji je korišćen u istraživanju uticaja veličine banaka na njihovo poslovanje u periodu pre početka pandemije obuhvata dvadeset i tri banke, koje su na kraju trećeg kvartala 2019. godine poslovale na domaćem tržištu. Sa druge strane, uzorak obuhvaćen istraživanjem istog uticaja tokom trajanja pandemije, obuhvata dvadeset i jednu banku koja je u Republici Srbiji poslovala krajem trećeg kvartala 2021. godine. Razlika u broju banaka u uzorku je posledica bankarskih akvizicija tokom perioda istraživanja (Société Générale banka je pripojena OTP banci, dok je MTS banka pripojena Banci Poštanska štedionica). Oba segmenta uzorka su reprezentativna, jer obuhvataju preko 90% ukupne aktive domaćeg bankarskog sektora. Banke obuhvaćene istraživanjem prikazane su u tabeli 1.

Istraživanje je bazirano na analizi podataka iz kvartalnih bilansa banaka. Panel regresionom analizom je obuhvaćeno ukupno šesto dvadeset osam opservacija, koje pokrivaju vremenski period od drugog kvartala 2014. godine do trećeg kvartala 2021. godine.

Tabela 1: *Uzorak banaka obuhvaćen istraživanjem*

R.br.	Naziv banaka
1.	API Bank a.d. Beograd
2.	Addiko Bank a.d. Beograd
3.	AIK banka a.d. Beograd
4.	Banca Intesa a.d. Beograd
5.	Banka Poštanska štedionica a.d. Beograd
6.	Crédit Agricole banka Srbija a.d. Novi Sad
7.	Direktna banka a.d. Kragujevac
8.	Erste Bank a.d. Novi Sad
9.	Eurobank a.d. Beograd
10.	Expobank a.d. Beograd
11.	Halkbank a.d. Beograd
12.	JUBMES (Alta) banka
13.	Komercijalna banka a.d. Beograd
14.	MTS banka (pripojena Banci Poštanska štedionica)
15.	NLB banka a.d. Beograd
16.	Opportunity banka a.d. Novi Sad
17.	ProCredit Bank a.d. Beograd
18.	Raiffeisen banka a.d. Beograd
19.	Sberbank Srbija a.d. Beograd
20.	Société Générale banka a.d. Beograd (pripojena OTP banci)
21.	Srpska banka a.d. Beograd
22.	Telenor banka a.d. Beograd
23.	Unicredit Bank a.d. Beograd

Izvor: Prikaz autora (www.nbs.rs)

Istraživanje je bazirano na primeni sledećih statičkih panel modela: Pooled effects model, Fixed Effects model i Random Effects model. Primena panel modela u empirijskim istraživanjima pruža mnogobrojne prednosti, kao što su veća informativnost, koja je rezultat povećanja uzorka i broja stepena slobode. Veći varijabilitet podataka doprinosi većoj efikasnosti ocena regresionih koeficijenata i smanjenju multikolinearnosti u modelu. Pored toga, važno je istaći da panel modeli analiziraju varijacije podataka po dve dimenzije: po jedinicama posmatranja i po vremenskoj dimenziji, dajući na taj način mogućnost analize strukture podataka, kao i promena u strukturi podataka tokom vremena (Račić, 2013a). Izbor statičkog panel modela koji daje najpreciznije ocene posmatranih međuzavisnosti, izvršen je na bazi rezultata odgovarajućih testova: F-test, Breusch- Pagan Test, Hausman Test (Račić i saradnici, 2014).

U radu su analizirani sledeći regresioni modeli:

$$l_{ij} = \beta_0 + \beta_1 vel_{ij} + \varepsilon_{ij} \quad (1)$$

$$kred_{ij} = \beta_0 + \beta_1 vel_{ij} + \varepsilon_{ij} \quad (2)$$

$$roe_{ij} = \beta_0 + \beta_1 vel_{ij} + \varepsilon_{ij} \quad (3)$$

$$cap_{ij} = \beta_0 + \beta_1 vel_{ij} + \varepsilon_{ij} \quad (4)$$

gde je,

$vel_{i,j}$ - prirodni logaritam bilansnih suma banke i u vremenskom trenutku j ,

$\Pi_{i,j}$ - količnik likvidne aktive i ukupne aktive banke i u vremenskom trenutku j ,

$kred_{i,j}$ - udeo kreditnih plasmana u bilansnoj sumi banke i u vremenskom trenutku j ,

$roe_{i,j}$ - količnik neto dobiti i kapitala banke i u vremenskom trenutku j ,

$cap_{i,j}$ - udeo kapitala u bilansnoj sumi banke i u vremenskom trenutku j ,

ϵ_{ij} - standardna greška modela.

Tabela 2: Prosečne vrednosti nezavisnih varijabli modela u periodu pre/posle početka pandemije

Varijabla	Prosečna vrednost	Promena
li	0,15/0,16	rast
roe	0,01/0,03	rast
kred	0,61/0,64	rast
cap	0,20/0,17	pad

Izvor: Proračun autora

Analiza kretanja prosečnih vrednosti pokazatelja likvidnosti, solventnosti, kreditne aktivnosti i profitabilnosti, kao nezavisnih varijabli regresionih modela, pokazala je da je domaći bankarski sektor u periodu pre proglašenja pandemije bio stabilan. Prosečan udeo likvidnih sredstava u aktivi za banke iz uzorka iznosio je 15%, dok je prosečan udeo kapitala u bilansnoj sumi za banke iz uzorka bio 20%. Pored toga, prosečan udeo kredita od 61% u aktivi svedoči o tome da su banke bile pretežno orijentisane na tradicionalnu kreditno-depozitnu aktivnost, što takođe ide u prilog stabilnosti, posebno u uslovima većih ekonomskih kriza. Prosečna vrednost prinosa na kapital je iznosila 1,2%, što znači da je domaći bankarski sektor profitabilan. Prosečne vrednosti analiziranih pokazatelja poslovanja banaka u periodu pandemije, pokazuju da je došlo do neznatnog povećanja likvidnosti, kreditne aktivnosti i profitabilnosti banaka, dok je njihova solventnost neznatno smanjena. To znači da pandemija suštinski nije ugrozila stabilnost bankarskog sektora Srbije.

Analiza rezultata istraživanja

Primena statičkih panel modela rezultirala je ocenama regresionih koeficijenata čija je analiza predmet ovog dela rada. S obzirom na činjenicu da su posebno analizirani periodi pre i tokom pandemije, primenom T- testa (2 tails) je izvršena procena postojanja statistički značajnih promena vrednosti analiziranih pokazatelja u periodima pre i nakon proglašenja pandemije. Analiza dobijenih rezultata predstavljena je u delu rada koji sledi.

U tabeli 3 su prikazane dobijene ocene regresionih koeficijenata, koje opisuju uticaj veličine banaka na njihovu likvidnost. Primenom regresionih modela i odgovarajućih testova za odabir najrelevantnijeg

modela i procenu ispunjenosti standardnih pretpostavki modela, zaključeno je da uticaj veličine banaka na likvidnost najbolje opisuje Fixed effects model.

Tabela 3: Rezultati primene statičkih panel modela: uticaj veličine na likvidnost banaka

	Pooled (OLS) model		Fixed effects model		Random effects model	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
vel	-0,01***	0,002	-0,04***	0,012	-0,018****	0,004
_cons	0,334***	0,030	0,942***	0,212	0,484***	0,072
Koeficijent determinacije	R2 = 0,07 (adjust)		R2 = 0,073 (within)		R2 = 0,024 (within)	
Izbor modela	Hausman test: Prob>chi2= 0,0001 => FE model najrelevantniji					
Otklanjanje heteroskedastičnosti i Autokorelacije	-		Robust. Std.Err.		-	
Rezultati u periodu pandemije						
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
vel	-0,001	0,003	0,088***	0,027	-0,004	0,007
_cons	0,182***	0,058	-1,462***	0,5	0,082	0,132
Koeficijent determinacije	R2 = -0,005 (adjust)		R2 = 0,0671 (within)		R2 = 0,0671 (within)	
Izbor modela	Hausman test: Prob>chi2= 0,0014 => FE model najrelevantniji					
Otklanjanje heteroskedastičnosti i autokorelacije	-		-		-	

*P-vrednosti: * signifikantnost 10%, ** signifikantnost 5%, *** signifikantnost 1%*

Izvor: Prikaz autora- STATA 13

Rezultat T-testa ($p=0,000$) ukazuje na to da je u periodu pandemije došlo do statistički značajnih promena u nivou likvidnosti banaka u odnosu na period pre pandemije. Rezultati panel analize idu u prilog oceni da su pre pandemije veće banke u bilansu držale manje likvidnih sredstava, što se tokom pandemije promenilo. Pandemija je dakle uticala na to da veće banke povećaju nivo likvidnosti u odnosu na banke sa nižim nivoima bilansne sume. Na osnovu vrednosti koeficijenta determinacije ($R^2 = 0,0671$), može da se izvede zaključak da varijacije bilansnih suma banaka determinišu njihovu likvidnost u procentu od 6,7%, dok 93,3% varijacija likvidnosti determinišu drugi faktori, koji nisu obuhvaćeni istraživanjem.

U tabeli 4 su prikazane ocene regresionih koeficijenata, koje opisuju uticaj veličine banaka na njihovu profitabilnost. Primenom identičnih modela i testova kao u prethodnom slučaju, zaključeno je da uticaj veličine na profitabilnost banaka u periodu pre pandemije najbolje opisuje Fixed effects model, dok je u slučaju analize podataka iz perioda pandemije to Random effects model.

Tabela 4: Rezultati primene panel modela: uticaj veličine na profitabilnost banaka

	Pooled (OLS) model		Fixed effects model		Random effects model	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
vel	-0,01***	0,002	-0,04***	0,012	-0,018****	0,004
_cons	0,334***	0,030	0,942***	0,212	0,484***	0,072
Koeficijent determinacije	R2 = 0,07 (adjust)		R2 = 0,073 (within)		R2 = 0,024 (within)	
Izbor modela	Hausman test: Prob>chi2= 0,0001 => FE model najrelevantniji					
Otklanjanje heteroskedastičnosti i Autokorelacije	-		Robust. Std.Err.		-	
Rezultati u periodu pandemije						
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
vel	-0,001	0,003	0,088***	0,027	-0,004	0,007
_cons	0,182***	0,058	-1,462***	0,5	0,082	0,132
Koeficijent determinacije	R2 = -0,005 (adjust)		R2 = 0,0671 (within)		R2 = 0,0671 (within)	
Izbor modela	Hausman test: Prob>chi2= 0,0014 => FE model najrelevantniji					
Otklanjanje heteroskedastičnosti i autokorelacije	-		-		-	

*P-vrednosti: * signifikantnost 10%, ** signifikantnost 5%, *** signifikantnost 1%*
Izvor: Prikaz autora- STATA 13

Rezultat T-testa ($p=0,03$) ide u prilog oceni da je u periodu pandemije došlo do statistički značajnih promena u nivou profitabilnosti banaka u odnosu na period pre pandemije. Vrednosti koeficijenta determinacije ukazuju na to da je pre pandemije profitabilnost banaka bila određena varijacijama bilansne sume u procentu od 5,9%, dok je u periodu pandemije taj uticaj pao na svega 0,05%. Drugim rečima, od početka pandemije profitabilnost banaka nije određena njihovom veličinom u meri u kojoj je to bio slučaj pre pandemije. Ocene regresionih koeficijenata u periodu pre (0,112) i tokom pandemije (0,024) svedoče da su u oba perioda veće banke profitabilnije u odnosu na manje banke, uz napomenu da je uticaj veličine na profitabilnost u periodu pandemije oslabio.

U tabeli 5 su prikazane dobijene ocene regresionih koeficijenata, koje opisuju uticaj veličine banaka na kreditnu aktivnost. Model koji najbolje opisuje ovu međuzavisnost u oba analizirana perioda je Fixed effects model.

Tabela 5: Rezultati primene panel modela: uticaj veličine na kreditnu aktivnost banaka

KRED	Pooled (OLS) model		Fixed effects model		Random effects model	
	Coef.	Std. Err.	Coef.		Coef.	Std. Err.
vel	0,021***	0,005	0,114***	vel	0,021***	0,005
_cons	0,227**	0,089	-1,438**	_cons	0,227**	0,089
Koeficijent determinacije	R² = 0,037 (adjust)		R² = 0,177 (within)		R² = 0,177 (within)	
Izbor modela	Hausman test: Prob>chi2= 0,0000 => FE model najrelevantniji					
Otklanjanje heteroskedastičnosti i autokorelacije	-		Robust. Std.Err.		-	
Rezultati u periodu pandemije						
	Coef.	Std. Err.	Coef.		Coef.	Std. Err.
vel	0,006	0,008	-0,068***	vel	0,006	0,008
_cons	0,522***	0,144	1,889***	_cons	0,522***	0,144
Koeficijent determinacije	R² = -0,002 (adjust)		R² = 0,05 (within)		R² = 0,05 (within)	
Izbor modela	Hausman test: Prob>chi2= 0,023 => FE model najrelevantniji					
Otklanjanje heteroskedastičnosti i autokorelacije	-		-		-	

*P-vrednosti: * signifikantnost 10%, ** signifikantnost 5%, *** signifikantnost 1%*

Izvor: Prikaz autora- STATA 13

Na osnovu rezultata T-testa ($p=0,94$) se može zaključiti da u periodu pandemije nije došlo do statistički značajnih promena u kretanju udela kredita u aktivi banaka, u odnosu na period pre pandemije. Vrednosti ocena regresionih koeficijenata u periodu pre (0,114) i tokom pandemije (-0,068), idu u prilog oceni da su veće banke pre pandemije bile kreditno aktivnije, što znači da su tokom pandemije smanjile kreditnu aktivnost u odnosu na manje banke. Pored toga, rezultati istraživanja idu u prilog oceni da je tokom pandemije došlo do smanjenja intenziteta uticaja veličine banaka na njihovu kreditnu aktivnost. Vrednosti koeficijenta determinacije pre ($R^2 = 0,177$) i tokom pandemije ($R^2 = 0,05$) idu u prilog zaključku da je pre pandemije kreditna aktivnost banaka bila određena varijacijama bilansne sume u procentu od 17,7%, dok je u periodu pandemije taj uticaj smanjen na 5%.

U tabeli 6 su prikazane ocene regresionih koeficijenata, koje opisuju uticaj veličine banaka na njihovu solventnost. Regresioni model koji u oba perioda najbolje opisuje međuzavisnost veličine i nivoa kapitala banaka je Fixed effects model.

Tabela 6: Rezultati primene panel modela: uticaj veličine na nivo kapitala banaka

CAP	Pooled (OLS) model		Fixed effects model		Random effects model	
	Coef.	Std. Err.	Coef.		Coef.	Std. Err.
vel	- 0,006***	0.005	-0,058*	vel	- 0,006***	0.005
_cons	0,307***	0.04	1,247**	_cons	0,307***	0.04
Koeficijent determinacije	R² = 0,013 (adjust)		R² = 0,203 (within)		R² = 0,203 (within)	
Izbor modela	Hausman test: Prob>chi2= 0,0000 => FE model najrelevantniji					
Otklanjanje heteroskedastičnosti i autokorelacije	-		Robust. Std.Err.		-	
REZULTATI U PERIODU PANDEMIJE						
	Coef.	Std. Err.	Coef.		Coef.	Std. Err.
vel	-0,011***	0,003	-0,161***	vel	-0,011***	0,003
_cons	0,388***	0,054	3,136***	_cons	0,388***	0,054
Koeficijent determinacije	R² = 0,084 (adjust)		R² = 0,443 (within)		R² = 0,443 (within)	
Izbor modela	Hausman test: Prob>chi2= 0,000 => FE model najrelevantniji					
Otklanjanje heteroskedastičnosti i	-		Robust. Std.Err.		-	

*P-vrednosti: * signifikantnost 10%, ** signifikantnost 5%, *** signifikantnost 1%*

Izvor: Prikaz autora- STATA 13

Rezultat T-testa ($p=0,000$) svedoči o tome da je u periodu pandemije došlo do statistički značajnih promena u udelu kapitala u bilansnoj sumi, u poređenju sa periodom pre pandemije. Rezultati panel analize idu u prilog zaključku da su veće banke u oba slučaja slabije kapitalizovane u odnosu na manje banke, uz napomenu da to ne ugrožava stabilnost bankarskog sektora, iz razloga što je stopa adekvatnosti kapitala na nivou sektora daleko iznad regulatornog minimuma koji iznosi 12% u odnosu na rizikom ponderisanu aktivu.

Zaključak

Na osnovu rezultata istraživanja može se izvesti zaključak da je veličina banaka važan faktor, koji na statistički značajnom nivou determiniše poslovne rezultate banaka. Ocene regresionih koeficijenata su pokazale da je u periodu pre pandemije rast bilansne sume uticao na smanjenje likvidnosti banaka, što znači da su veće banke držale u bilansu manje likvidne aktive u odnosu na manje banke. Međutim, u periodu pandemije je došlo do promene u smislu da su veće banke povećale nivo likvidnosti u odnosu na svoje manje konkurente. Iako držanje većih iznosa likvidne aktive povećava oportunitetne

troškove, što se posebno odnosi na držanje primarnih rezervi likvidnosti, profitabilnost većih banaka u periodu pandemije nije ugrožena, što potvrđuju i rezultati istraživanja. Dobijene ocene regresionih koeficijenata svedoče o tome da su pre, kao i tokom pandemije, veće banke ostvarile višu stopu prinosa na kapital u odnosu na manje banke, uz napomenu da je tokom pandemije došlo do značajnog smanjenja uticaja veličine na profitabilnost. Postoje dva osnovna razloga koja većim bankama na domaćem tržištu omogućavaju više stope profitabilnosti. Prvi razlog je taj što veće banke imaju mogućnost primene strategije vođstva u troškovima, odnosno mogućnost da kroz digitalizaciju smanje broj filijala i broj zaposlenih. Drugi razlog koji većim bankama obezbeđuje više stope profitabilnosti su niske pasivne kamatne stope, koje su prevashodno posledica činjenice da je domaći bankarski sektor visoko likvidan. Što se tiče kreditne aktivnosti banaka, rezultati istraživanja idu u prilog zaključku da su tokom pandemije veće banke smanjile kreditnu aktivnost u odnosu na manje banke. Važno je istaći i to da je tokom pandemije uticaj veličine na kreditnu aktivnost banaka značajno opao. Rezultati istraživanja daju ocenu da veće banke imaju manji udeo kapitala u bilansnoj sumi u odnosu na manje banke. S obzirom na činjenicu da je nivo adekvatnosti kapitala u domaćem bankarskom sektoru značajno iznad minimuma koji propisuju Bazel 3 standardi i Narodna banka Srbije, može se izvesti zaključak da veće banke u cilju poboljšanja poslovnih rezultata više koriste raspoloživi potencijal za preuzimanje rizika, što je posebno došlo do izražaja tokom pandemijskog perioda.

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Received: 22.07.2021
Approved: 01.02.2022

DOI: 10.5937/bankarstvo2104036R

COMPARATIVE ANALYSIS OF THE IMPACT OF BALANCE SHEET SIZE ON BANK OPERATIONS IN THE REPUBLIC OF SERBIA IN THE PERIOD BEFORE AND DURING THE COVID-19 PANDEMIC

Željko Račić, PhD, Business School of Vocational Studies
in Novi Sad, professor of vocational studies
email: raciczeljko@gmail.com

Branka Paunović, PhD, Business School of Vocational Studies
in Novi Sad, professor
email: brankapaunovic1711@gmail.com

Summary

This paper aims to analyze the impact of the size of banks operating in the Republic of Serbia on the main indicators of their business activity and assess whether the Covid-19 pandemic has changed the nature and intensity of this impact. The research was conducted on a representative sample of twenty-three domestic banks. The paper's conclusions are based on the results of applying static panel regression models and cover the period from the second quarter of 2014 to the third quarter of 2021. From the study results, it can be concluded that larger banks reduced lending activities and increased liquidity during the pandemic compared to smaller banks. This had no impact on their profitability, meaning that banks achieved higher returns on capital compared to smaller banks, as in the pre-pandemic period. In addition, the study found that larger banks reduced the ratio of capital to total assets during the pandemic compared to smaller banks, but not to the extent that threatened the banking sector's stability.

Keywords: banking sector of the Republic of Serbia; size of total assets of banks; liquidity of banks; profitability of banks; lending of banks; solvency of banks; concentration of banking sector; Covid-19 pandemic; static panel regression models.

JEL classification: G21, M41, C33, C65

Introduction

The fundamental role of banks is to ensure economic growth and development through the rapid and efficient flow of money between market participants with surpluses and deficits. Therefore, the banking sector's stability is a constant focus of regulators worldwide. One of the most important and best-regulated banking business segments is maintaining competition in the banking market, which is measured by the Herfindahl-Hirschman Index (hereinafter: HHI Index). In recent years, there has been a clear trend in the Serbian banking sector towards a reduction in the number of banks and stratification in terms of the dominance of the five largest banks compared to the rest of the sector (Filipović et al., 2016).

The main objective of this paper is to assess whether the fluctuations in the balance sheets of banks operating in the Republic of Serbia (hereinafter: banks) affect their liquidity, credit activity, profitability and capital level (solvency). It also aims to investigate whether the nature and intensity of these effects changed during the Covid-19 pandemic (hereinafter: pandemic) compared to the period before the pandemic was declared. The analysis and conclusions derived are based on static panel regression models. The paper's conclusions cover the period between the second quarter of 2014 and the third quarter of 2021.

After the introductory section and a review of the literature analyzing the impact of bank size on various operations, a brief overview of the relationship between bank size and concentration in the domestic banking market is presented. The remainder of the paper presents the methodology used in the study and the characteristics of the sample based on which the study was conducted. In the last part of the paper features the analysis of the estimated regression coefficients based on which the paper's conclusions were derived.

Literature Review

The impact of banks' size on various aspects of their operations has been the subject of numerous studies worldwide. From the summary and analysis of their results, the general impression is that larger banks operate more stably and contribute to the overall development of the markets in which they operate (Adusei, 2015). This is mainly because larger banks use economies of scale and scope more than smaller banks (Bikker et al., 2006). However, the awareness that bank instability can threaten the safety of any financial system (Kamani, 2021) often leads to large banks being protected by the state. The protection of large banks from bankruptcy by the state is better known as the "too big to fail" concept, the application of which often leads to the agency problem and the increase in their exposure to various forms of risk (Virginie, 2015), (Račić, 2013b).

Depending on the geographic area and the time interval covered by the survey, estimates of the impact of banks' size on their business indicators also vary. For example, in most cases, the size of total assets determines their liquidity (Virginie, 2015), with larger banks usually holding less cash and relying on secondary liquidity reserves (Račić, 2018). Regarding the impact of bank size on profitability, most studies assume that growth in total assets promotes profitability (Ozcan et al., 2018). However, some assume that there is no statistically significant relationship between bank size and profitability in the markets of underdeveloped and developing countries (Al-Harbi, 2019) and those who conclude that growth in total assets reduces profitability (Siddiqui, 2020). In addition, it should be noted that several

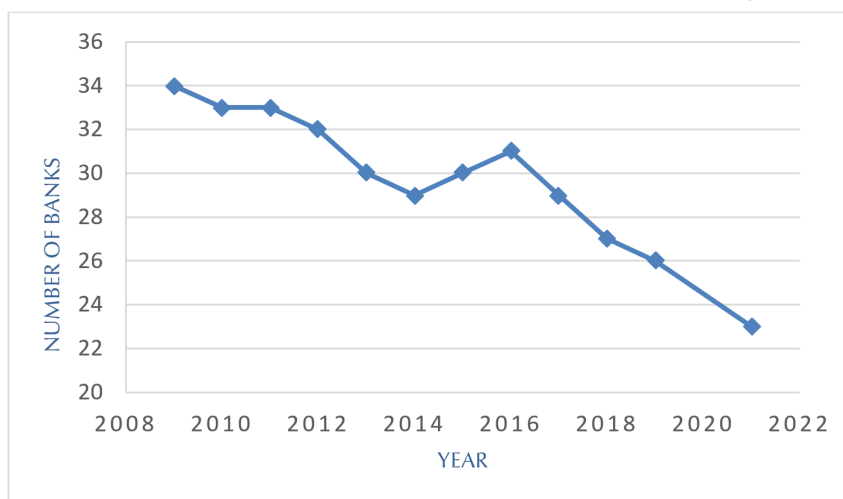
studies find a negative relationship between the size of banks and the capital adequacy ratio (Račić, 2018).

As the paper addresses the impact of the pandemic on banks' operations, it is essential to note that few studies on this topic show that the pandemic significantly affects various aspects of their operations and that the intensity of this impact depends on factors such as banks' focus on leadership costs (Vasić, 2020a), the degree of digitalization of the business (Vasić, 2020b), the structure of the financial market in terms of the institutional environment and the regulatory framework, the level of development of the debt securities market, and the response of the public health system to the pandemic (Colak & Oztekin, 2021).

Relationship Between Bank Size and Concentration in the Banking Sector of the Republic of Serbia

In the post-2000 period, a significant number of foreign banks have expanded their operations into the financial market of the Republic of Serbia. However, the impact of the market size and the fact that the transition of the domestic economy is slower than initially expected lead to a gradual decline in the number of banks on the market (Stojmenović, 2021). Chart 1 shows the decline in the number of banks on the market in the Republic of Serbia.

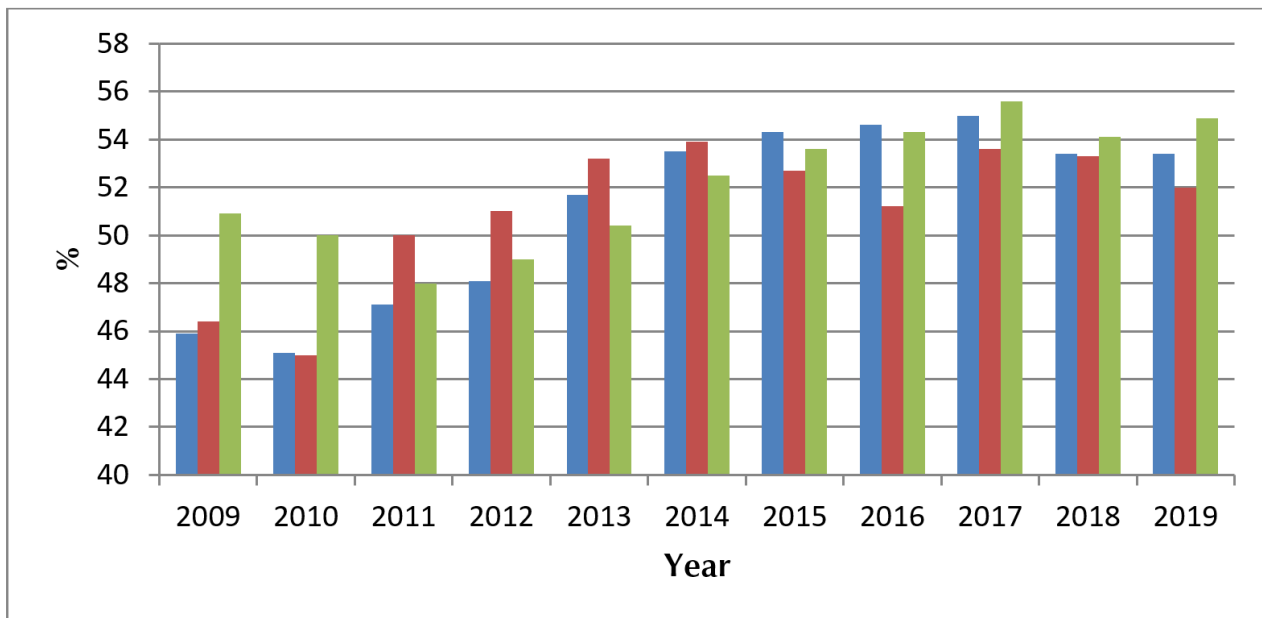
Chart 1: *Movement of the Number of Banks on the Market of the Republic of Serbia*



Source: Review of authors based on data from the National Bank of Serbia (www.nbs.rs)

Twenty-three banks currently operate in the domestic market, which indicates a high degree of competition. This is supported by the consistently low value of the HHI index, which stood at 840 at the end of 2019. However, a potential threat to the stability and further development of competition in the domestic banking market is the high concentration of the five largest banks (after this CR5 index). Values of CR5 indicate that the five largest banks in Serbia hold more than 50% of the share in total assets, deposits and lending (Stojmenović, 2021). The movement of the value of the CR5 index in the domestic banking market is shown in Chart 2.

Chart 2: *Movement of CR5 Index of Assets, Loans and Deposits*



Source: Review of authors based on data from the National Bank of Serbia (www.nbs.rs)

Considering the fact that in the banking market in Serbia, as well as in the region, there is a clear trend to reduce the number of banks and their stratification by size criteria (Jovic, 2006), the author wanted to study the nature and intensity of banking business in the balance sheet size, with particular attention to the impact of the pandemic on this issue.

Sample and Research Methodology

The sample related to the period before the pandemic includes twenty-three banks operating in the domestic market at the end of the third quarter of 2019. On the other hand, the sample included in the study of the same impact during the pandemic includes twenty-one banks operating in the Republic of Serbia at the end of the third quarter of 2021. The difference in the number of banks in the sample is a result of bank acquisitions during the study period (Société Générale bank was merged with OTP bank, while MTS bank was merged with Postal Savings Bank). Both segments of the sample are representative, as they cover over 90% of the total assets of the domestic banking sector. The banks covered by the survey are listed in table 1.

The study is based on analyzing data from banks' quarterly balance sheets. The panel regression analysis included six hundred twenty-eight observations covering period from the second quarter of 2014 to the third quarter of 2021.

Table 1: *Sample of Banks Included in the Survey*

No.	Bank name
1.	API Bank
2.	Addiko Bank
3.	AIK banka
4.	Banca Intesa
5.	Postal Savings Bank
6.	Crédit Agricole banka Srbija
7.	Direktna banka
8.	Erste Bank
9.	Eurobank
10.	Expobank
11.	Halkbank
12.	JUBMES (Alta) banka
13.	Komercijalna banka
14.	MTS banka (merged with the Postal Savings Bank)
15.	NLB banka
16.	Opportunity banka
17.	ProCredit Bank
18.	Raiffeisen banka
19.	Sberbank Srbija
20.	Société Générale banka (merged with the OTP banka)
21.	Srpska banka
22.	Telenor banka
23.	Unicredit Bank

Source: Review of authors (STATA 13)

The study applies the following static panel models: pooled-effects model, fixed-effects model, and the random-effects model. The use of panel models in empirical research offers many advantages, such as greater informativeness resulting from the size of the sample and the number of degrees of freedom. The more significant variability in the data contributes to greater efficiency in the regression coefficients' estimates and the reduction of multicollinearity in the model. In addition, it is essential to point out that panel models analyze variations in the data according to two dimensions: by units of observation and by the temporal dimension, which provides an opportunity to analyze the data structure as well as changes in the data structure over time (Račić, 2013a). The choice of the static panel model, which provides the most accurate estimates of the observed interdependencies, was made based on the results of the corresponding tests: F-test, Breusch-Pagan test and Hausman test (Račić et al., 2014).

The following regression models are analyzed in this paper:

$$l_{ij} = \beta_0 + \beta_1 \text{vel}_{ij} + \varepsilon_{ij} \quad (1)$$

$$\text{kred}_{ij} = \beta_0 + \beta_1 \text{vel}_{ij} + \varepsilon_{ij} \quad (2)$$

$$\text{roe}_{ij} = \beta_0 + \beta_1 \text{vel}_{ij} + \varepsilon_{ij} \quad (3)$$

$$\text{cap}_{ij} = \beta_0 + \beta_1 \text{vel}_{ij} + \varepsilon_{ij} \quad (4)$$

where is,

vel_{ij} - the natural logarithm of the bank's balance sheets and at time j ,

l_{ij} - ratio of liquid assets and total assets of the bank and at time j ,

kred_{ij} - share of lending in the bank's total assets and at time j ,

roe_{ij} - the ratio of net profit and capital of the bank and at time j ,

cap_{ij} - share of capital in the bank's balance sheet and at time j ,

ε_{ij} - standard error.

Table 2: Average Values of the Independent Variables of the Model in the Period Before/After the Pandemic.

Variables	Average value	Change
l1	0.15 / 0.16	increase
roe	0.01 / 0.03	increase
kred	0.61 / 0.64	increase
cap	0.20 / 0.17	decrease

Source: Author's calculation (STATA 13)

The analysis of the evolution of the average values of the indicators of liquidity, solvency, lending activity and profitability as independent variables of the regression models showed that the domestic banking sector was stable in the pre-pandemic period. The average ratio of liquid assets to assets was 15% for banks in the sample, while the average ratio of capital to total assets was 20% for banks in the sample. In addition, the average ratio of loans to assets of 61% indicates that banks were predominantly focused on traditional lending and deposit-taking activities, which also supports stability, especially in times of major economic crises. The average value of return on assets was 1.2%, which means that the domestic banking sector is profitable. The average values of the analyzed indicators of banks' operations during the pandemic show that banks' liquidity, lending and profitability have slightly increased, while their solvency has slightly decreased. It means that the pandemic did not significantly threaten the stability of the Serbian banking sector.

Analysis of Research Results

The application of static panel models led to estimates of regression coefficients, which analysis is the subject of this part of the paper. Since the periods before and during the pandemic were analyzed separately, the T-test (2 tails) was used to evaluate statistically significant changes in the values of the

analyzed indicators in the periods before and after the pandemic. The analysis of the obtained results is presented in the following part of the paper.

Table 3 shows the profit estimates of the regression coefficients describing the impact of bank size on their liquidity. The application of regression models and appropriate tests to select the most relevant model and evaluate the satisfaction of the standard model assumptions led to the conclusion that the fixed-effects model best describes the impact of bank size on liquidity.

Table 3: Results of the Application of Static Panel Models: the Impact of Size on Bank Liquidity

II	Pooled (OLS) model		Fixed- effects model		Random- effects model	
	Coef.	Std. Err.	Coef.		Coef.	Std. Err.
vel	-0.01***	0.002	-0.04***	vel	-0.01***	0.002
_cons	0.334***	0.030	0.942***	_cons	0.334***	0.030
Coefficient of determination	R ² = 0.07 (adjust)		R ² = 0.073 (within)		R ² = 0.024 (within)	
Model selection	Hausman test: Prob>chi2= 0.0001 => FE model is the most relevant					
Elimination of heteroscedasticity and autocorrelation	-		Robust. Std. Err.		-	
Results in the pandemic period						
	Coef.	Std. Err.	Coef.		Coef.	Std. Err.
vel	-0,001	0,003	0,088***	vel	-0,001	0,003
_cons	0,182***	0,058	-1,462***	_cons	0,182***	0,058
Coefficient of determination	R ² = -0,005 (adjust)		R ² = 0,0671 (within)		R ² = 0,0671 (within)	
Model selection	Hausman test: Prob>chi2= 0,0014 => FE model is the most relevant					
Elimination of heteroscedasticity and autocorrelation	-		-		-	

*P-values: * significant at 10%, ** significant at 5%, *** significant at 1%*

Source: Author's review - STATA 13

The result of the T-test ($p = 0.000$) shows that there were statistically significant changes in the liquidity levels of banks during the pandemic period compared to the pre-pandemic period. The results of the panel analysis support the view that larger banks had lower level of liquid assets on their balance sheets before the pandemic, which changed during the pandemic. Therefore, the pandemic caused larger banks to increase liquidity relative to smaller banks. From the value of the coefficient of determination ($R^2 = 0.0671$), we can conclude that fluctuations in bank balance sheets determine 6.7% of liquidity, while 93.3% of liquidity fluctuations are determined by other factors not captured in the survey.

Table 4 shows the estimates of the regression coefficients describing the impact of bank size on their profitability. Using the same models and tests as in the previous case, it was found that the influence

of size on banks' profitability in the pre-pandemic period is best described by the fixed effects model, while in the case of the pandemic data analysis it is the random effects model.

Table 4: Results of the Application of the Panel Model: Influence of Size on the Profitability of Banks

ROE	Pooled (OLS) model		Fixed- effects model		Random- effects model	
	Coef.	Std. Err.	Coef.		Coef.	Std. Err.
vel	0.039***	0.005	0.112***	vel	0.039***	0.005
_cons	-0.68***	0.085	-1,998***	_cons	-0.68***	0.085
Coefficient of determination	R ² = 0.127 (adjust)		R ² = 0.059 (within)		R ² = 0.059 (within)	
Model selection	Hausman test: Prob>chi2= 0.0022 => FE model is the most relevant					
Elimination of heteroscedasticity and autocorrelation	-		Robust. Std. Err.		-	
Results in the pandemic period						
	Coef.	Std. Err.	Coef.		Coef.	Std. Err.
vel	0.026***	0.003	-0.007	vel	0.026***	0.003
_cons	-0.452***	0.05	0.154	_cons	-0.452***	0.05
Coefficient of determination	R ² = 0.349 (adjust)		R ² = 0.0005 (within)		R ² = 0.0005 (within)	
Model selection	Hausman test: Prob>chi2= 0.188 => RE model is the most relevant					
Elimination of heteroscedasticity and autocorrelation	-		-		Robust. Std. Err.	

*P-values: * significant at 10%, ** significant at 5%, *** significant at 1%*

Source: Author's review - STATA 13

The result of the T-test ($p = 0.03$) supports the view that there were statistically significant changes in the profitability level of banks during the pandemic period compared to the pre-pandemic period. The values of the coefficient of the determination indicate that before the pandemic, 5.9% of banks' profitability was determined by fluctuations in total assets. In comparison, this influence decreased to only 0.05% during the pandemic period. In other words, since the onset of the pandemic, bank profitability is no longer determined by size to the same extent as it was before the pandemic. Estimates of the regression coefficients in the pre-pandemic period (0.122) and during the pandemic (0.024) show that larger banks are more profitable in both periods than smaller banks, with the influence of size on profitability becoming weaker in the pandemic period.

Table 5 shows the profit estimates of the regression coefficients describing the effect of bank size on lending activities. The model that best describes this interdependence in both periods analyzed is the fixed effects model.

Table 5: Results of the Application of the Panel Model: Influence of Size on Bank Lending Activities

KRED	Pooled (OLS) model		Fixed- effects model		Random- effects model	
	Coef.	Std. Err.	Coef.		Coef.	Std. Err.
vel	0.021***	0.005	0.114***	vel	0.021***	0.005
_cons	0.227**	0.089	-1.438**	_cons	0.227**	0.089
Coefficient of determination	R ² = 0.037 (adjust)		R ² = 0.177 (within)		R ² = 0.177 (within)	
Model selection	Hausman test: Prob>chi2= 0.0000 => FE model is the most relevant					
Elimination of heteroscedasticity and autocorrelation	-		Robust. Std. Err.		-	
Results in the pandemic period						
	Coef.	Std. Err.	Coef.		Coef.	Std. Err.
vel	0.006	0.008	-0.068***	vel	0.006	0.008
_cons	0.522***	0.144	1.889***	_cons	0.522***	0.144
Coefficient of determination	R ² = -0.002 (adjust)		R ² = 0.05 (within)		R ² = 0.05 (within)	
Model selection	Hausman test: Prob>chi2= 0.023 => FE model is the most relevant					
Elimination of heteroscedasticity and autocorrelation	-		-		-	

*P-values: * significant at 10%, ** significant at 5%, *** significant at 1%*

Source: Author's review - STATA 13

From the T-test results ($p = 0.94$), we can conclude that there were no statistically significant changes in the share of loans in banks' assets during the pandemic period compared to the pre-pandemic period. Values of regression coefficients before (0.114) and during the pandemic (-0.068) support the view that larger banks were more active in lending before the pandemic, implying that they reduced their lending activity during the pandemic compared to smaller banks. In addition, the study results support the assessment that during the pandemic, the intensity of the influence of the size of banks on their lending activity decreased. The coefficient of determination values before ($R^2 = 0.177$) and during the pandemic ($R^2 = 0.05$) support the conclusion that 17.7% of banks' lending activity was determined by variations in total assets in the pre-pandemic period. In comparison, during the pandemic, it decreased to 5%.

Table 6 shows the estimates of the regression coefficients describing the impact of bank size on their solvency. The regression model that best describes the interdependence of bank size and level of capital in both periods is the fixed effects model.

Table 6: Results of the Application of the Panel Model: Influence of Size on the Level of Banks' Equity.

CAP	Pooled (OLS) model		Fixed- effects model		Random- effects model	
	Coef.	Std. Err.	Coef.		Coef.	Std. Err.
vel	-0.006***	0.005	-0.058*	vel	-0.006***	0.005
_cons	0.307***	0.04	1.247**	_cons	0.307***	0.04
Coefficient of determination	R ² = 0.013 (adjust)		R ² = 0.203 (within)		R ² = 0.203 (within)	
Model selection	Hausman test: Prob>chi2= 0.0000 => FE model is the most relevant					
Elimination of heteroscedasticity and autocorrelation	-		Robust. Std. Err.		-	
Results in the pandemic period						
	Coef.	Std. Err.	Coef.		Coef.	Std. Err.
vel	-0.011***	0.003	-0.161***	vel	-0.011***	0.003
_cons	0.388***	0.054	3.136***	_cons	0.388***	0.054
Coefficient of determination	R ² = 0.084 (adjust)		R ² = 0.443 (within)		R ² = 0.443 (within)	
Model selection	Hausman test: Prob>chi2= 0.000 => FE model is the most relevant					
Elimination of heteroscedasticity and autocorrelation	-		Robust. Std. Err.		-	

*P-values: * significant at 10%, ** significant at 5%, *** significant at 1%*

Source: Author's review - STATA 13

The T-test result ($p = 0.000$) shows that there were statistically significant changes in the share of capital in total assets during the pandemic period compared to the pre-pandemic period. The results of the panel analysis support the conclusion that larger banks are less capitalized than smaller banks in both cases. However, it should be noted that this does not threaten the banking sector's stability, as the capital adequacy ratio at the sector level is well above the regulatory minimum of 12% relative to risk-weighted assets.

Conclusion

Based on the research results, it can be concluded that bank size is an essential factor that determines bank business performance at a statistically significant level. The estimates of regression coefficients showed that in the pre-pandemic period, growth in total assets influenced the decline in bank liquidity, implying that larger banks held fewer liquid assets on their balance sheets than smaller banks. During the pandemic, however, changes occurred because larger banks increased their liquidity holdings relative to smaller banks. Although holding more significant amounts of liquid assets increases opportunity costs, which mainly refers to holding primary liquidity reserves, the profitability of larger banks is not threatened during the pandemic, which is confirmed by the research results. The obtained estimates of the regression coefficients demonstrate that larger banks had a higher return on capital compared to smaller banks both before and during the pandemic. However, it should be

noted that the effect of size on profitability was much smaller during the pandemic. There are two main reasons that larger banks can achieve higher profitability rates in the domestic market. The first reason is that larger banks can implement a cost leadership strategy, i.e., reduce the number of branches and the number of employees through digitization. Another reason that helps larger banks achieve higher profitability rates is the low deposit rates, mainly because the domestic banking sector is very liquid. In terms of bank lending, the survey results support the conclusion that larger banks reduced their lending during the pandemic compared to smaller banks. It is important to note that the size of bank lending decreased significantly during the pandemic. The study results suggest that larger banks have a lower proportion of capital to total assets than smaller banks. Considering that the level of capital adequacy in the domestic banking sector is significantly higher than the minimum required by the Basel 3 standards and the National Bank of Serbia, it can be concluded that larger banks use the available risk potential to improve their business results, especially during the pandemic period.

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