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REGULATORNA OPTIMIZACIJA U CILJU JAČANJA KONKURENTNOSTI EVROPSKE EKONOMIJE VAŽNA I ZA BANKE U SRBIJI

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Pored regulative i zakonodavnog okvira, bankarski sektor Srbije u značajnoj meri deli sa sektorima iz Evrope i sveta i druge sličnosti, savremene tendencije i perspektive koje postoje i u međunarodnom i naročito evropskom bankarstvu: Srbija ima status zemlje kandidata za članstvo u Evropskoj uniji od 2012. godine, a banke koje posluju u Srbiji u svom poslovanju primenjuju u značajnoj meri međunarodne i evropske standarde, propise i regulativu. Kao pridružena članica Evropske bankarske federacije od 2007. godine, Udruženje banaka Srbije je u prilici da ima pravovremeni uvid u navedene aktuelnosti, da prati tendencije u razvoju i primeni regulative, ali i da aktivno učestvuje u panevropskim inicijativama bankarskog sektora, podržavajući tako uslove poslovanja domaćih banaka u Srbiji. Upravo kroz ovu saradnju, svedočimo razvoju novih trendova u bankarskoj industriji Evrope od kojih za naše uvažene čitaoce izdvajamo posebno jedan od njih – pristup tzv. pojednostavljivanja, koji je uvela Evropska komisija u cilju jačanja konkurentnosti EU, istovremeno štiteći ekonomske, socijalne i ekološke ciljeve. Ovaj pristup je od izuzetnog značaja i za same banke, a njegova važnost, dometi i benefiti se očekuju i u budućem srednjoročnom okviru.

Evropa se nalazi u ključnom trenutku svog ekonomskog i regulatornog razvoja. Kao što je istaknuto u Izveštaju o konkurentnosti EU iz 2024. godine, g. Marija Dragija, kontinent se bori sa prekomernom regulatornom složnošću – ključnim faktorom koji podriva investicije, inovacije i ekonomsku dinamiku.

Regulatorna optimizacija je osnovna komponenta ekonomske strategije EU, i suštinska poluga za jačanje konkurentnosti Evrope, uz podršku merljivih indikatora učinka, pa je shodno tome tzv. pojednostavljivanje (eng. simplification) postalo centralni politički prioritet i u programu rada Evropske komisije u 2025. godini. Ciljajući na smanjenje administrativnih opterećenja, pojednostavljivanje postojećih pravila i negovanje poslovnog okruženja pogodnijeg za inovacije, do danas je već odobren tzv. Omnibus VI paket mera za sledeće oblasti: izveštavanje o održivosti, investiranje, pojednostavljivanje zajedničke poljoprivredne politike, mere pojednostavljivanja namenjenih malim i srednjim preduzećima, spremnost sektora odbrane, hemikalije.

Bankarski i finansijski sektor je posebno opterećen obimom regulative, a uz to, bankama je dodeljen sve veći broj odgovornosti i široke lepeze ciljeva tokom poslednje dve decenije: od borbe protiv pranja novca i utaje poreza do rešavanja problema sajber kriminala i podrške zelenoj tranziciji. Iako finansijski sektor prihvata ove uloge, i ima pozitivne efekte kao što su ojačana finansijska stabilnost

i zaštita potrošača, kombinacija sve složenijih regulatornih obaveza i dodatnih mandata rizikuje da potkopa njegovu sposobnost da ih efikasno ispuni, jer su često preklapajuće, fragmentirane, a ponekad čak i neusaglašene ili kontradiktorne. Sama količina i slojevitost pravila stvorili su regulatorno okruženje koje otežava prekogranične aktivnosti, usporava inovacije i ograničava kapacitet sektora da odgovori na promenljive potrebe tržišta zbog velikog tereta usklađenosti. Multiplikovani zahtevi za izveštavanjem takođe čine finansijska tržišta EU manje atraktivnim – ne samo za institucionalne i male investitore, već i za mala i srednja preduzeća koja zavise od njih za finansiranje.

Stoga i u samoj bankarskoj industriji Evrope, čiji glas zastupa Evropska bankarska federacija, postoji hitna potreba za pojednostavljenjem i stabilizacijom finansijskog regulatornog i nadzornog okvira EU. Koherentniji i proporcionalniji sistem bi poboljšao sposobnost sektora da podrži strateške prioritete Evrope – od konkurentnosti i inovacija do održivosti i finansiranja odbrane. Usklađivanjem regulatornog pojednostavljenja sa širom agendom konkurentnosti EU, kreatori politike mogu pomoći u izgradnji finansijskog ekosistema koji je i otporan i dinamičan. Stabilno, proporcionalno i inovativno pogodno regulatorno okruženje je neophodno za izgradnju konkurentnog bankarskog i kapitalnog tržišta EU koje služi ekonomiji EU, podržava zelenu i digitalnu tranziciju i doprinosi otvorenoj strateškoj autonomiji Evrope. Ovo je još važnije jer su druge jurisdikcije – posebno SAD i Velika Britanija – već pokrenule slične napore za pojednostavljivanje. Naime, govor Mišel Bouman, nedavno potvrđene za potpredsednicu za nadzor u Federalnim rezervama SAD, naglasio je potrebu za nadzorom koji je više usmeren na rizik, prilagođen i transparentan, a koji izbegava prekoračenje procedura i podržava institucionalnu raznolikost.

Shodno tome, i bankarski sektor Evrope, predstavljen kroz aktivnosti Evropske bankarske federacije, snažno podržava fokus Evropske Komisije na pojednostavljenje u njenoj agendi za 2025. godinu. EBF ne zagovara deregulaciju, nego poziva na efikasniji i koherentniji regulatorni okvir, kroz nedavno kreiran zajednički dokument svih evropskih banaka „Jednostavno konkurentno“ (eng. Simply Competitive) – zasnovan na opsežnim konsultacijama EBF i svih njenih članica – nacionalnih udruženja banaka iz svih evropskih zemalja i na sveobuhvatnom pregledu zakonodavstva EU, regulatornih i nadzornih okvira za banke i efekata uticaja postojećih i budućih propisa EU. Dokument podrazumeva pojednostavljivanje pravila i poboljšanje jasnoće, doslednosti i proporcionalnosti zasnovanih na pristupu upravljanja rizicima, i zajedničkom vizijom za evropsko bankarstvo koji podržavaju ključne ciljeve politike kao što su finansijska stabilnost i zaštita potrošača, i istovremeno podsticanje rasta i konkurentnosti. Dokument identifikuje mogućnosti pojednostavljenja kroz predloge u sedam ključnih oblasti:

1. Opšti okvir
2. Prudencijalni okvir i supervizija
3. Digitalne finansije i sajber otpornost
4. Štedna i investiciona unija
5. Održivost
6. Porezi i usklađenost
7. Izveštavanje.

Dokument EBF-a ima za cilj da doprinese inicijativama koje su pokrenule evropske institucije radi jačanja konkurentnosti bankarskog sektora – i, samim tim, ukupne ekonomske konkurentnosti Evrope. EBF

kontinuirano sarađuje sa institucijama EU kako bi se osiguralo da ove reforme podržavaju ključne ciljeve donetih politika, dominantno kroz regulatornu optimizaciju i negovanje konkurentnijeg okruženja pogodnog za inovacije i kvalitativan rast. Udruženje banaka Srbije će, svojim aktivnim učešćem u radu Evropske bankarske federacije na analizi i praćenju savremenih tendencija međunarodnog bankarstva, nastojati da podržava napore svojih banaka članica u sprovođenju ciljeva i politika na dugoročnu dobrobit građana, privrede i društva.

Urednik

Dr Slađana Andrian Sredojević

REGULATORY OPTIMIZATION AIMED AT STRENGTHENING THE COMPETITIVENESS OF THE EUROPEAN ECONOMY IS ALSO IMPERATIVE FOR BANKS IN SERBIA



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In addition to the regulation and legislative framework, the banking sector of Serbia shares other significant similarities with European and global sectors, modern tendencies and perspectives that exist in international and especially European banking: Serbia has had the status of a candidate country for membership in the European Union since 2012, and banks operating in Serbia apply international and European standards, regulations and regulations to a significant extent in their operations. As an associate member of the European Banking Federation since 2007, the Association of Banks of Serbia has the opportunity to have a timely insight into the aforementioned current events, to monitor trends in the development and implementation of regulations and can actively participate in pan-European initiatives of the banking sector, thus supporting the business conditions of domestic banks in Serbia. Through this cooperation, we are witnessing the development of new trends in the European banking industry – and we single out one of them for our esteemed readers – the so-called simplification approach, which was introduced by the European Commission in order to strengthen the competitiveness of the EU, while protecting economic, social and environmental objectives. This approach is extremely important for the banks themselves, and its importance, scope and benefits are expected to reach the future medium-term framework.

Europe is at a crucial moment in its economic and regulatory development. As highlighted in the 2024 EU Competitiveness Report by Mr Mario Draghi, the continent is struggling with excessive regulatory complexity – a key factor undermining investment, innovation and the dynamic nature of the economy.

Regulatory optimization is a basic component of the EU's economic strategy, and an essential lever for strengthening Europe's competitiveness, with the support of measurable performance indicators, so accordingly, this simplification became a central political priority in the work program of the European Commission in 2025. Aiming at reducing administrative burdens, simplifying existing rules and fostering a business environment more suitable for innovation, the Omnibus VI package of measures was approved for the following areas: sustainability reporting, investment, simplification of the common agricultural policy, simplification measures aimed at small and medium-sized enterprises, defence sector readiness, chemicals.

The banking and financial sector is particularly burdened by the volume of regulation, with banks being given an increasing number of responsibilities and a wide range of objectives over the last two decades: from the fight against money laundering and tax evasion, to tackling cybercrime and supporting the green transition. While the financial sector embraces these roles, and has positive effects such as strengthened financial stability and consumer protection, the combination of increasingly complex regulatory obligations and additional mandates risk undermining its ability to deliver effectively, as they are often overlapping, fragmented and sometimes even inconsistent or contradictory. The sheer volume and layering of rules have created a regulatory environment that hinders cross-border activities, slows down innovation and limits the sector's capacity to respond to changing market needs due to the high compliance burden. The multiple reporting requirements also make EU financial markets less attractive – not only for institutional and retail investors, but also for the small and medium-sized enterprises that depend on them for funding.

Therefore, within Europe's banking industry itself, whose voice is represented by the European Banking Federation, there is an urgent need to simplify and stabilise the EU's financial regulatory and supervisory framework. A more coherent and proportionate system would improve the sector's ability to support Europe's strategic priorities – from competitiveness and innovation to sustainability and defence financing. By aligning regulatory simplification with the EU's broader competitiveness agenda, policymakers can help build a financial ecosystem that is both resilient and dynamic. A stable, proportionate and innovation-friendly regulatory environment is essential for building a competitive EU banking and capital market that serves the EU economy, supports the green and digital transitions and contributes to Europe's open strategic autonomy. This is even more important as other jurisdictions – notably the US and the UK – have already launched similar simplification efforts. Namely, the speech of Michelle Bowman, recently confirmed as Vice President for Supervision at the US Federal Reserve, emphasised the need for supervision that is more risk-focused, tailored and transparent, and that avoids procedural overreach and supports institutional diversity.

Consequently, the European banking sector, represented through the activities of the European Banking Federation, strongly supports the European Commission's focus on simplification in its 2025 agenda. The EBF does not advocate deregulation, but calls for a more efficient and coherent regulatory framework, through the recently created joint document of all European banks "Simply Competitive" - based on extensive consultations of the EBF and all its members - national banking associations from all European countries and on a comprehensive review of EU legislation, regulatory and supervisory frameworks for banks and the impact of existing and future EU regulations. This document calls for simplifying rules and improving clarity, consistency and proportionality based on a risk management approach, and a shared vision for European banking that supports key policy objectives such as financial stability and consumer protection, while fostering growth and competitiveness. The document identifies opportunities for simplification through proposals in seven key areas:

1. General framework
2. Prudential framework and supervision
3. Digital finance and cyber resilience
4. Savings and Investment Union
5. Sustainability

6. Taxation and compliance

7. Reporting.

The EBF's document aims to contribute to the initiatives launched by the European institutions to strengthen the competitiveness of the banking sector – and, subsequently, the overall economic competitiveness of Europe. The EBF continuously cooperates with the EU institutions to ensure that these reforms support the key objectives of the adopted policies, predominantly through regulatory optimisation and fostering a more competitive environment conducive to innovation and qualitative growth. The Association of Serbian Banks, through its active participation in the work of the European Banking Federation on the analysis and monitoring of contemporary trends in international banking, will strive to support the efforts of its member banks in implementing objectives and policies for the long-term benefit of citizens, the economy and society.

Editor

Sladana Andrian Sredojević, PhD

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CIKLUS MONETARNE POLITIKE U BOSNI I HERCEGOVINI

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Rezime: *S obzirom na to da Centralna banka BiH nema zakonsko ovlašćenje da kreditira rezidente, monetarni režim BiH je lišen referentne kamatne stope. Zbog toga smo ciklus monetarne politike u BiH aproksimirali odnosom između monetarnog agregata M2 i bruto domaćeg proizvoda. U radu smo dokazali visoku perzistentnost monetarnog ciklusa, potvrdili njegovu zavisnost od primarnog novca, te u analizu uključili i razliku između strane i domaće kamatne stope, kao i finansijski ciklus. Značajan dio monetarnih uslova kreiraju domaće banke, koje kroz depozitno-kreditnu multiplikaciju stvaraju sekundarne depozite, čime se potvrđuje endogena teorija novca. Na monetarni ciklus, očekivano, utiče i razlika između strane i domaće kamatne stope, pri čemu je ovaj odnos inverzan. Radi povećanja likvidnosti ekonomije, odnosno vrijednosti monetarnog ciklusa, preporučujemo primjenu politike monetarnog regulisanja. Ona bi obuhvatala ograničavanje izloženosti bh. banaka prema inostranstvu, uz istovremeno uvođenje negativne naknade na višak rezervi koje banke drže kod CBBiH.*

Ključne reči: bankarstvo, monetarni režim, endogena teorija novca, valutni odbor, ponuda novca, zona evra.

JEL klasifikacija: G21, G17, E50, E58, C30

Uvod

U jednom od prethodnih istraživanja (Jović, 2021) dokazali smo da se poslovni ciklus u zoni evra i u BiH razlikuju, osporavajući time višedecenijski stav da je valutni odbor, koji je uveden prvenstveno radi preuzimanja niske i/ili predvidive inflacije iz zone evra, prikladan monetarni režim za Bosnu i Hercegovinu. Logika valutnog odbora u kojem već treću deceniju funkcioniše bh. ekonomija je da ako se poslovni ciklusi u zemlji rezervne valute (zona evra) i u zemlji valutnog odbora (BiH) podudaraju nije potrebno voditi diskrecionu monetarnu politiku, a ako se dokaže suprotno, onda je diskreciona monetarna politika bolja opcija monetarnog režima od valutnog odbora. Opravdanost uvođenja režima valutnog odbora se izvodi i iz stepena integrisanosti bh. ekonomije u zonu evra.

Veza između strane i domaće ekonomije se može dokazivati i direktno upoređivanjem monetarnih ciklusa i određivanjem stepena međuzavisnosti stranog i bh. monetarnog ciklusa pri čemu se u obzir moraju uzeti i domaće monetarne i kreditne varijable. Jedna od varijabli za koju pretpostavljamo da bi, u skladu sa endogenom teorijom o novcu, trebala uticati na bh. monetarni ciklus je kreditna aktivnost bh. komercijalnih banaka. Naime, egzogena teorija kreiranja novca polazi od stava da se depoziti kreiraju pologom efektivnog novca u banku, tj. kreacijom primarnih depozita. Endogena teorija novca, koja je mnogo bliža stvarnom načinu kreiranja depozita, objašnjava da se odobravanjem kredita stvaraju sekundarni depoziti koji se dalje kroz proces odobravanja novih kredita umnožavaju i stvaraju nove depozite.

Ovim istraživanjem želimo da dokažemo da je uticaj monetarnog ciklusa u zoni evra na bh. monetarni ciklus relativno nizak u poređenju sa ostalim bh. determinantama monetarnog ciklusa. Monetarni ciklus smo definisali kao periodične fluktuacije u ponudi novca – monetarnih agregata M2 za BiH i M3 za zonu evra – a statistički monetarni ciklus smo odredili kao cikličnu komponentu filtriranu iz omjera monetarnog agregata i bruto domaćeg proizvoda. Uticaj primarnog novca (M0) na monetarni agregat M2 je nešto što se u uslovima valutnog odbora podrazumijeva, ali mi dokazujemo i uticaj kreditne aktivnosti bh. banaka i razlike u stranoj i domaćoj kamatnoj stopi (kamatna diferencija) na bh. monetarni ciklus tj. cikličnu komponentu monetarnog agregata M2. Zbog visoke likvidnosti banaka, koja se ogleda u visokoj stopi implicitne stope obavezne rezerve (odnos između ukupnih rezervi, koje uključuju obavezne rezerve i višak rezervi, i osnovice za obračun obaveznih rezervi) kreditnom dinamikom upravljaju banke, dok je druga najbitnija komponenta bh. monetarnog ciklusa kamatna diferencija pod kontrolom CBBiH. Naša hipoteza je da je uticaj ove dvije domaće komponente na bh. monetarni ciklus zbirno, a u jednom dijelu i pojedinačno, iznad uticaja monetarnog ciklusa u zoni evra.

U prvom dijelu istraživanja dajemo pregled literature koja se ovom temom bavila pretežno u drugim zemljama, s obzirom na neistraženost ove teme BiH i činjenicu da Centralna banka Bosne i Hercegovine (CBBiH) nema referentnu kamatnu stopu na kredite bh. bankama, jer joj nije dozvoljeno da pozajmljuje kredite bh. rezidentima. Navodimo i one izvore koji su pitanje diskrecione monetarne politike i valutnog odbora u BiH ispitivale i sa nekog drugog, ali sličnog, aspekta. U sljedećem dijelu predstavljamo metodološku osnovu istraživanja, a u narednom prikazujemo osnovne rezultate istraživanja, obrazlažemo ih i dovodimo u vezu sa postavljenim hipotezama istraživanja. U zaključku pored sumiranja glavnih nalaza istraživanja dajemo i preporuke za kreiranje ekonomske politike usmjerene na prevazilaženje negativne faze bh. monetarnog ciklusa.

Literarni pregled

Pod kontrakcijom u ciklusu monetarne politike se podrazumijeva rast kamatnih stopa i smanjenje ponude novca (eng. *monetary policy tightening*), a suprotno tome ekspanzija u ciklusu monetarne politike se svodi na smanjenje kamatnih stopa i povećanje ponude novca (eng. *monetary policy easing*). Neka od prvih istraživanja ciklusu u monetarnoj politici (SAD) su ga dovela u vezu sa poslovnim ciklusom i ulogom novca u poslovnom ciklusu (Kydland, 1989). Po jednom od ovih istraživanja monetarnog ciklusa ponuda novca utiče na poslovni ciklus na tri načina – efekat prihoda, efekat blagostanja i efekat supstitucije – a stepen korelacije između promjena u ponudi novca i poslovnoj aktivnosti varira u zavisnosti od perioda (Davis, 1968). Kasnija istraživanja monetarnog ciklusa dovedena su u vezu sa finansijskim ciklusom, finansijskom stabilnošću i inflacijom, zadržavajući odnos sa poslovnim ciklusom. (Lane, 2024) daje pregled posljednjeg ciklusa kontrakcije monetarne politike ECB sa efektima na inflaciju, prinosu i bankarski sektor, a isto to rade dva autora za SAD. Analizirajući lekcije iz prošlih epizoda monetarne ekspanzije (rasta u monetarnom ciklusu) autori (de Soyres & Saijid, 2024) zaključuju da FED nije bio efikasan u borbi protiv inflacije, te da je čest ishod restriktivnog monetarnog ciklusa bila recesija. Bosanskohercegovački autori (Mitrović & Erceg, 2018) ukazuju na ulogu CBBiH u određivanju likvidnosti bh. banaka, ali ne idu dalje od toga i ne istražuju monetarni ciklus, dok druga dva autora sagledavaju bh. monetarnu politiku sa aspekta makroekonomske stabilnosti (Nuhanović & Kešetović, 2009). Jedno istraživanje tretira bh. monetarnu politiku sa aspekta monetarne stabilnosti i ekonomskog razvoja (Marjanac, 2014) a drugo istraživanje (Tošković, 2018) sa aspekta kredibiliteta monetarne politike u režimu valutnog odbora. Naše prvo istraživanje na temu ciklusa u bh. ekonomiji (Jović, 2021) pokazalo je da se poslovni ciklus u BiH bitno razlikuje od poslovnog ciklusa u zoni evra, a ta pojava od bh. monetarne politike zahtjeva veći stepen samostalnosti u odnosu na monetarnu politiku ECB. Naime, da su se domaći i strani poslovni ciklus podudarili, to bi u režimu fiksnog deviznog kursa lišilo CBBiH bilo kakve potrebe za vođenjem samostalne monetarne politike, jer bi preuzimanje monetarne politike ECB, naravno pod pretpostavkom da je efikasna, bilo idealna opcija za bh. monetarnu politiku i ekonomiju. Drugo naše istraživanje na temu ciklusa u bh. ekonomiji ukazalo je na opadajući trend finansijskog ciklusa (deriviranog iz odnosa kredita i BDP), koji je uz to zadnjih nekoliko godina negativan, kao i na njegovo značajno odstupanje od finansijskog ciklusa u zoni evra (Jović & Vlašković, 2024). Postoje i istraživanja koja su dokazala uticaj instrumenata monetarne politike na pojedine intermedijarne varijable bh. monetarne politike (Jović, 2020). Grupa američkih autora je povezala monetarni, poslovni i finansijski ciklus te pokazala da kada u fazi monetarne restrikcije dođe do izravnjavanja ročnog spreda, neto kamatna margina se smanjuje, što smanjuje profitabilnost banaka i sklonost ka pozajmljivanju. (Pascal, 2018), dokazuje da ciklus monetarne politike ukoliko je suviše ekspanzivan ili naglo restriktivan povećava rizike po finansijsku stabilnost. U kontekstu monetarnog ciklusa i njegove veze sa globalnom finansijskom krizom (2007 - 2009) i dužničkom krizom ECB je objavila studiju (Giannone, Lenza, & Reichlin, 2019) u kojoj je pokazala da su dugoročne kamatne stope bile natprosječno visoke, dugoročni krediti i depoziti izuzetno niski, dok ove dvije krize nisu uticale na kratkoročne kamatne stope, kao ni na kratkoročne kredite i depozite.

Materijal i metode

Glavna metodološka alatka istraživanja je višestruki regresioni model, s metodom najmanjih kvadrata koja je korištena za ocijenu parametara regresionog modela, a sve vremenske serije su na kvartalnom nivou. Najveći problem u ovom istraživanju je bio metodološke prirode – kako definisati ciklus monetarne politike, ili monetarni ciklus u valutnom odboru koji ne daje kredite rezidentima? Uobičajeno je da se ciklus monetarne politike posmatra kroz ciklus referentne kamatne stope centralne banke i u skladu sa

tim razmišljali smo da naknadi na višak rezervi (koje banke drže kod CBBiH) dodijelimo status referentne kamatne stope i da njene promjene uzmemo kao pokazatelj monetarnog ciklusa u BiH. Problem sa ovakvim pristupom je višestruk. Ta kamatna stopa nije kamatna stopa na kredite, već na višak rezervi, tj. višak depozita kod CBBiH, koje banke uvijek zbog odsustva kontrole kretanja kapitala mogu konvertovati u devize i tako prekinuti prenos efekata monetarne politike CBBiH. Dalje, bh. banke su izuzetno likvidne, neto kamatna margina je kao posljedica bankocentričnosti finansijskog sistema visoka, kao i provizije u neutralnim bankarskim poslovima (banke su jedini nosilac unutrašnjeg platnog prometa u BiH), oko 60% pasive banaka je nekamatonosno i zato je prenos promjena u naknadi na višak rezervi na aktivne i pasivne stope banaka nizak, skoro nepostojeći. Problem sa tretmanom drugog instrumenta monetarne politike, stope obavezne rezerve, je u tome što se ona vrlo rijetko mijenja – od jula 2016.godine do decembra 2024.godine stopa obavezne rezerve nije promijenjena, što je čini nepodesnom za ulogu pokazatelja ciklusa monetarne politike. Jedna od dobrih aproksimacija monetarnog ciklusa u valutnom odboru koji ne može davati kredite rezidentima (valutni odbori u Bugarskoj i Hong-Kongu se mogu izlagati prema domaćem tržištu), u nedostatku reprezentativne referentne kamatne stope, je ponuda novca tj. novčana masa posmatrana apsolutno, ili još bolje relativno u odnosu na privrednu aktivnost. Zbog svega prethodno navedenog ciklus monetarne politike (u istraživanju koristimo i alternativni, kraći, termin, monetarni ciklus) u Bosni i Hercegovini kao odnosa između monetarnog agregata M2 i nominalnog BDP, a alternativno on se može označiti i kao ciklus ponude novca. Radi analogije, a uvažavajući bitno drugačiju strukturu bilansa banaka zone evra iz čega je proizašao i drugačiji način mjerenja likvidnosti za određivanje monetarnog ciklusa u zoni evra je upotrebljen najširi monetarni agregat, M3, umjesto ciklusa referentne kamatne stope ECB. S obzirom da u BiH monetarni multiplikator već godinama ima približno istu vrijednost kao jednu od determinanti bh. monetarnog ciklusa smo uveli cikličnu komponentu primarnog novca (M0) koji u bh. valutnom odboru nije pod uticajem diskrecione politike centralne banke zbog zabrane kreiranja novca *ex nihilo*. Zbog intenzivne upotrebe Euribora u ugovaranju kredita sa promjenljivom kamatnom stopom u BiH, te kanala kamatnih stopa monetarne politike ECB, raspon (diferencija) između strane i domaće kamatne stope je određena kao razlika između dvanaestomjesečnog EURIBOR-a i naknade na sredstva iznad obavezne rezerve. Finansijski ciklus i za BiH i za zonu evra je dat u standardnoj formi kao odnos kredita banaka (krediti stanovništvu i krediti nefinansijskim privatnim sektorima) i nominalnog BDP. Ciklična komponenta je određena upotrebom Hodrick – Prescott filtera sa parametrom izravnavanja (λ) od 400.000. U svim ciklusima BDP je određen kao pomična suma njegovih kvartalnih vrijednosti. Uveli smo jednu vještačku varijablu za četvrti kvartal 2008.godine, kada je kretanje M2 u BiH bilo pod jakim uticajem bankrota američke investicione banke Lehman Brothers (septembar 2008) i bankarske panike koju je ovaj bankrot izazvao na bh. bankarskom tržištu. Korištene su javno-dostupne baze podataka ECB, Eurostata, CBBiH i BHAS za period Q1 2006 – Q2 2024. Oznake varijabli, način njihovog izračunavanja i filtriranja ciklusa su kako slijedi.

Tabela 1 - Varijable u istraživanju

Varijabla	Oznaka	Izvor	Način izračunavanja	Metodologija filtriranja
Monetarni agregat M0 u BiH	M0	CBBH	-	-
Monetarni agregat M2 u BiH	M2	CBBH	-	-

Monetarni agregat M3 u zoni evra	M3	ECB	-	-
Monetarni ciklus u BiH	MC	Obrada autora	Ciklična komponenta M2/BDP	HP filter, lambda 400.000
Monetarni ciklus u zoni evra	MC_EUR	Obrada autora	Ciklična komponenta M3/BDP	HP filter, lambda 400.000
Finansijski ciklus u BiH	FC	Obrada autora	Ciklična komponenta krediti/BDP	HP filter, lambda 400.000
Ciklus primarnog novca u BiH	MC_PM	Obrada autora	Ciklična komponenta primarnog novca/BDP	HP filter, lambda 400.000
Kamatna diferencija	IRD	ECB i CBBiH	12-mjesečni Euribor minus naknada na višak rezervi CBBiH	-

Izvor: Autor

Rezultati i diskusija

Uzročno-posljedičnu vezu između varijabli smo kvantifikovali kroz višestruke regresione modele (Tabela 2). U svim jednačinama bh. monetarni ciklus ispoljava visoku perzistentnost mjerenu uticajem pretходne (prvi pomak – **lag**) na tekuću vrijednost ciklusa koja se kreće na nivou od oko 1. Uticaj drugog laga na monetarni ciklus je minus 0,4 tako da zbirni rast prve i druge autoregresione komponente bh. monetarnog ciklusa za 1 p.p. povećava tekuću vrijednost monetarnog ciklusa za oko 0,6 p.p.

Tabela 2 - Pregled rezultata regresione analize, zavisno-promjenljiva bh. monetarni ciklus (MC), Q1 2006 – Q2 2024.

	EQ 1	EQ 2	EQ 3	EQ 4	EQ 5	EQ 6	EQ 7
Konstanta				1,75 (4,7)***	0,42 (1,7)*		
MC(-1)	1,08 (10,1)***	1,06 (9,9)***	0,93 (8,3)***		0,72 (11,2)***	1,05 (9,7)***	0,93 (7,8)***
MC(-2)	-0,42 (-4,6)***	-0,40 (-4,4)***	-0,35 (-3,9)***			-0,43 (-4,6)***	-0,35 (-3,7)***
MC_PM	0,31 (3,64)***	0,30 (3,7)***	0,35 (4,4)***			0,26 (3,1)***	0,32 (3,6)***

FC(-1)	0,09 (3,7)***					0,06 (2,4)**	0,09 (3,0)***
FC		0,09 (3,9)***	0,10 (4,5)***				
IRD			-0,22 (2,7)***	-1,5 (6,8)***	-0,30 (1,8)*		-0,22 (2,2)**
MC_EUR				0,23 (3,7)***			
MC_EUR(3)					0,09 (1,96)**	0,06 (2,1)**	0,05 (1,7)*
Dummy	-4,19 (-4,4)***	-4,13 (-4,3)***	-3,62 (3,9)***			-4,3 (-4,5)***	-3,9 (4,1)***

Dijagnostika							
R ²	0,92	0,92	0,93	0,49	0,77	0,91	0,92
Durbin- Watson test	1,98	1,96	1,89	0,45	1,44	2,06	1,92
Jarque-Bera test	5,71 (0,057)	4 (1,13)	2,66 (0,26)	5,95 (0,05)	1.668 (0,000)	3,32 (0,16)	1,88 (0,38)

Napomena: *** signifikantno na nivou od 1%, ** signifikantno na nivou od 5%, * signifikantno na nivou od 10%

Izvor: Ibid

U svim jednačinama, očekivano, vrijednost koeficijenta uz cikličnu komponentu primarnog novca signifikantna je na nivou od 1 %. U prosjeku rast MC_PM za 1 p.p. povećava bh. monetarni ciklus za 0,3 p.p. što je očekivano visoka vrijednost koeficijenta s obzirom da u bh. monetarnom režimu nema emisije primarnog novca *ex nihilo*. Kreditna aktivnost banaka, predstavljena u obliku finansijskog ciklusa, djeluje na bh. monetarni ciklus odmah ili sa vremenskim pomakom, čime smo potvrdili tezu o endogenoj teoriji novca, po kojoj sama kreditna aktivnost autonomno stvara novac – povećava monetarni agregat M2. Prosječno rast finansijskog ciklusa za 1 p.p. utiče na rast bh. monetarnog ciklusa za 0,08 p.p. u odnosu na trendnu vrijednost.

Koeficijent uz kamatnu razliku (IRD) očekivano je negativan, a u dvije jednačine (EQ3 i EQ4) signifikantan je na nivou od 1%. U ekstremnom slučaju (EQ 4) rast IRD za 1 p.p. smanjuje vrijednost MC za 1,5 p.p., a u prosjeku, ako se ova ekstremna vrijednost isključuje, uticaj IRD je 0,25 p.p.

Bez obzira na srednje jaku korelaciju domaćeg (MC) i stranog (MC_EUR) monetarnog ciklusa bilo nam je vrlo teško pronaći specifikaciju sa signifikantnim parametrom ispred MC_EUR. On je signifikantan na ni-

vou od 5% u četvrtoj jednačini, koja pored kamatne razlike (IRD) sadrži i konstantu. Monetarni impuls iz zone evra od 1 p.p., predstavljen kao ciklična komponenta odnosa monetarnog agregata M3 i BDP, povećava bh. monetarni ciklus za 0,09 p.p, ali ovaj monetarni impuls ne djeluje unaprijed, već retrospektivno (jednačina 5). U tri specifikacije uspostavljena je veza između tekućeg bh. monetarnog ciklusa i stranog monetarnog ciklusa, ali tek nakon tri kvartala (eng. lead), pa prema nije utvrđena hronološki očekivana reakcija domaćeg monetarnog ciklusa na promjene u stranom monetarnom ciklusu. U specifikacijama u kojima je izolovana jaka statistička veza između stranog monetarnog ciklusa i domaćeg monetarnog ciklusa koji reaguje na njegove promjene znak ispred ovoga parametra je negativan što protivrječi ekonomskoj logici veze ova dva ciklusa koji se uspostavlja sa monetarnim ciklusom u zemlji rezervne valute, a koja je pored toga u korelacionoj analizi pozitivna, a ne inverzna. Kako god bilo u regresionoj analizi smo uspostavili srednje jaku vezu između ovih monetarnih ciklusa, ali očekivanu uzročno-posljedičnu vezu u kojoj prethodne promjene stranog monetarnog ciklusa utiču na naredne promjene bh. monetarnog ciklusa smo utvrdili samo u jednoj od ukupno tri jednačine. Rast stranog monetarnog ciklusa odmah djeluje na rast bh. monetarnog ciklusa, ta veza je statistički signifikantna u omjeru 1 p.p. : 0,23 p.p. (četvrta jednačina).

Prema upotrebljenim pokazateljima dijagnostika modela je u prosjeku zadovoljavajuća. Stepenu u kojem odabrane varijable objašnjavaju bh. monetarni ciklus, mjereno koeficijentom determinacije, vrlo je visok. Durbin-Watsonova statistika samo u dva slučaja odstupa bitno od dva, što je vrijednost koja ukazuje na nepostojanje pozitivne ili negativne autokorelacije reziduala. Osim kod pete jednačine raspored reziduala je normalan, sa p vrijednošću iznad 5% (ne može se odbaciti hipoteza da je raspored reziduala normalan).

I prostom korelacionom analizom pokazan je stepen zavisnosti bh. monetarnog ciklusa od domaćih i stranih monetarnih varijabli.

Tabela 3 - Matrica koeficijenata korelacije

	MC	MC_PM	FC	IRD	MC_EUR
MC	1,00	0,78	0,36	-0,71	0,54
MC_PM	0,78	1,00	-0,08	-0,32	0,48
FC	0,36	-0,08	1,00	-0,43	0,34
IRD	-0,71	-0,32	-0,43	1,00	-0,29
MC_EUR	0,54	0,48	0,34	-0,29	1,00

Izvor: Ibid.

U prvim godinama analiziranog perioda sve do kraja 2009. godine (Grafikon 1) odstupanja između monetarnog ciklusa i ciklusa primarnog novca su minimalna (razlika u prosjeku 0,4 p.p.). Značajna neusklađenost ovih ciklusa, iako je primarni novac u monetarnom odboru glavna determinanta monetarnog agregata M2, traje u manjoj ili većoj mjeri sve do kraja 2015. godine (razlika u prosjeku 1,8 p.p.). Ovaj period velikog odstupanja dva najznačajnija monetarna ciklusa se najvećim dijelom odnosi na produženo djelovanje svjetske ekonomske krize (2007 – 2009) i krizu javnog duga u zemljama zone evra. Do polovine 2020., prije nego što su efekti „zaključavanja“ ekonomije pogodili BiH, održavana je visoka usklađenost monetarnog ciklusa i ciklusa primarnog novca (razlika u prosjeku 0,3 p.p.). Nakon toga potpuno razdvajanje ciklusa M2 i ciklusa M0 traje sve do kraja analiziranog perioda, likvidnost ekonomije, poslije izuzetno ekspanzivne monetarne politike ECB i najviših vrijednosti monetarnog

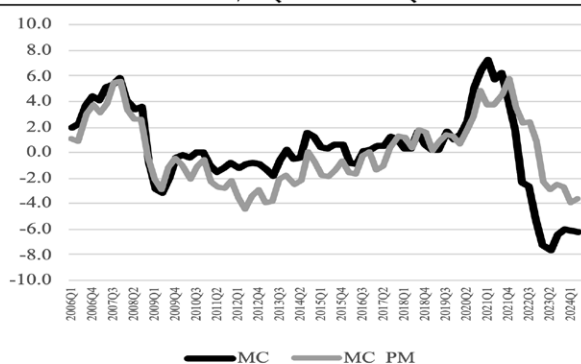
ciklusa, pada na istorijski najniži nivo (vrijednost monetarnog ciklusa je od trendne vrijednosti u Q2 2024. godine odstupila za 6,2%), a monetarni ciklus je prosječno za 2 p.p. niži od ciklusa primarnog novca. Za ovih, malo više od 8 godina (33 kvartala) koeficijent korelacije je 0,78 (Tabela 3), pa je prema tome 60% promjena u monetarnom ciklusu, determinisano promjenama u primarnom novcu.

Na početku i pri kraju posmatranog perioda uspostavljena je izuzetno jaka veza monetarnog agregata M2 i kredita banaka, odnosno monetarnog i finansijskog ciklusa (Grafikon 2). Između dva perioda jake pozitivne korelacije monetarni ciklus oscilira oko nule, a finansijski ciklus ima trend pada, koji je na kratko prekinut u razdoblju od polovine 2016. godine do polovine 2018. godine. Tokom 2024. godine negativne vrijednosti monetarnog i finansijskog ciklusa su skoro izjednačene. Korelacija između dva ključna bh. novčana ciklusa je duplo niža od jačine veze koja je identifikovana kod ciklusa primarnog novca, ali je pozitivna, ukazujući na depozitnu multiplikaciju i endogeno (unutrašnje) stvaranje novca od strane komercijalnih banaka.

Razlika u stranoj (12m Euribor) i bh. kamatnoj stopi (naknada na višak rezervi) i monetarni ciklus su inverzno korelisani, u apsolutnoj vrijednosti, skoro na nivou jačine veze između monetarnog ciklusa i ciklusa primarnog novca (Grafikon 3). Kamatna razlika određuje skoro ravno 50% varijabiliteta bh. monetarnog ciklusa. Od kad je postalo očigledno da će ECB promijeniti smjer monetarne politike i početi voditi restriktivnu monetarnu politiku, formira se izrazito jaka međuzavisnost između ovih varijabli, mjereno koeficijentom korelacije 0,95. Viša strana od domaće kamatne stope pokazatelj je većeg stepena restriktivnosti monetarne politike u zoni evra u poređenju sa bh. monetarnom politikom.

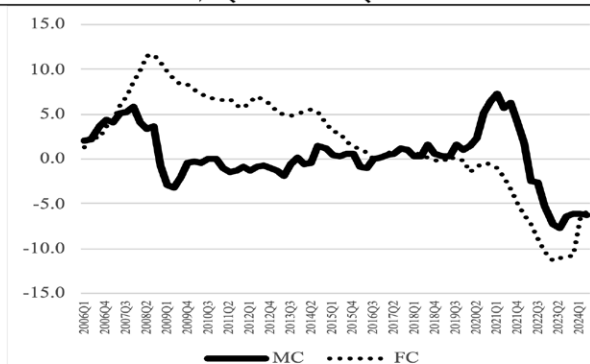
Uticaj monetarnog ciklusa u zoni evra na bh. monetarni ciklus (Grafikon 4) je umjerene jačine, sa povremenim odstupanjem domaćeg od stranog ciklusa (Q1 2010 – Q3 2017), njihove izražene podudarnosti (Q4 2017 – Q2 2022), viših vrijednosti domaćeg od stranog ciklusa (Q3 2020 – 2021 Q1) i na kraju (Q2 2022 – Q2 2024) jake direktne veze i značajno nižih vrijednosti domaćeg u odnosu na strani monetarni ciklus. U prosjeku, 30% varijabiliteta bh. monetarnog ciklusa je pod direktnim uticajem promjena u monetarnom agregatu M3 zone evra. Ovdje se mora primijetiti da je i u prvoj i u drugoj godini korone, sa izuzetkom četvrtog kvartala 2022. godine domaći monetarni ciklus ima veću vrijednost od stranog.

Grafikon 1. Monetarni ciklus i ciklus primarnog novca u BiH, Q1 2006 - Q2 2024.



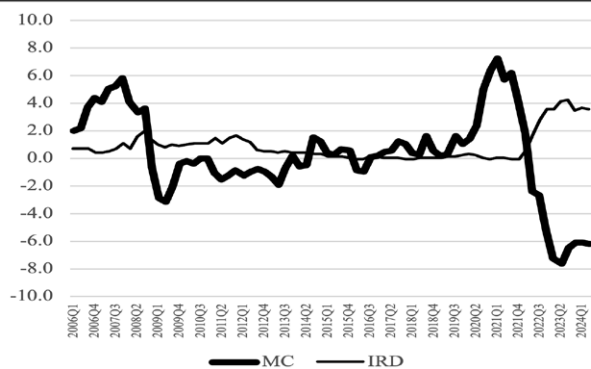
Izvor: Autor.

Grafikon 2. Monetarni ciklus i finansijski ciklus u BiH, Q1 2006 - Q2 2024.



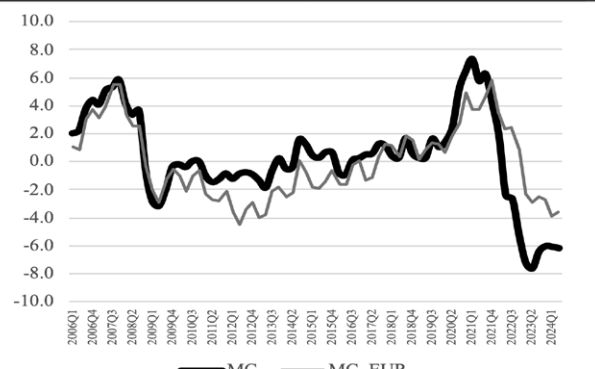
Izvor: Ibid.

Grafikon 3. Monetarni ciklus u BiH i kamatna razlika, Q1 2006 - Q2 2024.



Izvor: Ibid.

Grafikon 4. Monetarni ciklus u BiH i monetarni ciklus u zoni evra, Q1 2006 - Q2 2024.



Izvor: Ibid.

Dobijeni rezultati istraživanja su u skladu sa radnim hipotezama postavljenom na početku. Autoregresivna komponenta je izuzetno jaka, sa prvim autoregresivnim koeficijentom koji povećava i drugim koji smanjuje bh. monetarni ciklus. U prosjeku prethodne vrijednosti bh. monetarnog ciklusa povećavaju tekuće vrijednosti bh. monetarnog ciklusa za 0,6 p.p. Druga determinanta bh. monetarnog ciklusa je ciklus primarnog novca, što je i očekivano s obzirom da bh. bankarski sistem funkcioniše u režimu valutnog odbora. U prosjeku rast ciklusa primarnog novca za 1 p.p. povećava bh. monetarni ciklus za 0,3 p.p. Treća najvažnija komponenta bh. monetarnog ciklusa je razlika strane i domaće kamatne stope čiji koeficijenti variraju od 0,22 p.p. do 1,5 p.p. Pozitivna vrijednost ove razlike smanjuje, a negativna vrijednost povećava likvidnost bh. ekonomije mjerene monetarnim ciklusom na bazi M2. Koeficijent (parametar) uz finansijski ciklus, koji smo definisali kao cikličnu komponentu iz odnosa kredita i BDP, uzima prosječnu vrijednost od 0,095 p.p. za koliko se povećava bh. monetarni ciklus ako se odstupanje odnosa kredita i BDP u odnosu na trendnu vrijednost poveća za 1 p.p. Ovim je na primjeru bh. bankarskog sistema potvrđena endogena teorija novca koja se odnosi na važnu ulogu banaka u kreiranju depozita kroz proces depozitno-kreditne multiplikacije i stvaranja sekundarnih depozita. Bh. bankarski sistem endogeno, interno i samostalno kreira novac i time, pored Centralne banke Bosne i Hercegovine, istupa kao jedan od de facto kreatora monetarne politike.

Zaključna razmatranja i preporuke

Kao ni finansijski ni monetarni ciklus u BiH nisu bili predmet intenzivnog proučavanja, jer je glavni tok bh. ekonomske misli odabrao analizu varijabli u apsolutnim vrijednostima za predmet proučavanja. Dekompozicija varijabli i samostalna analiza ciklične komponente vremenske serije nije, u kontekstu analize jaza (eng. *gap analysis*) tj. odstupanja serije od njene trendirane vrijednosti, dugo vremena bila opšteprihvaćena kao metod statističke ili ekonometrijske analize.

Nakon što smo u prethodnim istraživanjima pokazali da se poslovni ciklus u BiH i zoni evra razlikuju, a dokazali smo i da se bh. finansijski ciklus nalazi u opadajućoj fazi, dokazivanje potrebe za većim stepenom diskrecije u vođenju monetarne politike u BiH nastavili smo konstrukcijom bh. monetarnog ciklusa i utvrđivanjem njegovih uzročno-posljedičnih veza sa ključnim monetarnim varijablama. Dokazali smo dominantan uticaj bh. varijabli na bh. monetarni ciklus, uz samo marginalni uticaj monetar-

nog ciklusa u zoni evra. Zajednički bh. finansijski ciklus, kao i razlika između strane i domaće kamatne stope, u većoj mjeri određuju bh. monetarni ciklus nego što to čini monetarni ciklus u zoni evra. Pojedinačno uzevši uticaj kamatne diferencije na bh. monetarni ciklus veći je od uticaja monetarnog ciklusa u zoni evra.

Koeficijenti ispred svih varijabli u svim jednačinama imaju očekivani znak, a najveću vrijednost imaju parametri ispred autoregresivne komponente i ciklusa bh. primarnog novca. Visoka perzistentnost bh. monetarnog ciklusa i uticaj monetarne baze na promjene monetarnog ciklusa u režimu valutnog odbora koji ne može odobravati kredite rezidentima su očekivane karakteristike monetarnog ciklusa koje omogućavaju njegovo predviđanje.

S druge strane stvaranje novca u bh. bankarskom sistemu odvija se endogeno kreditnom aktivnošću banaka, koje kroz depozitno-kreditnu multiplikaciju uvećavaju depozitni potencijal banaka.

Svi uključeni ciklusi tj. varijable, osim kamatne diferencije, imaju direktnu vezu sa bh. monetarnim ciklusom. Inverznu vezu monetarnog ciklusa sa kamatnom diferencijom, koja je predstavljena kao razlika između strane i domaće kamatne stope, treba tumačiti na način da će smanjenje strane kamatne stope (*ceteris paribus*) pozitivno uticati na naš monetarni ciklus jer to preokreće tokove novca i kapitala u korist Bosne i Hercegovine, povećavajući kreditni potencijal bh. banaka.

S druge strane smanjenje kamatne diferencije kroz rast bh. kamatne stope (naknade na višak rezervi banaka kod CBBiH) ne vodi ka pozitivnim promjenama u bh. finansijskom i monetarnom ciklusu jer to predstavlja restriktivnu monetarnu politiku. Zbog toga se monetarna politika usmjerena na povećanje kreditnog potencijala banaka i rasta likvidnosti bh. ekonomije treba zasnivati na ograničenju izloženosti bh. banaka prema inostranstvu (oročeni depoziti kod nerezidentnih banaka, krediti nerezidentima, hartije od vrijednosti izdate od strane nerezidenata) i negativnoj naknadi na višak rezervi. Prva mjera obezbjeđuje smanjenje deviznih potraživanja bh. banke tj. konverziju deviza u sredstva na računu rezervi banaka kod CBBiH, a druga mjera motiviše banka da radi smanjenja troškova (negativna naknada) povećaju kreditnu aktivnost i podignu vrijednosti finansijskog i monetarnog ciklusa.

Ovo istraživanje pruža detaljan uvid u determinante bh. monetarnog ciklusa, ali samo sa aspekta monetarne ekonomije i zato bi se buduća istraživanja monetarnog ciklusa trebala nastaviti u pravcu obožavanja jednačina monetarnog ciklusa sa objašnjavajućim varijablama iz realnog sektora, kao što je npr. bh. spoljnotrgovinski promet sa zonom evra. Drugi pravac analize monetarnih uslova može poći od činjenice da se monetarni uslovi mjere na četiri načina. Mjera monetarnih uslova su pored finansijskog i monetarnog ciklusa i indeks monetarnih uslova i ciklus kamatnih stopa, a posebno istraživanje ove posljednje mjere nedostaje monetarnom režimu Bosne i Hercegovine. Korisna istraživačka tema bi bio i monetarni ciklus u Bugarskoj, čija ekonomija takođe funkcioniše u režimu monetarnog odbora, ali uz pravo Narodne banke Bugarske da pozajmljuje novac bugarskim bankama.

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THE MONETARY POLICY CYCLE IN BOSNIA AND HERZEGOVINA

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Abstract: *Given that the Central Bank of Bosnia and Herzegovina does not have the legal authority to lend to residents, the country's monetary regime is deprived of a reference interest rate. Therefore, we approximated the monetary policy cycle in Bosnia and Herzegovina by using the ratio between the monetary aggregate M2 and gross domestic product. In this paper, we demonstrated the high persistence of the monetary cycle, confirmed its dependence on base money, and included in our analysis the interest rate differential between foreign and domestic rates, as well as the financial cycle. A significant portion of monetary conditions is shaped by domestic banks, which create secondary deposits through deposit-credit multiplication, thereby confirming the endogenous theory of money. As expected, the monetary cycle is also influenced by the interest rate differential, with this relationship being inverse. In order to increase the liquidity of the economy, that is, the value of the monetary cycle, we recommend implementing a policy of monetary regulation. This would include limiting the exposure of BH banks to foreign markets, while simultaneously introducing a negative fee on excess reserves held by banks at the Central Bank of Bosnia and Herzegovina.*

Keywords: banking; monetary regime; endogenous money theory; currency board; money supply; euro area.

JEL classification: G21, G17, E50, E58, C30

Introduction

In one of our previous studies (Jović, 2021), we demonstrated that the business cycles in the euro area and in Bosnia and Herzegovina differ, thereby challenging the decades-long belief that a currency board, which was introduced primarily to import the low and/or predictable inflation from the euro area, is a suitable monetary regime for Bosnia and Herzegovina. The logic behind the currency board, under which the BH economy has operated for nearly three decades, is that if the business cycles of the reserve currency country (the euro area) and the currency board country (BiH) are synchronized, there is no need to conduct discretionary monetary policy. However, if the opposite is proven, then discretionary monetary policy becomes a more appropriate monetary regime than the currency board. The justification for introducing the currency board regime is also derived from the degree of integration of the BiH economy into the euro area.

The connection between the foreign and domestic economies can also be examined by directly comparing their monetary cycles and determining the degree of interdependence between the foreign and BH monetary cycles, taking into account domestic monetary and credit variables. One such variable, which we assume, based on the endogenous theory of money, affects the BH monetary cycle is the lending activity of BH commercial banks. The exogenous theory of money creation holds that deposits are created by placing base money into banks, i.e., through the creation of primary deposits. The endogenous theory of money, which more accurately reflects the real process of deposit creation, explains that loans themselves generate secondary deposits, which are then multiplied through further lending, creating new deposits.

This research aims to demonstrate that the influence of the euro area monetary cycle on the BH monetary cycle is relatively low compared to other domestic determinants of the BH monetary cycle. We define the monetary cycle as periodic fluctuations in the money supply, represented by the monetary aggregate M2 for BH and M3 for the euro area, and statistically define the monetary cycle as the cyclical component extracted from the ratio of the monetary aggregate to gross domestic product. The influence of base money (M0) on the monetary aggregate M2 is a given under the currency board arrangement, but we also demonstrate the influence of domestic banks' credit activity and the interest rate differential (the gap between foreign and domestic interest rates) on the BH monetary cycle, i.e., on the cyclical component of the M2 aggregate.

Due to the high liquidity of banks, reflected in a high implicit reserve requirement ratio (the ratio of total reserves, which include required and excess reserves, to the reserve base) credit dynamics are controlled by the banks. The second most important component of the BH monetary cycle is the interest rate differential, which is under the control of the Central Bank of Bosnia and Herzegovina (CBBiH). Our hypothesis is that the combined, and in some cases even individual, impact of these two domestic components on the BH monetary cycle exceeds the influence of the euro area monetary cycle.

The first part of this research presents a literature review of studies that have examined this topic, mostly in the context of other countries, given the lack of research on this subject in BH and the fact that the CBBH does not have a reference interest rate on loans to BH banks, since it is not allowed to lend to domestic residents. We also include sources that have examined the issue of discretionary monetary policy and the currency board in BH from other, but related, perspectives. In the following sections, we present the methodological framework of the study, outline the key findings, provide explanations, and link them to the stated research hypotheses. In the conclusion, we summarize the main findings and offer policy recommendations aimed at overcoming the negative phase of the BH monetary cycle.

Literature Review

Contraction in the monetary policy cycle refers to rising interest rates and a reduction in the money supply (monetary policy tightening), while expansion in the cycle refers to lowering interest rates and increasing the money supply (monetary policy easing). Some of the earliest studies of the monetary policy cycle (in the U.S.) linked it to the business cycle and the role of money in the business cycle (Kydland, 1989). According to one such study, changes in the money supply affect the business cycle through three channels, the income effect, the wealth effect, and the substitution effect, while the degree of correlation between changes in money supply and business activity varies over time (Davis, 1968). Later research connected the monetary cycle to the financial cycle, financial stability, and inflation, while retaining its link to the business cycle. (Lane, 2024) provides an overview of the latest tightening cycle of ECB monetary policy and its effects on inflation, yields, and the banking sector, and two other authors do the same for the U.S. economy. Analyzing lessons from past episodes of monetary expansion (growth phases of the monetary cycle), the authors (de Soyres & Saijid, 2024) conclude that the Federal Reserve was not effective in curbing inflation, and that a common outcome of restrictive monetary policy cycles was recession. Bosnian authors (Mitrović & Erceg, 2018) highlight the role of the Central Bank of Bosnia and Herzegovina (CBBiH) in determining the liquidity of BH banks but do not go further to examine the monetary cycle. Another two authors analyze BiH's monetary policy from the standpoint of macroeconomic stability (Nuhanović & Kešetović, 2009). One study addresses BiH's monetary policy from the perspective of monetary stability and economic development (Marjanac, 2014), while another (Tošković, 2018) looks at it through the lens of the credibility of monetary policy under the currency board regime. Our first study on cyclical patterns in the BH economy (Jović, 2021) showed that the business cycle in BH differs significantly from that of the euro area. This divergence requires a greater degree of independence in BiH's monetary policy compared to the policy set by the ECB. If the domestic and foreign business cycles had been synchronized, the fixed exchange rate regime would have eliminated the need for an independent monetary policy in BiH. In that case, adopting the ECB's policy, assuming it is effective, would have been an ideal option for BiH's monetary framework and economy. Our second study on cycles in the BH economy revealed a declining trend in the financial cycle (derived from the credit-to-GDP ratio), which has even been negative in recent years. It also highlighted significant divergence from the financial cycle in the euro area (Jović & Vlašković, 2024). There are also studies that confirmed the impact of monetary policy instruments on certain intermediate variables of BiH's monetary policy (Jović, 2020). A group of U.S. authors linked the monetary, business, and financial cycles and showed that during phases of monetary tightening, if the term spread flattens, net interest margins decrease, which reduces bank profitability and willingness to lend. (Pascal, 2018) demonstrates that if the monetary policy cycle is overly expansionary or abruptly restrictive, it increases risks to financial stability. In the context of the monetary cycle and its connection to the global financial crisis (2007–2009) and the sovereign debt crisis, the ECB published a study (Giannone, Lenza, & Reichlin, 2019), which found that long-term interest rates were exceptionally high, while long-term loans and deposits were very low. These two crises, however, did not significantly affect short-term interest rates, loans, or deposits.

Materials and Methods

The main methodological tool of the research is a multiple regression model, with the ordinary least squares (OLS) used to estimate the parameters of the regression model, and all time series are on a quarterly basis. The biggest challenge in this research was methodological in nature, how to define the monetary policy cycle, or the monetary cycle, in a currency board system that does not lend to residents? Typically, the monetary policy cycle is observed through the central bank's reference interest rate cycle. Accord-

ingly, we considered assigning the remuneration on excess reserves (held by banks at the Central Bank of Bosnia and Herzegovina – CBBiH) the role of a reference interest rate and using its changes as an indicator of the monetary cycle in BiH. However, this approach presents several problems. That interest rate is not a lending rate but a rate on excess reserves, i.e., excess deposits held at the CBBiH, which banks can convert into foreign currency at any time due to the absence of capital controls, thus interrupting the transmission of CBBiH's monetary policy. Furthermore, BH banks are highly liquid; the net interest margin is high due to the bank-centric nature of the financial system, as are the fees for non-interest banking operations (banks are the sole providers of domestic payment services in BiH). About 60% of bank liabilities are non-interest bearing, which results in a weak, almost non-existent, transmission of changes in the excess reserve remuneration rate to banks' lending and deposit rates. Another instrument, the required reserve ratio, is rarely adjusted: from July 2016 to December 2024, the required reserve rate remained unchanged, making it unsuitable as an indicator of the monetary policy cycle. One of the more appropriate approximations of the monetary cycle in a currency board regime that does not allow lending to residents (unlike the currency boards in Bulgaria or Hong Kong, which may lend domestically), in the absence of a representative reference interest rate, is the money supply either in absolute terms or, preferably, relative to economic activity. Due to all the above, we defined the monetary policy cycle (alternatively referred to as the monetary cycle) in Bosnia and Herzegovina as the ratio between the monetary aggregate M2 and nominal GDP, this can also be described as the money supply cycle. For the euro area, to draw a proper analogy while considering the fundamentally different structure of bank balance sheets (which has led to a different liquidity measurement method), we used the broadest monetary aggregate M3 instead of the ECB reference interest rate cycle. Since the money multiplier in BH has remained approximately constant for years, one of the determinants we introduced into the model for BiH's monetary cycle is the cyclical component of base money (M0), which, under the BH currency board, is not influenced by discretionary monetary policy due to the prohibition of ex nihilo money creation. Due to the widespread use of Euribor in loan agreements with variable interest rates in BiH, and the ECB's interest rate channel, we defined the interest rate differential as the difference between the 12-month EURIBOR and the remuneration on reserves above the required reserve level. The financial cycle, both for BH and the euro area, is expressed in the standard form as the ratio of bank loans (to households and non-financial private sectors) to nominal GDP. The cyclical component was extracted using the Hodrick–Prescott filter with a smoothing parameter (λ) of 400,000. In all cycles, GDP was defined as a moving sum of its quarterly values. We also introduced a dummy variable for Q4 2008, when M2 in BH was strongly influenced by the collapse of the U.S. investment bank Lehman Brothers (September 2008) and the banking panic it triggered in the BH financial market. Publicly available data from the ECB, Eurostat, CBBiH, and the Agency for Statistics of BH (BHAS) were used for the period Q1 2006 – Q2 2024. The variable labels, calculation methods, and the cyclical filtering process are presented below.

Table 1 - Variables Used in the Research

Variable	Label	Source	Calculation Method	Filtering Methodology
Monetary aggregate M0 in BiH	M0	CBBH	–	–
Monetary aggregate M2 in BiH	M2	CBBH	–	–

Monetary aggregate M3 in the euro area	M3	ECB	–	–
Monetary cycle in BiH	MC	Author's calculation	Cyclical component of M2/GDP	HP filter, lambda = 400,000
Monetary cycle in the euro area	MC_EUR	Author's calculation	Cyclical component of M3/GDP	HP filter, lambda = 400,000
Financial cycle in BiH	FC	Author's calculation	Cyclical component of loans/GDP	HP filter, lambda = 400,000
Cycle of base money in BiH	MC_PM	Author's calculation	Cyclical component of base money/GDP	HP filter, lambda = 400,000
Interest rate differential	IRD	ECB and CBBH	12-month Euribor minus remuneration on excess reserves (CBBH)	–

Source: Author.

Results and Discussion

The causal relationship between the variables was quantified through multiple regression models (Table 2). In all equations, the BH monetary cycle exhibits high persistence, measured by the influence of the first lag on the current value of the cycle, which is approximately 1. The effect of the second lag on the monetary cycle is around -0.4, so the combined increase of the first and second autoregressive components of the BiH monetary cycle by 1 pp leads to an approximate increase of 0.6 percentage points in the current value of the monetary cycle.

Table 2 - Overview of Regression Equations, Dependent Variable: BH Monetary Cycle (MC), Q1 2006 – Q2 2024

	EQ 1	EQ 2	EQ 3	EQ 4	EQ 5	EQ 6	EQ 7
Constant				1.75 (4.7)***	0.42 (1.7)*		
MC(-1)	1.08 (10.1)***	1.06 (9.9)***	0.93 (8.3)***		0.72 (11.2)***	1.05 (9.7)***	0.93 (7.8)***
MC(-2)	-0.42 (-4.6)***	-0.40 (-4.4)***	-0.35 (-3.9)***			-0.43 (-4.6)***	-0.35 (-3.7)***
MC_PM	0.31 (3.64)***	0.30 (3.7)***	0.35 (4.4)***			0.26 (3.1)***	0.32 (3.6)***

FC(-1)	0.09 (3.7)***					0.06 (2.4)**	0.09 (3.0)***
FC		0.09 (3.9)***	0.10 (4.5)***				
IRD			- 0.22 (2.7)***	-1.5 (6.8)***	-0.30 (1.8)*		-0.22 (2.2)**
MC_EUR				0.23 (3.7)***			
MC_EUR(3)					0.09 (1.96)**	0.06 (2.1)**	0.05 (1.7)*
Dummy	-4.19 (-4.4)***	-4.13 (-4.3)***	-3.62 (3.9)***			-4.3 (-4.5)***	-3.9 (4.1)***

Diagnostics							
R ²	0.92	0.92	0.93	0.49	0.77	0.91	0.92
Durbin- Watson test	1.98	1.96	1.89	0.45	1.44	2.06	1.92
Jarque-Bera test	5.71 (0.057)	4 (1.13)	2.66 (0.26)	5.95 (0.05)	1.668 (0.000)	3.32 (0.16)	1.88 (0.38)

Note: *** significant at 1%, ** significant at 5%, * significant at 10%.

Source: Ibid

In all equations, as expected, the coefficient for the cyclical component of base money is statistically significant at the 1% level. On average, a 1 percentage point increase in MC_PM raises the BH monetary cycle by 0.3 p.p., which is a relatively high coefficient value, particularly considering that under BiH's monetary regime there is no ex nihilo issuance of base money. The credit activity of banks, represented through the financial cycle, affects the BH monetary cycle either contemporaneously or with a time lag. This confirms the premise of the endogenous theory of money, which holds that lending activity autonomously creates money, increasing the M2 monetary aggregate. On average, a 1 p.p. increase in the financial cycle leads to a 0.08 p.p. increase in the BH monetary cycle relative to its trend value.

The coefficient on the interest rate differential (IRD) is, as expected, negative and statistically significant at the 1% level in two equations (EQ3 and EQ4). In the extreme case (EQ4), a 1 p.p. increase in IRD reduces the value of the monetary cycle (MC) by 1.5 p.p. On average, excluding this extreme value, the effect of IRD is around 0.25 p.p.

Despite the moderate correlation between the domestic (MC) and foreign (MC_EUR) monetary cycles, it was very difficult to find a model specification in which the coefficient for MC_EUR is statistically significant. It is only significant at the 5% level in the fourth equation, which includes both the interest rate differential (IRD) and a constant term. A monetary impulse from the euro area of 1 p.p., represented by the cyclical component of the M3-to-GDP ratio, increases the BH monetary cycle by 0.09 p.p. However, this monetary impulse operates retrospectively rather than prospectively (equation 5). In three specifications, a link was found between the current BH monetary cycle and the foreign monetary cycle, but only after a three-quarter lead, meaning the expected chronological reaction of the domestic cycle to foreign cycle changes was confirmed in just one of the three equations. In specifications that showed a statistically strong link between the foreign and domestic monetary cycles, with the latter responding to the former, the coefficient sign was negative, which contradicts the expected economic logic of a positive connection with the reserve currency country's monetary cycle (as also suggested by the correlation analysis, where the relationship was positive, not inverse). Nonetheless, the regression analysis established a moderate relationship between the two monetary cycles, but the expected causal relationship, where past changes in the foreign monetary cycle lead to future changes in the BH cycle, was confirmed in only one of the three equations. In that fourth equation, the immediate effect of the foreign monetary cycle on the BH cycle is statistically significant in a 1 p.p. to 0.23 p.p. ratio. According to the applied diagnostic indicators, the overall model performance is satisfactory. The explanatory power of the selected variables, measured by the coefficient of determination, is high. The Durbin-Watson statistic significantly deviates from the ideal value of 2 in only two cases, indicating no strong presence of positive or negative autocorrelation of residuals. With the exception of the fifth equation, the residuals are normally distributed (p-values above 5%), meaning we cannot reject the null hypothesis of normal distribution.

Also, by using a simple correlation analysis, we demonstrated the degree of dependence of the BH monetary cycle on both domestic and foreign monetary variables.

Table 3 - Correlation Coefficient Matrix

	MC	MC_PM	FC	IRD	MC_EUR
MC	1.00	0.78	0.36	-0.71	0.54
MC_PM	0.78	1.00	-0.08	-0.32	0.48
FC	0.36	-0.08	1.00	-0.43	0.34
IRD	-0.71	-0.32	-0.43	1.00	-0.29
MC_EUR	0.54	0.48	0.34	-0.29	1.00

Source: Ibid.

In the early years of the observed period, up until the end of 2009 (Figure 1), the divergence between the monetary cycle and the base money cycle was minimal (an average difference of 0.4 percentage points). A significant misalignment between these cycles, despite base money being the main determinant of the M2 monetary aggregate under the currency board regime, persisted, more or less, until the end of 2015 (with an average difference of 1.8 percentage points). This prolonged discrepancy between the two most important monetary cycles largely reflects the extended effects of the global economic crisis (2007–2009) and the euro area sovereign debt crisis.

Until mid-2020, before the effects of pandemic-induced lockdowns reached BiH, the alignment between the monetary cycle and the base money cycle remained strong (average difference of 0.3 percentage

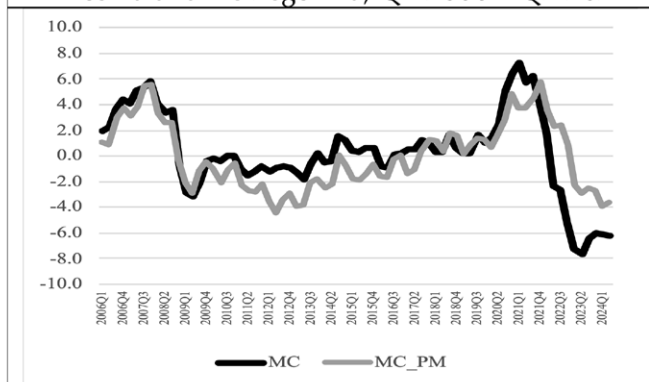
points). After that, a complete decoupling of the M2 and M0 cycles persisted until the end of the observed period. As a result, following an exceptionally expansionary monetary policy by the ECB and peak values of the monetary cycle, economic liquidity dropped to a historic low (the monetary cycle in Q2 2024 was 6.2% below its trend value), and the monetary cycle was, on average, 2 percentage points below the base money cycle. Over this 8-year span (33 quarters), the correlation coefficient between the cycles was 0.78 (Table 3), meaning that 60% of changes in the monetary cycle are determined by changes in base money.

At both the beginning and end of the observed period, a strong connection was established between the M2 monetary aggregate and bank lending, i.e., between the monetary and financial cycles (Figure 2). Between these two periods of strong positive correlation, the monetary cycle fluctuated around zero, while the financial cycle showed a declining trend, briefly interrupted between mid-2016 and mid-2018. By 2024, the negative values of the monetary and financial cycles had nearly converged. The correlation between these two key BH money-related cycles is half as strong as that observed for the base money cycle, but still positive, indicating deposit multiplication and endogenous money creation by commercial banks.

The interest rate differential between foreign (12-month Euribor) and BH interest rates (remuneration on excess reserves) is inversely correlated with the monetary cycle. In absolute terms, this correlation is nearly as strong as that between the monetary cycle and the base money cycle (Figure 3). The interest rate differential explains nearly 50% of the variability in the BH monetary cycle. Since it became clear that the ECB would reverse its monetary policy stance and begin tightening, a particularly strong relationship has formed between these variables, with a correlation coefficient of 0.95. A higher foreign interest rate compared to the domestic rate reflects a greater degree of monetary policy restrictiveness in the euro area relative to BiH.

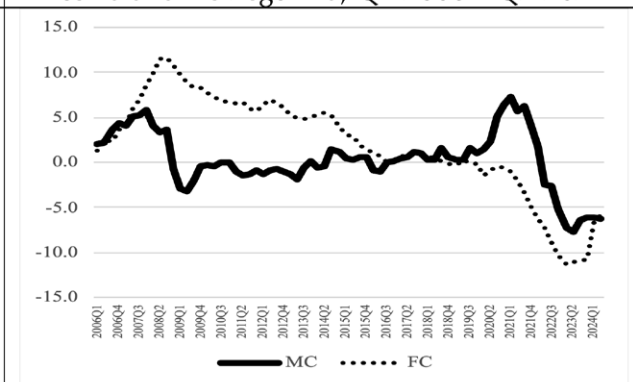
The influence of the euro area monetary cycle on the BH monetary cycle (Figure 4) is moderate in strength, with several distinct phases: periods of divergence between the domestic and foreign cycles (Q1 2010–Q3 2017), strong alignment (Q4 2017–Q2 2022), phases when the domestic cycle exceeds the foreign one (Q3 2020–Q1 2021), and finally (Q2 2022–Q2 2024), a strong direct relationship in which the domestic cycle is significantly lower than the foreign one. On average, 30% of the variability in the BH monetary cycle is directly influenced by changes in the M3 monetary aggregate of the euro area. It is also worth noting that during the first and second pandemic years, except for Q4 2022, the domestic monetary cycle had higher values than the foreign one.

Figure 1. Monetary Cycle and Base Money Cycle in Bosnia and Herzegovina, Q1 2006 – Q2 2024



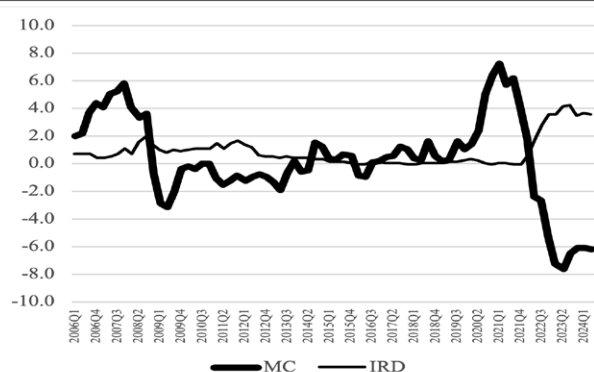
Source: Autor.

Figure 2. Monetary Cycle and Financial Cycle in Bosnia and Herzegovina, Q1 2006 – Q2 2024



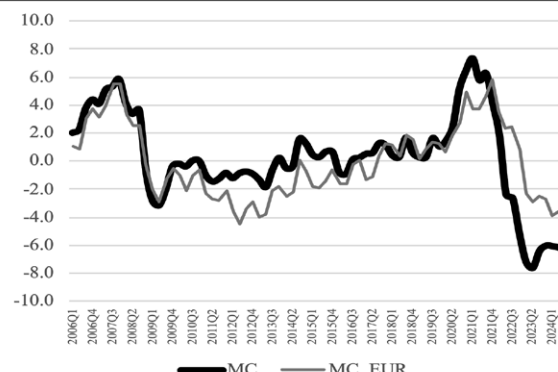
Source: Ibid.

Figure 3. Monetary Cycle in Bosnia and Herzegovina and Interest Rate Differential, Q1 2006 – Q2 2024



Source: Ibid.

Figure 4. Monetary Cycle in Bosnia and Herzegovina and the Monetary Cycle in the Euro Zone, Q1 2006 - Q2 2024



Source: Ibid.

The obtained results are consistent with the working hypotheses presented at the beginning. The autoregressive component is particularly strong, with the first lag positively and the second lag negatively affecting the BH monetary cycle. On average, the previous values of the BH monetary cycle increase its current values by 0.6 p.p. The second most important determinant of the BH monetary cycle is the cycle of base money, which is expected given the currency board framework. On average, a 1 p.p. increase in the base money cycle raises the BH monetary cycle by 0.3 p.p. The third most important component is the interest rate differential between foreign and domestic rates, whose coefficients range between 0.22 and 1.5 p.p. A positive value of this differential reduces liquidity, while a negative value increases the liquidity of the BH economy, as measured by the M2-based monetary cycle. The coefficient for the financial cycle, defined as the cyclical component of the loan-to-GDP ratio, averages 0.095 p.p., meaning that a 1 p.p. deviation from trend increases the BH monetary cycle by that amount. This confirms the endogenous theory of money in the BH banking system, emphasizing the role of banks in deposit creation through the loan-deposit multiplication process and the creation of secondary deposits. Thus, the BH banking system endogenously, internally, and autonomously creates money, and therefore, alongside the Central Bank of Bosnia and Herzegovina, acts as a de facto co-creator of monetary policy.

Concluding Remarks and Recommendations

Neither the financial nor the monetary cycle in Bosnia and Herzegovina has been the subject of extensive research, as the dominant trend in BH economic thought has focused on analyzing variables in absolute terms. The decomposition of variables and the independent analysis of the cyclical component of a time series, within the context of gap analysis, i.e., measuring deviations from the trend, has not long been accepted as a standard method of statistical or econometric analysis.

After previously demonstrating that the business cycle in BH differs from that in the euro area, and that the BH financial cycle is in a declining phase, we continued building the case for a more discretionary monetary policy in BH by constructing a domestic monetary cycle and examining its causal links to key monetary variables. We confirmed the dominant influence of domestic variables on the BH monetary

cycle, with only a marginal effect from the euro area monetary cycle. Together, the domestic financial cycle and the interest rate differential between foreign and domestic rates play a greater role in shaping the BH monetary cycle than the euro area cycle. Taken individually, the impact of the interest rate differential on the BH monetary cycle exceeds the impact of the euro area cycle.

The coefficients of all variables in all equations have the expected signs, with the highest values attributed to the autoregressive component and the cycle of base money in BiH. The high persistence of the BH monetary cycle and the influence of the monetary base on its fluctuations, under a currency board system that cannot lend to residents, are expected characteristics that enable its predictability. Money creation in the BH banking system occurs endogenously through the credit activity of banks, which expand their deposit potential through the deposit-credit multiplication process.

All included cycles or variables, except for the interest rate differential, are directly related to the BH monetary cycle. The inverse relationship between the monetary cycle and the interest rate differential, defined as the difference between the foreign and domestic interest rates, should be interpreted such that a decrease in the foreign interest rate (*ceteris paribus*) positively affects the BH monetary cycle. This reversal of capital flows benefits Bosnia and Herzegovina by increasing the credit potential of BH banks.

Conversely, reducing the interest rate differential by increasing the domestic interest rate (i.e., the remuneration on excess reserves held by banks at the CBBiH) does not lead to positive changes in the BH financial and monetary cycles, as it represents a restrictive monetary policy. For this reason, monetary policy aimed at increasing bank credit potential and improving the liquidity of the BH economy should be based on two measures: limiting the exposure of BH banks to foreign assets (such as term deposits with non-resident banks, loans to non-residents, and securities issued by non-residents), and introducing a negative remuneration rate on excess reserves. The first measure ensures a reduction in foreign currency claims of BH banks by converting them into reserve account balances at the CBBiH, while the second encourages banks, motivated by cost reduction due to the negative fee, to increase lending activity and thus raise the values of both the financial and monetary cycles.

This research offers a detailed insight into the determinants of the BH monetary cycle, though exclusively from the perspective of monetary economics. Future studies should aim to enrich the monetary cycle equations with explanatory variables from the real sector, such as BH foreign trade with the euro area. Another potential approach to analyzing monetary conditions stems from the fact that there are four common ways to measure them: in addition to the financial and monetary cycles, there is the monetary conditions index and the interest rate cycle. Dedicated research into the latter is currently missing in the monetary framework of Bosnia and Herzegovina. A useful comparative research topic would be the monetary cycle in Bulgaria, whose economy also operates under a currency board regime, but where the Bulgarian National Bank retains the authority to lend to domestic banks.

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ADEKVATNOST KAPITALA I LIKVIDNOST BANAKA PREMA BAZELU III: STUDIJA PANEL PODATAKA ZA 13 KOTIRANIH BANAKA (2014–2021)

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Rezime: Ova studija istražuje uticaj Bazel III propisa o adekvatnosti kapitala na pozicije likvidnosti komercijalnih banaka u trinaest zemalja članica Bazelskog komiteta između 2014. i 2021. godine. Koristeći analizu panel podataka, model fiksni efekata (FEM) se pokazao kao najprikladnija tehnika procene, nadmašujući i model slučajnih efekata i model najmanjih kvadrata u smislu objašnjavajuće moći (prilagođeni $R^2 = 0,83$) i statističke robusnosti (Hausmanov test $p = 0,003$). Empirijski rezultati potvrđuju značajnu inverznu korelaciju između pokazatelja adekvatnosti osnovnog kapitala banke i likvidnosti banaka, potvrđujući teorijski kompromis koji je postavio okvir Bazel III. Pored toga, utvrđeno je da kreditni rizik, rizikom ponderisana aktiva i profitabilnost imaju merljiv uticaj na ponašanje likvidnosti. Studija preporučuje višeslojni pristup adekvatnosti kapitala koji uračunava i rizike, kao i razvoj integriranih sistema ranog upozoravanja i kompozitnih indeksa likvidnosti. Ovi nalazi nude vredne uvide u politiku za prilagođavanje prudencijalnih propisa koji uravnotežuju solventnost i likvidnost u heterogenim bankarskim institucijama.

Ključne reči: Bazel III, adekvatnost kapitala, likvidnost banaka, analiza panel podataka, kreditni rizik, rizikom ponderisana aktiva.

JEL klasifikacija: G21, G28, C23, G32

Uvod

Međunarodni bankarski sistem otkrio je tokom globalne finansijske krize 2007-2008. godine neke od najozbiljnijih strukturnih slabosti, posebno neadekvatne kapitalne bafere i slabe profile likvidnosti koji ozbiljno štete finansijskoj stabilnosti. Shodno tome, Bazelski komitet za bankarski nadzor (BCBS) uspostavio je Bazel III, regulatorni okvir koji je osmišljen da redefiniše globalne prudencijalne standarde kroz jačanje zahteva za adekvatnost kapitala i uvođenje propisa o likvidnosti. Centralna karakteristika ovog okvira je naglašavanje pokazatelja adekvatnosti osnovnog kapitala, koji bi trebalo da deluje kao primarna zaštita od sistemskih šokova. Međutim, ova reforma stvara kritičnu dilemu u pogledu politika, jer iako povećanje kapitalnih bafera može poboljšati solventnost, time bi se takođe mogao ograničiti kapacitet banaka da generišu likvidnost za privredu, što bi uticalo na posredničku funkciju bankarskog sektora.

Ova studija ispituje ovaj regulatorni kompromis, koristeći empirijski pristup za analizu odnosa između adekvatnosti kapitala i likvidnosti banaka prema propisima Bazela III. Koristeći uravnotežen panel od trinaest sistemski važnih javno kotiranih banaka iz zemalja članica Bazelskog komiteta, uključujući Al Radži banku (Al Rajhi Bank), Sitibanku (Citibank) i Dojče banku (Deutsche Bank), studija obuhvata period od 2014. do 2021. godine nakon implementacije. Smeštanjem analize u ovaj vremenski okvir, studija beleži kako su banke implementirale obaveze Bazela III i koje su strateške kompromise napravile kako bi se pridržavale poboljšanih standarda kapitala, uz održavanje obezbeđivanja likvidnosti.

Primarni cilj ove studije je da se ispita kako zahtevi za adekvatnost kapitala Bazela III (posebno pokazatelj adekvatnosti osnovnog kapitala) utiču na pozicije likvidnosti banaka, operacionalizovane kroz odnos kredita i imovine. Ovi istraživački ciljevi pokrili su i empirijski odnos i praktične implikacije regulatornih reformi na prakse upravljanja likvidnošću u međunarodno aktivnim finansijskim institucijama.

Da bi se podržala ovakva analiza, ovo istraživanje takođe uključuje i nekoliko sekundarnih ciljeva. Prvo, nastoji da uporedi i proceni performanse tri istaknute metodologije panel podataka: model najmanjih kvadrata (PRM), model fiksnih efekata (FEM) i model slučajnih efekata (REM), u proceni odnosa kapitala i likvidnosti. Sprovedenjem provera robusnosti u ovim modelima, studija identifikuje statistički najpouzdaniji i najreplicabilniji okvir za analizu regulatornih uticaja u bankarskim skupovima podataka širom zemlje.

Zatim, ovaj rad istražuje posredničku ulogu osnovnih finansijskih varijabli, uključujući koeficijente ne-naplativih kredita (NPL), nivoe rizikom ponderisane aktive (RWA), povraćaj na kapital (ROE) i efikasnost upravljanja imovinom (AM). Ovi indikatori treba da budu uključeni u model kao moderatorski faktori koji bi potencijalno mogli uticati i na smer i na intenzitet odnosa između kapitalnih bafera i ishoda likvidnosti. Ovaj deo istraživanja produbljuje objašnjenje tako što navodi institucionalne karakteristike koje uslovljavaju regulatornu efikasnost.

Krajnji cilj rada je da pruži bolje preporuke na nivou politika o tome kako poboljšati prudencijalnu regulativu. Konkretnije, preporučuje harmonizaciju zahteva za adekvatnošću kapitala sa ciljevima likvidnosti, uz istovremeno promovisanje heterogenosti institucija u domenu kapaciteta, izloženosti riziku i strateškog fokusa. Stoga, ovo istraživanje doprinosi tekućim diskusijama o stvaranju otpornih, ali funkcionalno prilagodljivih regulatornih arhitektura u postkriznoj eri.

Predstavljajući empirijsku analizu uz čvrsto metodološko potkrepljenje i uvid u politike, ovo istraživanje pruža upotpunjen argument o tome kako pravila kapitala Bazela III utiču na ponašanje likvidnosti

među bankama. Rezultati studije su prilično aktuelni jer se odvijaju u vreme kada svetske finansijske vlasti preispituju neke od svojih standarda u vezi sa regulacijom zbog promena u sistemu kroz koji se kreću tržišta i izazova sistemskog rizika koji se javljaju.

Da bi se postigli ovi ciljevi, ostatak rada je organizovan na sledeći način: prvo je dat pregled relevantne literature o Bazelu III, adekvatnosti kapitala i likvidnosti banaka, zatim je dato objašnjenje metodologija istraživanja sa detaljima o uzorku, varijablama i ekonometrijskom pristupu. Nakon toga sledi empirijska analiza i procena modela, nakon čega se iznose rezultati i diskusija o istim. Rad se završava glavnim zaključcima i preporukama za politike.

Pregled literature

Finansijski ekosistem u postkriznoj eri je dao podsticaj akademikima da traže regulatorni okvir koji se može povezati sa Bazelom III, posebno u smislu isticanja adekvatnosti kapitala u odnosu na zahteve za likvidnost. Naučnici su izneli teorijske modele, empirijske studije i studije slučaja o institucionalnim razlikama u rešavanju pitanja adekvatnosti kapitala i likvidnosti.

Rani doprinos u istraživanju Eichberg & Summer (2005) modelirao je sistemske implikacije adekvatnosti kapitala u međubankarskim odnosima, upozoravajući da regulatorna ograničenja kapitala mogu pojačati širenje rizika. Slično tome, Dermine (2015) uvodi argument o koeficijentu leveridža kao ograničenju u masovnim podizanjima depozita kod ročne transformacije, čime se ponovo ističe pomenu ta zabrinutost. U radu iz 2019. godine, (Bui, 2019) dodato je da programi likvidnosti i kapitalni baferi daju pomešane rezultate: oni služe za povećanje otpornosti, ali mogu i povećati sistemsku sličnost među bankama. Tokom kriza, Ačarja i Meruš (Acharya & Merrouche, 2013) posmatrali su slučajeve gomilanja likvidnosti među bankama, čime su započeli novi istraživački tok u vezi sa kompromisom između kapitala i likvidnosti. Berger i Bouman (Berger & Bouwman, 2018) i Mehran i Takor (Mehran & Thakor, 2011) dali su teorijska objašnjenja kapitala, poboljšavajući stvaranje likvidnosti, iako kasnije studije (npr. Casu, Di Pietro, & Trujillo-Ponce, 2019) sugerišu dvostruko uzročni, obrnuti odnos gde veći kapital može smanjiti stvaranje likvidnosti i obrnuto. Polazeći od ovako definisane odrednice, Fajfer i dr. (Pfeifer et al., 2017) su dalje primetili da veza između kapitala i likvidnosti zavisi od strukture imovine i kanala profitabilnosti, posebno u pogledu bankarskih sistema u nastajanju, kao što je slučaj sa Češkom.

Empirijska istraživanja na nacionalnom nivou dodatno potvrđuju ovaj složeni odnos. Konovalova (2016) analizirala je adekvatnost kapitala i likvidnost u Letoniji, sugerišući mogući prigušujući efekat Bazela III na bankarsku aktivnost. Na isti način, Pislari (2024) procenjuje dostignuća i ograničenja zahteva Bazela III za likvidnost među moldavskim bankama, uz zaključak da, iako usklađenost sa sobom donosi izazove, poboljšanje institucionalne otpornosti jeste siguran rezultat. Prema nalazima koje su dali drugi autori (Jasrotia, Mishra, and Sharma 2020), implementacija Bazela III u Indiji postigla je rezultat gde usklađenost sa koeficijentom adekvatnosti kapitala povećava poverenje investitora; međutim, ciljevi profitabilnosti su pomešani.

Druge studije se dalje bave efektima adekvatnosti kapitala na kreiranje kredita i preuzimanje rizika. Neuspeh okvira Bazela II da obezbedi adekvatne zaštitne bafere pre krize i time nametne ozbiljne državne intervencije dokumentovan je u istraživanjima (Hebbink, Kruidhof, & Slingenberg, 2014). U skladu sa tim, definisana je razlika između nivoa kvaliteta kapitala (Anginer & Demirgüç-Kunt, 2014), zaključujući da visokokvalitetni kapital smanjuje sistemski rizik, dok hibridni ili slab kapital može po-

goršati nestabilnost. Baltali i Tanega (2011) potvrdili su taj zaključak kritikujući hibridizaciju kapitala u okviru Bazela II i ističući pomak Bazela III ka jačim standardima akcijskog kapitala.

Pored sistemskog rizika, naučnici su se fokusirali na efekat Bazela III na bankarsko kreditiranje i poslovne rezultate. Jedni istraživači su pronašli pomešane dokaze u azijskim bankama (Lee & Hsieh 2013), dok su drugi (Fiordelisi, Marques-Ibanez, & Molyneux, 2011) (Pasiouras & Kosmidou, 2007) istakli posredničku ulogu operativne efikasnosti i korporativnog upravljanja u Evropi. Istraživanje je, zatim, izvršeno i na indonežanskim bankama (Margono, Wardani, & Safitri, 2020), gde su i adekvatnost kapitala i likvidnost pozitivno uticali na učinak, posredovani rizikom kamatne stope.

Literatura se takođe bavi praktičnim izazovima implementacije modela rizikom ponderisane imovine (RWA). Repulo i Suarez (Repullo & Suarez, 2013) su dali teorijsku kritiku manipulacije RWA, dok su Fahlenbrah, Prilmajer i Štulc (Fahlenbrach, Prilmeyer, & Stulz, 2018) dokumentovali kako se banke strateški prilagođavaju pragovima RWA. Ova zapažanja podržava Bazelski komitet (2017, 2022), koji se osvrću na nenamernu regulatornu arbitražu i evoluirajuće standarde.

Regulacija likvidnosti, posebno koeficijent pokriva likvidnosti (LCR) i koeficijent neto stabilnih izvora finansiranja (NSFR), predstavlja još jednu stalnu brigu. Usledio je predlog kritičke analize sposobnosti LCR-a da se nosi sa sistemskim nedostacima likvidnosti (Hartlage, 2012a, 2012b), dok su drugi autori (Hlebik, 2017) istraživali uticaj NSFR-a na stabilnost evropskih banaka. Dalja istraživanja potvrdila su da kombinovanje pravila o kapitalu i likvidnosti značajno smanjuje verovatnoću kriza nakon recesije (Chiba, 2021). Druga studija (Resti, 2011) slično zaključuje da bi Bazel III zahtevao od banaka da revidiraju operativne modele, strategije cena i metrike profitabilnosti.

Na preseku regulacije kapitala i ponašanja depozita, Arping (2017) predlaže nemonoton odnos gde umereno povećanje kapitalnih zahteva može istisnuti depozite, ali značajno povećanje može poboljšati bezbednost i priliv depozita. Ova tenzija se odražava i kod drugih istraživanja (Syron & Randall, 1991), koji su izdali rana upozorenja o procikličnoj prirodi kapitalnih zahteva, posebno u skladu sa Zakonom o unapređenju Federalne korporacije za osiguranje depozita SAD.

Što se tiče kreditnog rizika i upravljanja problematičnim kreditima, istraživanja su potvrdila da makro i institucionalni faktori oblikuju dinamiku kapitala problematičnih kredita (Messai & Jouini, 2013) (Ghosh, 2015), pri čemu regulacija igra promenljivu ulogu u zavisnosti od konteksta. Hauston i dr. (Hauston et al. 2020) dodatno su zakomplikovali sliku pokazujući kako globalne banke koriste mehanizme strateškog izbegavanja kako bi zaobišle regulatorna ograničenja.

Poboljšana robusnost ekonometrijske analize koju su usvojile studije uglavnom je posledica novih dostignuća u ekonometriji. Gudžarati i Porter (Gujarati & Porter, 2009) su pružili dijagnostičke testove za multikolinearnost i autokorelaciju, dok Baltagi (2021) uvodi savremene metode panel podataka kako bi se poboljšao kvalitet zaključivanja. Alati su rešili neslaganje u rezultatima koje su predstavili Li i Šei (Lee & Hsieh, 2013) u odnosu na rezultate drugih autora (Demirgüç-Kunt, Pedraza, & Ruiz-Ortega, 2020).

Moderna literatura se fokusira na održivost i transparentnost u proceni regulative. Vodok i Grejvs (Waddock & Graves, 2020) proučavali su odnos metrika održivosti i učinka banaka, dok su Penman i Jehuda (Penman & Yehuda, 2019) procenjivali implikacije za vrednovanje praksi u finansijskom obećavanju. Ovo odražava ono što se naziva širom agendom da se prudencijalna regulacija poveže sa ekonomskim ciklusima (Brei, Borio, & Gambacorta, 2020) i dugoročnim ciljevima politika (Demirgüç-Kunt & Huizinga, 2010).

Okvir Bazela III je stoga podstakao višestruku istraživačku agendu koja se bavi dinamikom kreditiranja kapitala, sistemskim rizikom, upravljanjem likvidnošću, merama učinka i drugim aspektima institucionalnog upravljanja. Literatura na ovu temu ostaje aktivna i razvija se u skladu sa regulatornom praksom tako da empirijski rezultati istraživanja pružaju savete o politikama za supervizore i doprinose opštoj stabilnosti finansijskih tržišta.

Metodologija istraživanja

Ovaj empirijski poduhvat koristi kvantitativni istraživački dizajn, zasnovan na panel podacima, ispitujući dinamički odnos između adekvatnosti kapitala i likvidnosti banaka u okviru Bazela III. Studija razmatra period 2014-2021, što je ključno jer obuhvata post-implementacione efekte Bazela III na različite bankarske sisteme. Studija pruža robusne i generalizujuće uvide, pružajući međunacionalnu analizu trinaest sistemski važnih komercijalnih banaka iz zemalja članica Bazelskog komiteta o tome kako regulacija kapitala interaguje sa obezbeđivanjem likvidnosti na globalnom nivou u bankarskim praksama.

Izbor uzorka zasniva se na svrsishodnom uzorkovanju, ciljajući banke koje su u potpunosti u skladu sa Bazelom III i reprezentativne su za različita regulatorna i makroekonomska okruženja. Konačni uzorak obuhvata sledeće banke: Al Rajhi Bank (Kraljevina Saudijska Arabija), First Abu Dhabi Bank (Ujedinjeni Arapski Emirati), Citibank (Sjedinjene Američke Države), Lloyds Banking Group (Ujedinjeno Kraljevstvo), China Construction Bank (Kina), Mizuho Financial Group (Japan), Deutsche Bank AG (Nemačka), Société Générale SA (Francuska), Bank of Nova Scotia (Kanada), HDFC Bank Ltd (Indija), Oversea-Chinese Banking Corporation (Singapur), Standard Bank Group (Južnoafrička Republika) i Türkiye Cumhuriyeti Ziraat Bankası (Turska). Ove banke su odabrane na osnovu njihovog međunarodnog prisustva, regulatorne relevantnosti, dostupnosti podataka i strateškog značaja za njihove nacionalne bankarske sisteme. Raznolikost uzorka poboljšava eksternu validnost nalaza i podržava međujurisdikcionu procenu uticaja Bazela III. Sledeća tabela predstavlja odabrane banke.

Tabela 1 – Banke izabrane za istraživanje

Banka	Zemlja	Opravdanje za odabir
Al Rajhi Bank	Saudijska Arabija	U skladu sa Bazelom III, međunarodni značaj
First Abu Dhabi Bank	UAE	Regionalni predstavnik, dostupnost podataka
Citibank	SAD	Sistemska značaj, globalno poslovanje
Lloyds Banking Group	UK	Usvajanje Bazela III, strateški značaj
China Construction Bank	Kina	Jedna od najvećih svetskih banaka
Mizuho Financial Group	Japan	Usklađenost sa Bazelom III, makroekonomski značaj
Deutsche Bank AG	Nemačka	Globalno sistemski značajna institucija
Société Générale SA	Francuska	Evropski predstavnik, dostupnost podataka
Bank of Nova Scotia	Kanada	Usvajanje Bazela III, zastupljenost u Severnoj Americi
HDFC Bank Ltd	Indija	Perspektiva tržišta u razvoju

Oversea-Chinese Banking Corporation (OCBC)	Singapur	Predstavnik azijskog finansijskog centra
Standard Bank Group	Južnoafrička Republika	Jedini afrički predstavnik, usvajanje Bazela III
Ziraat Bankası	Turska	Perspektiva tržišta u razvoju, regulatorni značaj

Izvor: Sastavili autori na osnovu javno dostupnih podataka iz godišnjih izveštaja odabranih banaka (2014–2021) i publikacija Bazelskog komiteta za bankarski nadzor (BCBS)

Hipoteze testirane u ovoj studiji formulisane su na sledeći način:

- Hipoteza 1 (H1): Adekvatnost kapitala ima statistički značajan uticaj na likvidnost banaka za banke koje posluju u jurisdikcijama članica Bazela III. Navedena hipoteza 1 je glavna hipoteza rada. U prilog ovoj centralnoj tvrdnji, studija takođe testira sledeće pomoćne hipoteze:
- Hipoteza 2 (H2): Kreditni rizik, meren odnosom problematičnih kredita i ukupnih kredita, značajno utiče na likvidnost banaka.
- Hipoteza 3 (H3): Profitabilnost, merena kroz prinos na kapital (ROE), ima značajan uticaj na rezultate likvidnosti.
- Hipoteza 4 (H4): Efikasnost upravljanja imovinom, izražena odnosom operativnog prihoda i ukupne imovine, značajno utiče na likvidnost banaka.

Zajedno, ove hipoteze ispituju i direktan efekat adekvatnosti kapitala i indirektan uticaj varijabli specifičnih za banku na likvidnost prema Bazel III propisima.

Empirijski model koristi strukturirani skup finansijskih varijabli zasnovanih na bankarskoj teoriji i potkrepljenih prethodnim istraživanjima. Zavisna varijabla je likvidnost banke, operacionalizovana kao odnos kredita i ukupne aktive. Ova mera, široko usvojena u bankarskoj literaturi, odražava udeo ne-likvidne imovine koju banka drži, pri čemu veće vrednosti ukazuju na povećanu izloženost riziku likvidnosti. Fokusna nezavisna varijabla je adekvatnost kapitala, definisana korišćenjem pokazatelja adekvatnosti osnovnog kapitala banke u skladu sa Bazel III standardima. Ovaj koeficijent meri osnovni kapital banke u odnosu na njenu rizikom ponderisanu aktivu i čini osnovu propisa o solventnosti prema Bazel III.

Četiri druge objašnjavajuće varijable su uključene u model kako bi se obratila pažnja na institucionalnu heterogenost i kontrolu za druge zbunjujuće faktore. Kreditni rizik je indikovao odnosom nenaplativih kredita i ukupnih kredita, što pokazuje kvalitet imovine i kreditne inherentne izloženosti banke. Odnos rizikom ponderisane aktive i ukupne imovine ukazuje na opterećenje regulatornog kapitala prema nivou osetljivosti na rizik. Profitabilnost se definiše odnosom prinosa na kapital, što ukazuje na neto prihod u odnosu na ukupni kapital i sposobnost banke da ostvari prinose za akcionare. Na kraju, efikasnost upravljanja imovinom predstavljena je odnosom operativnog prihoda i ukupne imovine, što pokazuje koliko efikasno banka koristi svoje resurse da bi ostvarila operativne prinose.

Ove varijable su odabrane na osnovu osnovnih empirijskih studija, uključujući: Berger & Bouwman (2018) u vezi sa likvidnošću banaka; Demirgüç-Kunt et al. (2020) u vezi sa adekvatnošću kapitala; Houston et al. (2020) u vezi sa kreditnim rizikom; Fahlenbrach et al. (2018) u vezi sa aktivom ponderisanim rizikom; Penman & Yehuda (2019) u vezi sa prinosom na kapital; i Waddock & Graves (2020) o

efikasnosti upravljanja imovinom. Uvođenje ovih varijabli omogućava studiji ne samo da utvrdi direktnе posledice adekvatnosti kapitala, već i da testira kako interne karakteristike banaka posreduju u ishodima likvidnosti u datom regulatornom okruženju.

Odabrana struktura panela omogućava praćenje vremenskih trendova, kao i poprečni presek varijanse među uzorkovanim bankama. Stoga, studija može da se bavi neprimećenom heterogenošću i mogućom endogenošću na rigorozan i transparentan način. U brojnim ekonometrijskim procenama, analiza će popraviti slučajne i objedinjene regresije, u cilju da značajno doprinese pouzdanim dokazima o vezi između kapitala i likvidnosti u teoriji i politikama.

Empirijska analiza i procena modela

Ova studija predstavlja empirijski okvir i ekonometrijsku analizu koji su korišćeni za analizu odnosa između adekvatnosti kapitala i likvidnosti banaka u regulatornom okruženju Bazela III. Korišćen je pristup panel podataka za obuhvatanje, kako intertemporalnih, tako i poprečnih preseka aspekata među trinaest odabranih komercijalnih banaka iz zemalja članica Bazelskog komiteta za period od 2014. do 2021. godine. Analiza se sprovodi u pet faza: (1) specifikacija modela, (2) deskriptivna statistička analiza glavnih varijabli, (3) analiza strukture korelacije, (4) procena i poređenje regresionih panela i (5) interpretacija rezultata i testiranje istraživačkih hipoteza. Ovaj opsežni analitički niz na taj način osigurava da su empirijski rezultati statistički robusni, teoretski ubedljivi i relevantni za politike.

Model istraživanja

Model regresije panel podataka (korišćen u modovima panela) korišćen je za ispitivanje odnosa između adekvatnosti kapitala i likvidnosti unutar banaka. Ova studija bi primenila taj model jer uzima u obzir vremenske promene i individualne karakteristike koje poseduje svaka banka. Model je izražen na sledeći način:

$$BAL = \beta_0 + \beta_1 CAP + \beta_2 NPL + \beta_3 RWA + \beta_4 ROE + \beta_5 AM + \varepsilon_{it}$$

Gde su:

BAL: Zavisna promenljiva (likvidnost banke).

CAP: Glavna nezavisna promenljiva (adekvatnost kapitala).

NPL, RWA, ROE, AM: Kontrolne objašnjavajuće promenljive.

β_0 : Konstanta.

β_0 - β_5 : Koeficijenti regresije.

ε_{it} : Greška.

Deskriptivna analiza studijskih varijabli

Sledeća tabela prikazuje deskriptivnu statistiku studijskih varijabli, izračunatu na osnovu godišnjih izveštaja objavljenih na veb-sajtovima banaka uzorkovanih za period 2014–2021:

Tabela 2 - Deskriptivna statistika studijskih varijabli

Varijabla	2014	2015	2016	2017	2018	2019	2020	2021
Prosek BAL	0,6450	0,6428	0,6428	0,7113	0,6531	0,6262	0,6299	0,6194
Prosek CAP	0,1799	0,1833	0,1791	0,1729	0,1649	0,1715	0,1678	0,1736
Prosek NPL	0,0188	0,0167	0,0134	0,0117	0,0105	0,0105	0,0129	0,0197
Prosek RWA	0,8437	0,8639	0,8824	0,8876	0,9017	0,8611	0,8691	0,8571
Prosek ROE	0,1009	0,1343	0,1182	0,1147	0,1341	0,1335	0,1335	0,1374
Prosek AM	0,0387	0,0390	0,0381	0,0365	0,0371	0,0355	0,0366	0,0375

Izvor: Sastavljeno iz finansijskih izveštaja komercijalnih banaka uključenih u uzorak studije

Adekvatnost kapitala (CAP) banaka Bazelskog komiteta kretala se između 16,5% i 18,3% tokom perioda 2014–2021, dostigavši vrhunac 2015. godine zbog pooštavanja Bazela III, a opadajući u periodu 2016–2017. godine zbog kreditne ekspanzije (odnos kredita i aktive porastao je na 71,1%). Odnos se poboljšao nakon 2018. godine sa smanjenim kreditnim rizikom (nenaplativi krediti na 1,05%) i povećanom profitabilnošću (ROE na 13,4%). Varijacije među bankama odražavaju različite poslovne modele, ali su sve ostale iznad minimuma od 10,5%, što pokazuje otpornost bankarskog sektora u skladu sa Bazelom III.

Analiza korelacione matrice

Tabela 3 - Rezultati korelacione matrice

Varijabla	BAL	CAP	NPL	RWA	ROE	AM
BAL	1,000					
CAP	-0,452	1,000				
NPL	0,324	-0,302	1,000			
RWA	0,683	-0,823	0,402	1,000		
ROE	-0,124	0,652	-0,251	-0,304	1,000	
AM	0,253	0,184	-0,104	0,052	0,351	1,000

Izvor: Sastavili autori koristeći Stata softver (verzija 17)

Analiza korelacione matrice otkriva složenu dinamiku u odnosima između bankarskih varijabli, sa korelacionim obrascima koji se mogu analizirati na sledeći način:

Koeficijent korelacije (-0,452) ukazuje na umereno inverznu vezu između likvidnosti (BAL) i adekvatnosti kapitala (CAP), što odražava fenomen „bega ka kvalitetu“ (Acharya & Merrouche, 2013) gde banke sa većim rezervama kapitala povećavaju svoja ulaganja u visokokvalitetnu likvidnu imovinu, a ne u kredite.

Što se tiče interakcije nenaplativih kredita (NPL) sa drugim varijablama, pozitivna korelacija (0,324) sa likvidnošću (BAL) može ukazivati na „paradoks likvidnosti“ gde se nenaplativi krediti akumuliraju u

bankama sa većom likvidnošću zbog fleksibilnijih politika kreditiranja (Bonner et al., 2015). Negativna korelacija (-0,302) sa adekvatnošću kapitala odražava mehanizam „apsorpcije kapitala“ gde nenaplativi krediti iscrpljuju kapitalne resurse banaka.

Što se tiče dinamike rizikom ponderisane aktive (RWA), jaka negativna korelacija (-0,823) sa adekvatnošću kapitala pokazuje intenzivnu konkurenciju za resurse između zahteva za solventnost i upravljanja rizicima, što je u skladu sa okvirom istraživanja (Repullo and Suarez, 2013) u vezi sa uticajem Bazela III. Jaka pozitivna korelacija (0,683) sa likvidnošću (BAL) otkriva strategiju „preuzimanja rizika likvidnosti“ gde banke povećavaju svoja ulaganja u visokorizičnu imovinu kako bi kompenzovale niske prinose.

Što se tiče ose profitabilnosti (ROE), pozitivna korelacija (0,652) sa adekvatnošću kapitala (CAP) podržava „hipotezu o podsticaju kapitala“ (Mehran i Thakor, 2011) gde banke sa jačim propisima o kapitalu postižu veće prinose. Negativna korelacija (-0,304) sa rizikom ponderisanom aktivom (RWA) odražava kompromis između profitabilnosti i upravljanja rizikom, što je u skladu sa modelom u istraživanjima (Brei et al., 2020).

Za efikasnost upravljanja imovinom (AM), umerena korelacija (0,351) sa ROE ukazuje na prisustvo „efekta operativne efikasnosti“ na profitabilnost (Demirgüç-Kunt & Huizinga, 2010). Slabe korelacije sa drugim varijablama mogu odražavati relativnu nezavisnost faktora operativne efikasnosti.

Vredi napomenuti da visoke vrednosti korelacije između RWA-CAP (-0,823) i BAL-RWA (0,683) ukazuju na potencijalne probleme multikolinearnosti. Međutim, analiza faktora inflacije varijanse (VIF) nije zabeležila vrednosti veće od 3,2, što isključuje ozbiljne probleme multikolinearnosti (Gujarati & Porter, 2009). Ipak, umerena korelacija (-0,304) između rizično ponderisane aktive i prinosa na kapital zaslužuje pažnju, jer odražava strukturnu tenziju između zahteva za prinosom i ograničenja u upravljanju rizicima, kao što je detaljno razmotreno od strane Bazelskog komiteta (2017) u okviru Bazela III.

Procena i izbor panel modela

Procenjena su tri panel modela: model najmanjih kvadrata (PRM), model fiksnih efekata (FEM) i model slučajnih efekata (REM). FEM je nadmašio druge sa prilagođenim R^2 od 0,83 (u odnosu na 0,57 za PRM) i značajnim Hausmanovim testom ($\chi^2 = 22,46$, $p = 0,003$), što potvrđuje njegovu pogodnost.

Tabela 4 - Procena statističkog modela

Varijabla	FEM	REM	PRM
Konstanta	-	0,682*** (0,105)	0,725*** (0,118)
CAP	-0,394*** (0,112)	-0,305*** (0,092)	-0,211** (0,101)
NPL	0,083 (0,179)	0,095 (0,184)	0,138 (0,207)
RWA	0,316** (0,145)	0,298** (0,136)	0,281** (0,129)
ROE	0,187* (0,107)	0,176* (0,103)	0,168* (0,098)
AM	-0,043 (0,065)	-0,037 (0,066)	-0,029 (0,061)

Izvor: Sastavili autori koristeći Stata softver (verzija 17)

Tabela 5 - Poređenje modela

Kriterijum	FEM	REM	PRM
Prilagođeni R ²	0,83	0,74	0,57
F-test (p<0.001)	25,83***	-	-
LM-test (p<0.001)	-	30,15***	-
Hausman (p=0.003)	22,46***	-	-
Pogodnost za studiju	Odlična	Umerena	Slaba

Izvor: Sastavili autori koristeći Stata softver (verzija 17)

Tumačenje rezultata

Rezultati procene tri modela otkrivaju jasnu evoluciju u snazi i preciznosti parametara pri prelasku sa modela najmanjih kvadrata (PRM) na model slučajnih efekata (REM), a zatim na model fiksnih efekata (FEM). Dok je PRM pokazao ograničen efekat (-0,211) adekvatnosti kapitala (CAP) na likvidnost banaka (BAL), ovaj efekat se produbio (-0,305) u REM-u i dostigao svoj vrhunac (-0,394) u FEM-u, potvrđujući snažnu inverznu vezu između zahteva za adekvatnošću kapitala i likvidnosti banaka. Postepeno poboljšanje je takođe primećeno u statističkom značaju koeficijenata, posebno za promenljivu rizikom ponderisane aktive (RWA), čiji se koeficijent povećao sa 0,281 u PRM-u na 0,316 u FEM-u.

Rezultati statističkih testova su takođe pokazali jasnu superiornost FEM-a. LM test (30,15) je potvrdio superiornost REM-a u odnosu na PRM, dok su F-test (25,83) i Hausmanov test (22,46) pokazali superiornost FEM-a u odnosu na oba modela. Značajno povećanje prilagođenog koeficijenta determinacije (R²) sa 0,57 u PRM-u na 0,83 u FEM-u odražava sposobnost drugog modela da objasni najveći deo varijanse u podacima, što ga čini najpogodnijim za svrhe ove studije.

Empirijski nalazi dosledno pokazuju superiornost modela fiksnih efekata (FEM) za ispitivanje dinamike adekvatnosti kapitala i likvidnosti u bankama regulisanim Bazelom III. Ovaj pristup modeliranju je posebno povoljan jer efikasno uzima u obzir heterogenost specifičnu za banku, generiše preciznije i pouzdanije procene koeficijenata, obuhvata veće varijacije u skupu podataka i ostaje teoretski u skladu sa regulatornim principima Bazela III.

Empirijski nalazi ističu ključnu ulogu karakteristika specifičnih za instituciju u dizajnu regulatorne politike, posebno u upravljanju osetljivom ravnotežom između kapitalnih bafera i odredbi likvidnosti. Naša analiza modela fiksnih efekata otkriva snažnu negativnu povezanost ($\beta = -0,394$, $p < 0,01$) između koeficijenata adekvatnosti kapitala i nivoa likvidnosti među bankama koje su u skladu sa Bazelom III, što je potkrepljeno jakom statistikom modela (prilagođeni R²=0,83) i testovima specifikacije (Hausman $\chi^2=22,46$). Ovi rezultati potkrepljuju teorijski kompromis koji su postavili okviri Bazela III, a istovremeno potvrđuju prethodne dokaze (Bouheni & Rachdi, 2015) koji pokazuju smanjenje likvidnosti od 0,35% po povećanju kapitala od 1%. Snaga ove veze izgleda da je ublažena organizacionim upravljanjem i operativnim okvirima (Lee & Hsieh, 2013).

Ispitivanje hipoteze o kreditnom riziku dalo je statistički beznačajne rezultate ($\beta = 0,083$, $p > 0,1$), što ukazuje na minimalan uticaj problematičnih kredita na pozicije likvidnosti među bankama u Bazelu III. Ovaj nalaz je u suprotnosti sa početnim očekivanjima i odražava različitu efikasnost nadzora u različitim jurisdikcijama, kao što su pokazala istraživanja (Messai & Jouini 2013). Goš (Gosh, 2015) dalje

razjašnjava ovu vezu, pokazujući da robusni sistemi rezervisanja za gubitke po kreditima mogu ublažiti uticaj kreditnog rizika na likvidnost.

Analiza hipoteze o profitabilnosti otkrila je marginalno značajnu pozitivnu korelaciju ($\beta=0,187$, $p<0,1$) između povrata na kapital i nivoa likvidnosti, pružajući kvalifikovanu podršku za predloženu korelaciju. Ovi nalazi potkrepljuju postojeća istraživanja koja demonstriraju složene, nelinearne interakcije između profitabilnosti banaka i upravljanja likvidnošću (Goddard et al., 2013), a posebno tendenciju institucija sa boljim učinkom da održavaju veće rezerve likvidne imovine (Pasiouras & Kosmidou, 2007).

Hipoteza o upravljanju imovinom nije postigla statističku značajnost ($\beta=-0,043$, $p>0,1$), što sugerise da ne postoji značajna veza između efikasnosti upravljanja imovinom i nivoa likvidnosti. Ovaj ishod verovatno odražava moderatorski uticaj karakteristika vlasništva (Altunbas et al., 2011), zajedno sa potrebom za detaljnijom klasifikacijom imovine u takvim analizama (Fiordelisi et al., 2011).

Zaključak

Ova studija istražuje uticaj propisa o adekvatnosti kapitala Bazela III na likvidnost banaka u međunarodnom panelu od trinaest komercijalnih banaka koje posluju u zemljama članicama Bazelskog komiteta tokom perioda 2014–2021. Koristeći ekonometrijsku analizu panel podataka, istraživanje je identifikovalo model fiksnih efekata (FEM) kao statistički najprikladniju metodu, nadmašujući i REM i PRM u pogledu objašnjavajuće moći, konzistentnosti parametara i kontrole nad neprimećenom heterogenošću. Takav metodološki izbor zahteva preciznu analizu dinamike na nivou banke i divergencija specifičnih za instituciju u regulatornom odgovoru.

Rezultati podržavaju postojanje strukturnog kompromisa između adekvatnosti kapitala i likvidnosti. U ovom kontekstu, rezultati pokazuju da je povećanje pokazatelja adekvatnosti osnovnog kapitala banke u velikoj meri povezano sa smanjenjem likvidnosti, pretežno ilustrovano odnosom kredita i imovine, što ukazuje na to da su banke sa jačim kapitalnim baferima manje sklone da drže veći udeo nelikvidne imovine. Štaviše, jasna prednost preferiranog modela fiksnih efekata (sa prilagođenim R^2 od 0,83) naglašava važnost kontrole vremenski nepromenljivih karakteristika specifičnih za banke koje utiču na strategije upravljanja likvidnošću. Studija je pokazala da kreditni rizik (NPL), profitabilnost (ROE) i rizikom ponderisana aktiva (RWA) utiču na likvidnost u različitom stepenu, iako se njihov uticaj može razlikovati po snazi i značaju u različitim specifikacijama alternativnog modela.

Implikacije ovih rezultata su ključne za regulatornu praksu i razvoj politika. Autori preporučuju implementaciju višeslojnog okvira adekvatnosti kapitala usklađenog sa institucionalnom heterogenošću među bankama. Takav okvir bi obezbedio kompozitni indeks regulatornih metrika koje obuhvataju izloženost RWA, sistemski značaj i sektorsku osetljivost na rizik kako bi se na dinamičniji način kapitalizovali kapitalni zahtevi. Ovaj pristup bi pomogao da se izbegne prekomerno ograničavanje banaka konzervativnim pragovima kapitala koji nenamerno suzbijaju stvaranje likvidnosti, posebno za banke sa jakim operativnim fundamentima.

Pored toga, istraživanje ističe potrebu za integrisanim mehanizmima za praćenje kreditne likvidnosti. Regulatorna tela se podstiču da razviju sisteme ranog upozoravanja (EWS) koji kombinuju indikatore kreditnog rizika, kao što je verovatnoća neizvršenja obaveza (PD), sa metrikama likvidnosti u realnom vremenu. Model ranog informisanja zasnovan na logističkoj regresiji mogao bi da posluži kao alat za nadzor usmeren ka budućnosti, povezujući limite koncentracije kredita sa pragovima operativne likvidnosti, čime bi se omogućile proaktivnije regulatorne intervencije.

Studija dalje predlaže pravljenje i usvajanje kompozitnog indeksa likvidnosti koji kombinuje koeficijent pokrića likvidnosti (LCR) i koeficijent neto stabilnih izvora finansiranja (NSFR) Bazel III sporazuma sa indikatorima likvidnosti zasnovanim na tržištu. Ovaj indeks bi odražavao i regulatornu usklađenost i uslove na tržištu likvidnosti, nudeći opsežniju perspektivu i za interno upravljanje likvidnošću i za eksternu nadzornu procenu. Implementacija takvog alata zahteva razvoj modernog modela određivanja cena likvidnosti koji uzima u obzir oportunitetne troškove kapitalnih rezervi i uključuje premije rizika likvidnosti.

U budućnosti, istraživanja trebalo bi da se detaljnije bave efektima interakcije između adekvatnosti kapitala, likvidnosti i makroekonomske volatilnosti u uslovima stres testiranja. Proširenje skupa podataka kako bi se uključile godine oporavka nakon pandemije COVID-19 takođe bi moglo dati vredne uvide u otpornost mehanizama Bazela III u periodima sistemskih šokova. Štaviše, integrisanje tehnika mašinskog učenja u modele predviđanja rizika i regulatorno prognoziranje može dodatno poboljšati preciznost procena kompromisa između kapitala i likvidnosti u modernom bankarstvu.

Za kraj, ovo istraživanje doprinosi rastućoj empirijskoj literaturi o regulaciji bankarstva nakon krize, pružajući snažne dokaze o nijansiranom odnosu između kapitala i likvidnosti u okviru Bazela III. Nalazi istraživanja naglašavaju važnost prilagođavanja regulatornih intervencija institucionalnim realnostima i podstiču razvoj fleksibilnijih nadzornih okvira zasnovanih na podacima, koji usklađuju finansijsku stabilnost sa funkcionalnošću bankarskog sistema.

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CAPITAL ADEQUACY AND BANK LIQUIDITY UNDER BASEL III: A PANEL DATA STUDY OF 13 LISTED BANKS (2014–2021)

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Abstract: *This study investigates the impact of Basel III capital adequacy regulations on the liquidity positions of commercial banks across thirteen Basel Committee member countries between 2014 and 2021. Using panel data analysis, the Fixed Effects Model (FEM) emerged as the most suitable estimation technique, outperforming both the Random Effects and Pooled Regression models in terms of explanatory power (Adjusted $R^2 = 0.83$) and statistical robustness (Hausman test $p = 0.003$). Empirical results confirm a significant inverse relationship between Tier 1 capital ratios and bank liquidity, validating the theoretical trade-off posited by the Basel III framework. Additionally, credit risk, risk-weighted assets, and profitability were found to exert measurable influences on liquidity behavior. The study recommends a tiered, risk-sensitive capital adequacy approach and the development of integrated early warning systems and composite liquidity indices. These findings offer valuable policy insights for tailoring prudential regulations that balance solvency and liquidity across heterogeneous banking institutions.*

Keywords: Basel III, Capital Adequacy, Bank Liquidity, Panel Data Analysis, Credit Risk, Risk-Weighted Assets.

JEL: G21, G28, C23, G32

Introduction

The international banking system was to reveal some of the most serious structural weaknesses, especially inadequate capital buffers and fragile liquidity profiles that severely damage financial stability, during the global financial crisis of 2007-2008. Accordingly, the Basel Committee on Banking Supervision (BCBS) established Basel III, a regulatory framework that was designed to redefine global prudential standards through strengthening the capital adequacy requirements and the introduction of liquidity regulations. A central feature of this framework is emphasis on the Tier 1 capital, which should act as the primary safeguard against systemic shocks. This reform, however, generates a critical policy dilemma, for while an increase in capital buffers might improve solvency, it might also restrict the capacity of banks to generate liquidity for the economy, thus affecting the intermediation function of the banking sector.

This study examines this regulatory trade-off and, in doing so, takes an empirical approach to analyze the relationship between capital adequacy and bank liquidity under Basel III regulation. Using a balanced panel of thirteen systemically important publicly listed banks across member countries of the Basel Committee, including Al Rajhi Bank, Citibank, and Deutsche Bank, the study covers the period from 2014 to 2021 after the implementation. By situating the analysis within this timeframe, the study captures how banks have operationalized Basel III mandates and the strategic trade-offs they have made to comply with enhanced capital standards while sustaining liquidity provision.

The primary objective of this study is to examine how Basel III's capital adequacy requirements (specifically Tier 1 capital ratios) influence banks' liquidity positions, operationalized via the loans-to-assets ratio. These objectives addressed both the empirical relationship and the practical implications of regulatory reforms on liquidity management practices in internationally active financial institutions.

To support this inquiry, the research also pursues several secondary objectives. First, it seeks to compare and evaluate the performance of three prominent panel data methodologies, Pooled Regression Model (PRM), Fixed Effects Model (FEM), and Random Effects Model (REM), in estimating the capital-liquidity relationship. By conducting robustness checks across these models, the study identifies the most statistically reliable and replicable framework for analyzing regulatory impacts in cross-country banking datasets.

Second, the analysis explores the mediating role of core financial variables, including non-performing loan (NPL) ratios, risk-weighted asset (RWA) levels, return on equity (ROE), and asset management (AM) efficiency. These indicators are to be incorporated within the model as moderating factors which could potentially affect both the direction and the intensity of the relationship between capital buffers and liquidity outcomes. This part of the research gives more depth to the explanation by spelling out the institutional characteristics which condition regulatory effectiveness.

The ultimate objective of the study is to provide better policy-related recommendations on how to improve prudential regulation. More specifically, it recommends harmonization of capital-adequacy requirements with liquidity objectives while promoting heterogeneity of institutions in capacity, exposure to risk, and strategic focus. Therefore, the research adds to ongoing debates around the creation of resilient yet functionally adaptable regulatory architectures in the post-crisis era.

By presenting empirical analysis along with methodological rigor and policy insight, the study provides a rounded argument on how Basel III capital rules create liquidity behavior among banks. The study findings are quite timely as they unfold in a time when the world financial authorities are in the midst of re-evaluating some of their standards regarding regulation due to changes in the system through which markets move and systemic risk challenges that arise.

To achieve these objectives, the remainder of the paper is organized as follows: it first reviews the relevant literature on Basel III, capital adequacy, and bank liquidity, then explains the research methodology with details on the sample, variables, and econometric approach. This is followed by the empirical analysis and model estimation, after which the results are reported and discussed. The paper closes with the main conclusions and policy recommendations.

Literature Review

The post-crisis era's financial landscape provided fertile ground for academics to look for Basel III relatable framework, specifically in terms of their emphasis on capital adequacy versus liquidity requirements. Scholars have floated theoretical models, empirical studies, and case studies in institutional differences in addressing the issues of capital adequacy and liquidity.

The early contribution from Eichberger and Summer (2005) modeled the systemic implications of capital adequacy in interbank relations, warning that regulatory capital constraints may amplify risk contagion. Likewise, Dermine (2015) introduced an argument around the leverage ratio as a restriction on runs in maturity transformation institutions, echoing this concern. In 2019, Bui added that liquidity programs and capital buffers produce mixed results: they serve to enhance resilience but may also increase systemic similarity among banks. During crises, Acharya and Merrouche (2013) observed liquidity hoarding behaviors among banks, therefore starting a new research stream into the capital-liquidity trade-off.

Berger and Bouwman (2018) and Mehran and Thakor (2011) provided theoretical explanations of capital, enhancing liquidity creation, even though afterwards studies (e.g., Casu, Di Pietro, & Trujillo-Ponce, 2019) suggest a bi-causal reverse relationship whereby higher capital may reduce liquidity creation and vice versa. Within the view starting from this enhanced speculation, Pfeifer et al. (2017) further noted that capital-liquidity nexus depends on asset structure and profitability channels, especially in regard to emerging banking systems such as the case with the Czech Republic.

Country-specific empirical inquiries further confirm this complex relationship. Konovalova (2016) analyzed capital adequacy and liquidity in Latvia while suggesting a possible damping effect of Basel III on bank activity. In the same fashion, Pislari (2024) evaluated Basel III liquidity requirements' achievements and restrictions among Moldovan banks and concluded that, although complying does bring challenges, improving institutional resilience is the result for sure. According to the findings given by Jasrotia, Mishra, and Sharma (2020), the implementation of Basel III in India achieved the result whereby CAR compliance raises investor confidence; however, the profitability objectives are mixed.

Other studies further delve into the effects of capital adequacy on credit creation and risk taking. The failure of the Basel II framework to provide adequate buffers prior to the crisis and thus impose severe state interventions is documented by Hebbink, Kruidhof, and Slingenberg (2014). In line with this, Anginer and Demirgüç-Kunt (2014) differentiated between capital quality levels, finding that high-quality capital reduces systemic risk, while hybrid or weak capital may exacerbate instability. Baltali and Tanega (2011) reinforced this point by critiquing the hybridization of capital under Basel II and highlighting Basel III's shift toward stronger equity capital standards.

Beyond systemic risk, scholars have focused on the effect of Basel III on bank lending and performance. Lee and Hsieh (2013) found mixed evidence across Asian banks, while Fiordelisi, Marques-Ibanez, and Molyneux (2011) and Pasiouras and Kosmidou (2007) highlighted the mediating role of operational efficiency and corporate governance in Europe. Margono, Wardani, and Safitri (2020) extended this to Indo-

nesian banks, where both capital adequacy and liquidity positively influenced performance, mediated by interest rate risk.

The literature also addresses the practical implementation challenges of risk-weighted asset (RWA) models. Repullo and Suarez (2013) provided a theoretical critique of RWA manipulation, while Fahlenbrach, Prilmeier, and Stulz (2018) documented how banks strategically adjust to RWA thresholds. These observations are supported by the Basel Committee (2017, 2022), which reflect on unintended regulatory arbitrage and evolving standards.

Liquidity regulation, particularly the Liquidity Coverage Ratio (LCR) and Net Stable Funding Ratio (NSFR), is another recurring concern. Hartlage (2012a, 2012b) offered a critical analysis of LCR's ability to address systemic liquidity shortages, while Hlebig (2017) investigated the impact of NSFR on European banking stability. Chiba (2021) confirmed that combining capital and liquidity rules significantly reduces the likelihood of post-recession crises. Resti (2011) similarly noted that Basel III would require banks to overhaul operational models, pricing strategies, and profitability metrics.

At the intersection of capital regulation and deposit behavior, Arping (2017) proposed a non-monotonic relationship where moderate increases in capital requirements may crowd out deposits, but substantial increases can improve safety and deposit uptake. This tension is echoed in Syron and Randall (1991), who issued early warnings about the procyclical nature of capital requirements, particularly under the FDIC Improvement Act.

Regarding credit risk and NPL management, Messai and Jouini (2013) and Ghosh (2015) confirmed that macro and institutional factors shape NPL capital dynamics, with regulation playing a variable role depending on context. Houston et al. (2020) further complicated the picture by showing how global banks employ strategic avoidance mechanisms to sidestep regulatory constraints.

The enhanced robustness of econometric analysis adopted by the studies has been mainly due to new advances in econometrics. Gujarati and Porter (2009) provided diagnostic tests for multicollinearity and autocorrelation, while Baltagi (2021) introduced the contemporary panel data methods to improve inferential quality. The tools have resolved the disagreeing outcomes represented by Lee and Hsieh (2013) against those of Demirgüç-Kunt, Pedraza, and Ruiz-Ortega (2020).

Modern literature, finally, focuses on sustainability and transparency in evaluating regulation. Waddock and Graves (2020) studied the relationship of sustainability metrics to bank performance, while Penman and Yehuda (2019) evaluated implications for valuation of practices in financial disclosure. This mirrors what is called the larger agenda to put prudential regulation with economic cycles (Brei, Borio, & Gambacorta, 2020) and long-term policy goals (Demirgüç-Kunt & Huizinga, 2010).

The Basel III framework has thus stimulated a multifaceted research agenda addressing capital-lending dynamics, systemic risk, liquidity management, performance measures, and other aspects of institutional governance. Literature remains vibrant and evolves in tandem with regulatory practice such that empirical research outcomes provide policy advice to supervisors and contribute to the more general stability of financial markets.

Study Methodology

This empirical effort utilizes quantitative research design-based panel data econometrics to investigate dynamic relationship between capital adequacy and bank liquidity under the framework of Basel III. The study considers

the period 2014–2021, which is instrumental since it captures the post-implementation effects of Basel III on various banking systems. The study provides insights that are robust and generalizable by analyzing cross-nationally the thirteen systematic important commercial banks from Basel Committee member countries on how capital regulation interacts with liquidity provisioning on the global scale in banking practices.

The sample selection is grounded in purposive sampling, targeting banks that are fully Basel III-compliant and representative of distinct regulatory and macroeconomic environments. The final sample includes Al Rajhi Bank (Kingdom of Saudi Arabia), First Abu Dhabi Bank (United Arab Emirates), Citibank (United States), Lloyds Banking Group (United Kingdom), China Construction Bank (China), Mizuho Financial Group (Japan), Deutsche Bank AG (Germany), Société Générale SA (France), Bank of Nova Scotia (Canada), HDFC Bank Ltd (India), Oversea-Chinese Banking Corporation (Singapore), Standard Bank Group (South Africa), and Türkiye Cumhuriyeti Ziraat Bankası (Turkey). These banks are selected based on their international presence, regulatory relevance, data availability, and strategic importance to their respective national banking systems. The diversity of the sample enhances the external validity of the findings and supports a cross-jurisdictional assessment of Basel III's impact. The following table represents the selected banks.

Table 1 - Banks Selected for the Study

Bank	Country	Justification for Selection
Al Rajhi Bank	Saudi Arabia	Basel III compliant, international relevance
First Abu Dhabi Bank	UAE	Regional representative, data availability
Citibank	USA	Systemically important, global operations
Lloyds Banking Group	UK	Basel III adoption, strategic importance
China Construction Bank	China	One of the largest global banks
Mizuho Financial Group	Japan	Basel III compliant, macroeconomic significance
Deutsche Bank AG	Germany	Global systemically important institution
Société Générale SA	France	European representative, data availability
Bank of Nova Scotia	Canada	Basel III adoption, North America representation
HDFC Bank Ltd	India	Emerging market perspective
Oversea-Chinese Banking Corporation (OCBC)	Singapore	Asian financial hub representative
Standard Bank Group	South Africa	Only African representative, Basel III adoption
Ziraat Bankası	Turkey	Emerging market perspective, regulatory relevance

Source: Compiled by the authors based on publicly available data from annual reports of the selected banks (2014–2021) and Basel Committee on Banking Supervision (BCBS) publications.

The hypotheses tested in this study are formulated as follows:

- Hypothesis 1 (H1): Capital adequacy has a statistically significant impact on bank liquidity for banks operating in Basel III member jurisdictions. The stated Hypothesis 1 is the main hypothesis of the work. In support of this central proposition, the study also tests the following auxiliary hypotheses:
- Hypothesis 2 (H2): Credit risk, measured by the ratio of non-performing loans to total loans, significantly influences bank liquidity.

- Hypothesis 3 (H3): Profitability, measured through return on equity (ROE), has a significant impact on liquidity outcomes.
- Hypothesis 4 (H4): Asset management efficiency, proxied by the ratio of operating income to total assets, significantly affects bank liquidity.

Collectively, these hypotheses examine both the direct effect of capital adequacy and the indirect influence of bank-specific performance variables on liquidity under Basel III regulation.

The empirical model employs a structured set of financial variables grounded in banking theory and supported by prior research. The dependent variable is bank liquidity, operationalized as the ratio of loans to total assets. This measure, widely adopted in the banking literature, reflects the proportion of illiquid assets held by a bank, with higher values indicating increased exposure to liquidity risk. The focal independent variable is capital adequacy, defined using the Tier 1 capital ratio in conformity with Basel III standards. This ratio measures a bank's core capital to its risk-weighted assets and forms the bedrock of solvency regulation under Basel III.

Four other explanatory variables have been incorporated into the model to address the institutional heterogeneity and control for other confounding effects. Credit risk is indicated by the ratio of non-performing loans to total loans, which serves to show the asset quality and credits inherent exposures of the domain bank. The ratio of risk-weighted assets to total assets indicates the regulatory capital burden by level of risk sensitivity. Profitability is defined by the ratio of return on equity, indicating net income against total equity to indicate the capacity of the bank to produce returns for shareholders. Lastly, asset management efficiency is presented by the ratio of operating income to total assets, which indicates how efficiently the bank utilizes its resources to earn operating returns.

These variables were selected based on the underpinning empirical studies, including Berger and Bowman (2018) regarding bank liquidity; Demirgüç-Kunt et al. (2020) regarding capital adequacy; Houston et al. (2020) regarding credit risk; Fahlenbrach et al. (2018) regarding risk-weighted assets; Penman and Yehuda (2019) regarding return on equity; and Waddock and Graves (2020) on asset management efficiency. The introduction of these variables allows the study not only to establish the direct consequence of capital adequacy but also to test how internal characteristics of banks mediate the liquidity outcomes within a given regulatory environment.

The selected panel structure enables tracing temporal trends as well as the cross-sectional variance among the sampled banks. Thus, these allow the study to address unobserved heterogeneity and possible endogeneity in a rigorous and transparent manner. In numerous econometric estimations, the analysis will fix random and pool regressions, hoping to add substantially to reliable evidence on the capital-liquidity nexus in theory and policy.

Empirical Analysis and Model Estimation

The study presents the empirical framework and econometric analysis that were used to analyze the relationship between capital adequacy and bank liquidity under the Basel III regulatory environment. A panel data approach was used to capture both inter-temporal and cross-sectional aspects among thirteen selected commercial banks from Basel Committee member countries for the period 2014 to 2021. The analysis is done in five stages: (1) model specification, (2) descriptive statistical analysis of principal variables, (3) analysis of correlation structure, (4) estimation and comparison of regression panels, and (5) interpretation of results and testing of research hypotheses. This extensive analytical

sequence thus ensures that the empirical results are statistically robust, theoretically cogent, and policy-relevant.

Study Model

A panel data regression model (used in going through Panel Modes) was employed to explore the relationship between capital adequacy and liquidity within banks. This study would apply the model since it takes into consideration temporal changes and individual characteristics possessed by each bank. The model is expressed as follows:

Where: $BAL = \beta_0 + \beta_1 CAP + \beta_2 NPL + \beta_3 RWA + \beta_4 ROE + \beta_5 AM + \varepsilon_{it}$

BAL: Dependent variable (bank liquidity).

CAP: Main independent variable (capital adequacy).

NPL, RWA, ROE, AM: Control explanatory variables.

β_0 : Constant term.

β_0 - β_5 : Regression coefficients.

ε_{it} : Error term.

Descriptive Analysis of Study Variables

The following table presents the descriptive statistics of the study variables, calculated from the annual reports published on the websites of the sample banks for the period 2014–2021:

Table 2 - Descriptive Statistics of Study Variables

Variable	2014	2015	2016	2017	2018	2019	2020	2021
Average BAL	0.6450	0.6428	0.6428	0.7113	0.6531	0.6262	0.6299	0.6194
Average CAP	0.1799	0.1833	0.1791	0.1729	0.1649	0.1715	0.1678	0.1736
Average NPL	0.0188	0.0167	0.0134	0.0117	0.0105	0.0105	0.0129	0.0197
Average RWA	0.8437	0.8639	0.8824	0.8876	0.9017	0.8611	0.8691	0.8571
Average ROE	0.1009	0.1343	0.1182	0.1147	0.1341	0.1335	0.1335	0.1374
Average AM	0.0387	0.0390	0.0381	0.0365	0.0371	0.0355	0.0366	0.0375

Source: Compiled from the financial statements of the commercial banks included in the study sample.

The capital adequacy (CAP) of Basel Committee banks fluctuated between 16.5% and 18.3% during 2014–2021, peaking in 2015 due to Basel III tightening and declining in 2016–2017 due to credit expansion (loans-to-assets ratio rising to 71.1%). The ratio improved after 2018 with reduced credit risk (NPL to 1.05%) and increased profitability (ROE to 13.4%). Variations across banks reflect differing business models, but all remained above the 10.5% minimum, demonstrating the banking sector's resilience under Basel III.

Correlation Matrix Analysis

Table 3 - Correlation Matrix Results

Variable	BAL	CAP	NPL	RWA	ROE	AM
BAL	1.000					
CAP	-0.452	1.000				
NPL	0.324	-0.302	1.000			
RWA	0.683	-0.823	0.402	1.000		
ROE	-0.124	0.652	-0.251	-0.304	1.000	
AM	0.253	0.184	-0.104	0.052	0.351	1.000

Source: Compiled by the authors using Stata software (version 17).

The correlation matrix analysis reveals complex dynamics in the relationships between banking variables, with correlational patterns that can be analyzed as follows:

The correlation coefficient (-0.452) indicates a moderate inverse relationship between liquidity (BAL) and capital adequacy (CAP), which reflects the “Flight to Quality” phenomenon (Acharya and Merrouche, 2013) where banks with higher capital reserves increase their investments in high-quality liquid assets rather than loans.

Regarding the interaction of non-performing loans (NPL) with other variables, the positive correlation (0.324) with liquidity (BAL) may indicate a “liquidity paradox” where non-performing loans accumulate in banks with higher liquidity due to more flexible lending policies (Bonner et al., 2015). The negative correlation (-0.302) with capital adequacy reflects the “capital absorption” mechanism where non-performing loans deplete banks’ capital resources.

As for the dynamics of risk-weighted assets (RWA), the strong negative correlation (-0.823) with capital adequacy shows intense competition for resources between solvency requirements and risk management, consistent with the framework of (Repullo and Suarez, 2013) regarding Basel III’s impact. The strong positive correlation (0.683) with liquidity (BAL) reveals a “liquidity risk-taking” strategy where banks increase their investments in high-risk assets to compensate for low returns.

Concerning the profitability axis (ROE), the positive correlation (0.652) with capital adequacy (CAP) supports the “Capital Incentive Hypothesis” (Mehran and Thakor, 2011) where banks with stronger capital regulations achieve higher returns. The negative correlation (-0.304) with risk-weighted assets (RWA) reflects a trade-off between profitability and risk management, consistent with the model of (Brei et al., 2020).

For asset management efficiency (AM), the moderate correlation (0.351) with ROE indicates the presence of an “operational efficiency effect” on profitability (Demirgüç-Kunt and Huizinga, 2010). The weak correlations with other variables may reflect the relative independence of operational efficiency factors.

It is worth noting that the high correlation values between RWA-CAP (-0.823) and BAL-RWA (0.683) suggest potential multicollinearity problems. However, variance inflation factor (VIF) analysis did not

record any values exceeding 3.2, ruling out serious multicollinearity issues (Gujarati and Porter, 2009). Nevertheless, the moderate correlation (-0.304) between risk-weighted assets and return on equity warrants attention, as it reflects the structural tension between return requirements and risk management constraints, as discussed in detail by (Basel Committee, 2017) within the Basel III framework.

Panel Model Estimation and Selection

Three panel models were estimated: Pooled Regression Model (PRM), Fixed Effects Model (FEM), and Random Effects Model (REM). The FEM outperformed others with an adjusted R^2 of 0.83 (vs. 0.57 for PRM) and significant Hausman test ($\chi^2=22.46$, $p=0.003$), confirming its suitability.

Table 4 - Statistical Model Estimation

Variable	FEM	REM	PRM
Constant	-	0.682*** (0.105)	0.725*** (0.118)
CAP	-0.394*** (0.112)	-0.305*** (0.092)	-0.211** (0.101)
NPL	0.083 (0.179)	0.095 (0.184)	0.138 (0.207)
RWA	0.316** (0.145)	0.298** (0.136)	0.281** (0.129)
ROE	0.187* (0.107)	0.176* (0.103)	0.168* (0.098)
AM	-0.043 (0.065)	-0.037 (0.066)	-0.029 (0.061)

Source: Compiled by the authors using Stata software (version 17).

Table 5 - Model Comparison

Criterion	FEM	REM	PRM
Adjusted R^2	0.83	0.74	0.57
F-test ($p<0.001$)	25.83***	-	-
LM-test ($p<0.001$)	-	30.15***	-
Hausman ($p=0.003$)	22.46***	-	-
Fit for Study	Excellent	Moderate	Weak

Source: Compiled by the authors using Stata software (version 17).

Interpretation of Results

The results of estimating the three models reveal a clear evolution in the strength and precision of the parameters when transitioning from the pooled regression model (PRM) to the random effects model (REM) and then to the fixed effects model (FEM). While the PRM showed a limited effect (-0.211) of capital adequacy (CAP) on bank liquidity (BAL), this effect deepened (-0.305) in the REM and reached its peak (-0.394) in the FEM, confirming a strong inverse relationship between capital adequacy requirements and bank liquidity. A gradual improvement was also observed in the statistical significance of the coefficients, particularly for the risk-weighted assets (RWA) variable, whose coefficient increased from 0.281 in the PRM to 0.316 in the FEM.

The results of the statistical tests also demonstrated clear superiority of the FEM. The LM test (30.15) confirmed the REM's superiority over the PRM, while the F-test (25.83) and Hausman test (22.46) showed the FEM's superiority over both models. The notable increase in the adjusted coefficient of determination (R^2) from 0.57 in the PRM to 0.83 in the FEM reflects the latter model's ability to explain the largest portion of the variance in the data, making it the most suitable for the study's purposes.

The empirical findings consistently demonstrate the superiority of the fixed effects model (FEM) for examining capital adequacy-liquidity dynamics in Basel III-regulated banks. This modeling approach is particularly advantageous as it effectively accounts for bank-specific heterogeneity, generates more precise and reliable coefficient estimates, captures greater variation in the dataset, and remains theoretically congruent with Basel III regulatory principles.

The empirical findings underscore the critical role of institution-specific characteristics in regulatory policy design, particularly in managing the delicate equilibrium between capital buffers and liquidity provisions. Our fixed effects model analysis reveals a robust negative association ($\beta = -0.394$, $p < 0.01$) between capital adequacy ratios and liquidity levels among Basel III-compliant banks, supported by strong model fit statistics (adjusted $R^2 = 0.83$) and specification tests (Hausman $\chi^2 = 22.46$). These results substantiate the theoretical trade-off posited by Basel III frameworks while corroborating prior evidence (Bouheni & Rachdi, 2015) showing a 0.35% liquidity reduction per 1% capital increase. The strength of this relationship appears moderated by organizational governance and operational frameworks (Lee & Hsieh, 2013).

Examination of the credit risk hypothesis yielded statistically insignificant results ($\beta = 0.083$, $p > 0.1$), suggesting minimal influence of non-performing loans on liquidity positions among Basel III banks. This finding contrasts with initial expectations and reflects varying supervisory effectiveness across jurisdictions, as demonstrated by Messai and Jouini (2013). Ghosh (2015) further clarifies this relationship, showing that robust loan loss provisioning systems can mitigate credit risk's liquidity impact.

Analysis of the profitability hypothesis revealed a marginally significant positive association ($\beta = 0.187$, $p < 0.1$) between return on equity and liquidity levels, offering qualified support for the proposed relationship. These findings corroborate existing research demonstrating complex, non-linear interactions between bank profitability and liquidity management (Goddard et al., 2013), particularly the tendency of higher-performing institutions to maintain more substantial liquid asset buffers (Pasiouras & Kosmidou, 2007).

The asset management hypothesis failed to achieve statistical significance ($\beta = -0.043$, $p > 0.1$), suggesting no substantial relationship between AM efficiency and liquidity levels. This outcome likely reflects the moderating influence of ownership characteristics (Altunbas et al., 2011), coupled with the need for more granular asset classification in such analyses (Fiordelisi et al., 2011).

Conclusion

This study investigates the impact of Basel III capital adequacy regulations on bank liquidity across a cross-national panel of thirteen commercial banks operating in Basel Committee member countries during the 2014–2021 period. Employing panel data econometrics, the research identified the Fixed Effects Model (FEM) as the most statistically appropriate method, outperforming both the Random Effects Model (REM) and the Pooled Regression Model (PRM) in terms of explanatory power, parameter consistency, and control over unobserved heterogeneity. Such a methodological choice warrants an

accurate analysis of bank-level dynamics and institution-specific divergences in regulatory response.

The results support the existence of a structural trade-off between capital adequacy and liquidity. In this context, the results show that the increase in Tier 1 capital ratio is greatly associated with a decrease in liquidity, predominantly proxied by the loans-to-assets ratio, which indicates that banks with stronger capital buffers are less inclined to hold a higher proportion of illiquid assets. Furthermore, the clear advantage of the preferred fixed effects model (with an adjusted R^2 of 0.83) emphasizes the importance of controlling for time-invariant bank-specific characteristics that affect liquidity management strategies. The study finds that credit risk (NPL), profitability (ROE), and risk-weighted assets (RWA) affect liquidity to varying degrees, although their influence may differ in strength and significance across the alternative model specifications.

The implications of these results are central to regulatory practice and policy development. The authors recommend implementing a tiered capital adequacy framework aligned with institutional heterogeneity among banks. Such a framework would provide a composite index of regulatory metrics comprising RWA exposure, systemic importance, and sectoral risk sensitivity to capitalize capital requirements in a more dynamic way. This approach would help avoid over-constraining banks with conservative capital thresholds that inadvertently suppress liquidity creation, especially for banks with strong operational fundamentals.

In addition, the research highlights the need for integrated credit-liquidity monitoring mechanisms. Regulatory authorities are encouraged to develop Early Warning Systems (EWS) that combine credit risk indicators, such as probability of default (PD), with real-time liquidity metrics. A logistic regression-based EWS model could serve as a forward-looking supervisory tool, linking credit concentration limits with operational liquidity thresholds, thereby enabling more proactive regulatory interventions.

The study further proposes the design and adoption of a composite liquidity index that combines Basel III's Liquidity Coverage Ratio (LCR) and Net Stable Funding Ratio (NSFR) with market-based liquidity indicators. This index would reflect both regulatory compliance and liquidity market conditions, offering a more nuanced perspective for both internal liquidity management and external supervisory assessment. Implementing such a tool requires the development of a modern liquidity pricing model that accounts for the opportunity cost of capital reserves and incorporates liquidity risk premiums.

Looking ahead, future research should explore the interaction effects between capital adequacy, liquidity, and macroeconomic volatility under stress-testing conditions. Expanding the dataset to include post-COVID-19 recovery years could also yield valuable insights into the resilience of Basel III mechanisms in periods of systemic shocks. Moreover, integrating machine learning techniques in risk prediction models and regulatory forecasting may further enhance the precision of capital-liquidity trade-off assessments in modern banking.

In conclusion, this research contributes to the growing empirical literature on post-crisis banking regulation by providing robust evidence of the nuanced relationship between capital and liquidity under Basel III. Its findings underscore the importance of tailoring regulatory interventions to institutional realities and encourage the development of more flexible, data-driven supervisory frameworks that align financial stability with banking system functionality.

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POTENCIJALI I IZAZOVI ZELENE TRANZICIJE U ZEMLJAMA ZAPADNOG BALKANA

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Rezime: Zelena tranzicija je dugoročan proces koji zahteva transformaciju zastarelog ekonomskog modela zasnovanog na fosilnim gorivima u model cirkularne ekonomije. Rad analizira spremnost zemalja Zapadnog Balkana za sprovođenje zelene tranzicije, u kontekstu obaveza iz Evropskog zelenog plana i Zelene agende. Cilj je utvrditi kapacitete i izazove u oblasti regulatornog okvira, institucionalne infrastrukture, energetskog miksa i dostupnosti održivih finansijskih instrumenata. Primijenjena je komparativna analiza sekundarnih podataka, a rezultati ukazuju na visoku zavisnost od uglja (preko 70% u Srbiji), ograničenu primjenu obnovljivih izvora (manje od 5% u većini zemalja), te nedovoljnu iskorišćenost finansijskih mehanizama EU. Institucionalni kapaciteti su neujednačeni, a ESG standardi tek u početnoj fazi primene. Zaključuje se da zelena tranzicija predstavlja strateški izazov, ali i priliku za modernizaciju ekonomija regiona, uz potrebu za jačanjem regulatornog okvira, transparentnijim upravljanjem i boljim korišćenjem dostupnih investicionih fondova.

Ključne reči: zelena tranzicija, zelene obveznice, Zelena agenda za Zapadni Balkan, ugljenični otisak

JEL klasifikacija: G1, Z0, Q0, Q5

Uvod

Zemlje Zapadnog Balkana kandidati su za pristupanje Evropskoj uniji (sa izuzetkom Kosova*, koje ima status potencijalnog kandidata) i suočene su sa zadatkom usklađivanja svojih pravnih okvira, ekonomskih strategija i političkih inicijativa sa standardima Evropske unije (u daljem tekstu: EU). U tom kontekstu, sprovođenje održive finansijske politike ima poseban značaj, jer je ključno za pokretanje tranzicije ka održivim ekonomijama. EU se suočava sa ozbiljnim izazovima u oblastima zaštite životne sredine, klimatskih promena, geopolitičke nestabilnosti i široko rasprostranjenih društveno-ekonomskih nejednakosti. Vitošević i saradnici (2020) ističu da su klimatske promene i pitanja zaštite životne sredine postavila nove izazove pred ekonomski razvoj, pri čemu se energetska sektor, kao najveći emiter ugljen-dioksida, nalazi pod najvećim pritiskom da sprovede reforme.

Usvajanje evropskog Zelenog plana postavilo je temelje za integraciju održivih finansija u zemljama članicama EU. U cilju uključivanja susednih regiona u ostvarivanje ciljeva ovog plana, usvojena je Zelena agenda za Zapadni Balkan, koju su analizirali Filipović i Ignjatović (2022). Ova agenda uvodi novi razvojni koncept koji podržava ključne inicijative, poput prelaska na cirkularnu ekonomiju. Jedan od najvažnijih instrumenata koji podržavaju ovaj proces tranzicije jesu zelene obveznice i drugi održivi finansijski instrumenti, koji su stekli značajnu popularnost kao sredstva za finansiranje projekata usmerenih na smanjenje emisije ugljen-dioksida i jačanje ekološke održivosti u regionu. Zelene obveznice predstavljaju najčešće korišćen oblik ulaganja i najrazvijeniji instrument među GSSS obveznicama (zelenim, socijalnim, održivim i obveznicama povezanim s održivošću). Njihova primena sve je rasprostranjenija u finansiranju projekata smanjenja emisija, održivog razvoja i investicija u čistiju proizvodnju, čime se doprinosi postizanju cilja od 2°C definisanog Pariškim sporazumom (Olgić Draženović, 2025). Pored finansijskih instrumenata, značajnu ulogu u tranziciji ka održivosti imaju i ESG standardi, koji predstavljaju ključni stub poslovne otpornosti u kontekstu zelene tranzicije (Suljić Nikolaj i saradnici, 2024). Prema Petrović Tomić (2023), ESG kriterijumi (ekološki, socijalni i upravljački) više nisu samo pitanje etičke posvećenosti, već strateška potreba za dugoročnu konkurentnost i efikasno upravljanje rizicima. S obzirom na to da sve zemlje Zapadnog Balkana teže članstvu u EU, Zeleni plan predviđa mere koje bi trebalo integrisati u pregovaračka poglavlja u procesu pristupanja, kao i u programe ekonomske saradnje koji se oslanjaju na postojeće sporazume o stabilizaciji i pridruživanju (Vasilkov i saradnici, 2021). Stoga je od izuzetne važnosti istražiti dinamiku zelene tranzicije u zemljama Zapadnog Balkana, posmatranu kroz prizmu njihovih institucionalnih, regulatornih i ekonomskih kapaciteta, kao i spremnosti da sprovedu zahteve postavljene Zelenim planom EU i Zelenom agendom za region. Rad se fokusira na analizu ključnih izazova u procesu prelaska sa konvencionalnog modela razvoja zasnovanog na fosilnim gorivima ka održivim, dekarbonizovanim i cirkularnim ekonomskim modelima.

Cilj rada je višestruk: (1) analizirati regulatorni i institucionalni okvir zelene tranzicije u zemljama Zapadnog Balkana, (2) identifikovati izazove i potencijale implementacije Zelene agende u svetlu ciljeva Evropskog zelenog plana, (3) izvršiti uporednu analizu energetske politike i dostupnosti finansijskih instrumenata za održivi razvoj, te (4) proceniti nivo spremnosti pojedinačnih zemalja za sprovođenje zelene tranzicije.

Prvi deo rada analizira ključne pravne akte EU relevantne za zelenu tranziciju na Zapadnom Balkanu, uključujući Zeleni plan i Zelenu agendu za Zapadni Balkan. U drugom delu teorijski se razmatra koncept zelene tranzicije, s posebnim fokusom na Zapadni Balkan. Treći deo rada daje pregled energetske tranzicije u regionu, dok četvrti, najopsežniji deo rada, detaljno analizira energetska sektor svake zemlje Zapadnog Balkana. Peti deo rada sadrži zaključak.

* Sve reference vezane uz Kosovo, bilo da se radi o teritoriji, institucijama ili stanovništvu, u tekstu će biti shvaćene u potpunom skladu sa Rezolucijom 1244 Saveta bezbednosti Ujedinjenih nacija i bez prejudiciranja statusa Kosova.

Metodologija

Ovaj rad se zasniva na kvalitativno-deskriptivnom i komparativnom istraživačkom pristupu, koji omogućava procenu spremnosti zemalja Zapadnog Balkana za sprovođenje zelene tranzicije. Korišćeni su sekundarni podaci iz relevantne naučne i stručne literature, zvaničnih dokumenata zemalja, institucija EU, kao i izveštaja međunarodnih finansijskih organizacija kao što su Organizacija za ekonomsku saradnju i razvoj (engl. Organisation for Economic Co-operation and Development – OECD), Evropska agencija za životnu sredinu (engl. European Environmental Agency – EEA), Evropska banka za obnovu i razvoj (European Bank for Reconstruction and Development – EBRD), Svetska banka (engl. World Bank, WB), kao i nacionalni strateški dokumenti zemalja regiona: Nacionalni energetske i klimatski plan (engl. National Energy and Climate Plan – NECP, Nacionalni akcioni plan za energetske efikasnost (engl. National Energy Efficiency Action Plan – NEEAP), strategije energetskog razvoja i izvori energetskih kompanija). Takođe su korišćeni statistički podaci iz baza kao što su Eurostat i Evropska fondacija za obuku (engl. European Training Foundation – ETF).

U svrhu analize spremnosti zemalja Zapadnog Balkana za sprovođenje zelene tranzicije, korišćena je komparativna metoda i deskriptivno-analitički pristup, kojom su upoređeni ključni indikatori i politike po zemljama. Na osnovu prikupljenih podataka, izvršena je interpretacija postojećih pravnih i institucionalnih okvira, energetskog miksa i nivoa razvoja održivih finansijskih instrumenata. Analiza se odnosi na period od 2019. do 2024. godine, kako bi se obuhvatili ključni procesi sprovođenja Evropskog zelenog plana i Zelene agende za Zapadni Balkan, koji su inicirani krajem 2019. i tokom 2020. godine. Ovakav metodološki okvir omogućava sagledavanje trenutnog stanja i identifikaciju ključnih faktora koji utiču na efikasnost sprovođenja politike zelene tranzicije u zemljama regiona.

Strukturiranje nalaza obuhvata četiri osnovne dimenzije: (1) regulatorni okvir, (2) institucionalni kapacitet, (3) energetske miks i (4) dostupnost i primenljivost finansijskih instrumenata za zelenu tranziciju. Ovaj model omogućava holistički pregled faktora koji determinišu mogućnosti za uspešno sprovođenje Zelene agende za Zapadni Balkan.

Evropski zeleni plan i Zelena agenda za Zapadni Balkan

EU je 2019. godine usvojila Evropski zeleni plan, koji Evropska komisija (European Commission, 2019b) definiše kao novu strategiju rasta usmerenu ka transformaciji Evrope u pravedno i prosperitetno društvo, sa modernom, ekonomičnom i konkurentnom ekonomijom, u kojoj do 2050. godine neće biti neto emisija gasova sa efektom staklene bašte i u kojoj ekonomski rast nije uslovljen povećanom potrošnjom prirodnih resursa. Sprovođenje Evropskog zelenog plana zahteva brojne reforme i unapređenje zakonodavstva u cilju obezbeđivanja čiste energije u svim sektorima; od ekonomije i industrije, preko proizvodnje i potrošnje, infrastrukture, transporta, prehrambenog sektora i poljoprivrede, do građevinarstva, sistema oporezivanja i socijalnih usluga. Ovim pristupom EU nastoji da iskoristi svoj kolektivni kapacitet za transformaciju društva i ekonomije, čineći ih postepeno održivijima, kao i da zaštititi, osigura i unapredi prirodni kapital, zdravlje i dobrobit građana od ekoloških rizika. Istovremeno, cilj je da se obezbedi pravedna društvena tranzicija, u kojoj nijedan pojedinac niti region neće biti zapostavljeni. Inicijative Evropskog zelenog plana obuhvataju (Jadreškić, 2024):

- Strategiju EU o prilagođavanju klimatskim promenama, kao dugoročnu viziju klimatski otpornog društva do 2050. godine;
- Strategiju biološke raznovrsnosti EU do 2030. godine, sa ciljem doprinosa oporavku biološke raznovrsnosti u Evropi;

- **Strategiju „od njive do stola“**, usmerenu na postizanje klimatske neutralnosti kroz održivu proizvodnju hrane;
- Evropsku industrijsku strategiju koja je podrška industriji kao pokretaču promena, inovacija i rasta;
- Akcioni plan za cirkularnu ekonomiju, kao okvir za prelazak na održive modele proizvodnje i potrošnje u postpandemijskom oporavku;
- Regulativu o baterijama i otpadu, sa ciljem uspostavljanja cirkularne ekonomije tokom celog životnog ciklusa baterija, od dizajna do reciklaže;
- Pravednu tranziciju, koja obezbeđuje finansijsku i tehničku podršku regionima pogođenim prelaskom na niskougljeničnu ekonomiju;
- Čistu, pristupačnu i sigurnu energiju, usmerenu na dekarbonizaciju energetskeg sektora;
- Strategiju održivosti hemikalija EU, sa ciljem zaštite zdravlja, jačanja konkurentnosti i podsticanja netoksičnog okruženja;
- Strategiju o šumama i krčenju šuma, kojom se uspostavlja ravnoteža između ekoloških, društvenih i ekonomskih aspekata održivog upravljanja.

Evropska komisija (European Commission, 2019a) ističe da Evropski zeleni plan ima ključnu ulogu u sprovođenju Agende UN 2030 i ciljeva održivog razvoja. Kako bi zelena tranzicija bila uspešna, važno je da i zemlje u okruženju EU preduzmu konkretne mere, što je doprinelo usvajanju Zelene agende za Zapadni Balkan. Prema Evropskoj komisiji (2020), ova agenda je razvojna strategija usmerena na klimatske izazove i usklađivanje propisa Zapadnog Balkana sa standardima EU. Usvojena je na samitu u Sofiji 2020. godine, uz učešće svih šest zemalja regiona.

Zelena agenda se temelji na Evropskom zelenom planu i njegovom investicionom okviru, a finansira se iz IPA fondova. Predviđen je paket od 9 milijardi evra za podršku ekološkim prioritetima u okviru ekonomskog oporavka do 2027. godine (Vasilkov i saradnici, 2021). Zemlje regiona, prema istim autorima, treba da razviju saradnju na svim nivoima, u skladu sa zakonodavstvom EU i ciljevima Zelenog plana. OECD (2022) navodi da je karbonski intenzitet u Srbiji, Bosni i Hercegovini i na Kosovu* dva do tri puta veći od proseka OECD-a. Visoko zagađenje i niska energetska efikasnost rezultat su zavisnosti od uglja i zastarele energetske infrastrukture.

Stubovi Zelene agende za Zapadni Balkan (European Commission, 2020):

1. Dekarbonizacija (klimatske akcije, čista energija i održivi transport)
2. Cirkularna ekonomija
3. Borba protiv zagađenja vode, vazduha i zemljišta
4. Održiva proizvodnja hrane
5. Biološka raznovrsnost (zaštita i obnova prirode i ekosistema).

Ovi stubovi će biti detaljno objašnjeni u nastavku, ali će se analiza potencijala zelene tranzicije u daljem radu fokusirati na stubove 1 i 3.

Zapadni Balkan se suočava s izraženim posledicama klimatskih promena, što čini dekarbonizaciju ključnim prioritetom za region. Smanjenje emisija gasova sa efektom staklene bašte i prelazak na obnovljive izvore energije neophodni su, posebno imajući u vidu zavisnost od uglja i zastarelu energetsku infrastrukturu. U tom kontekstu, podrška EU dolazi kroz karbonske kvote i mehanizme određivanja cene ugljenika, u skladu s njenim klimatskim zakonodavstvom. Uloga cirkularne ekonomije dodatno dobija na značaju, jer doprinosi smanjenju otpada, efikasnijem korišćenju resursa i razvoju održivih sistema proizvodnje i potrošnje. Planirani su i regionalni sporazumi usmereni na smanjenje plastičnog zagađenja, posebno u zaštiti morskih ekosistema (UNEP, 2021). Pitanje zagađenja vazduha takođe zahteva hitnu pažnju, jer su nivoi zagađenja u regionu među najvišima u Evropi (UNEP, 2021). Usklađivanje sa EU standardima u oblasti kvaliteta vazduha, voda i otpadnih voda, kao i modernizacija sistema praćenja i upravljanja, predstavljaju osnovu za poboljšanje javnog zdravlja. S obzirom na to da poljoprivreda u zemljama regiona čini oko 10% BDP-a, važno je podstaći održivi ruralni razvoj koji će unaprediti kvalitet i bezbednost hrane, smanjiti otpad i podstaći organsku proizvodnju (Županić i saradnici, 2021; Smart Kolektiv, 2021). Ovi naponi doprinose i postepenom usklađivanju sa evropskim standardima o bezbednosti hrane i dobrobiti životinja. Zaštita biodiverziteta predstavlja još jedan strateški cilj, posebno zbog bogatih prirodnih resursa regiona. U tom pravcu razvijaju se planovi za očuvanje staništa i obnovu šumskih područja (Smart Kolektiv, 2021). Kako navode Filipović i Ignjatović (2022), uspešna realizacija Zelene agende za Zapadni Balkan zahteva izradu nacionalnih akcionih planova koji obuhvataju koordinisane projekte u okviru svih ključnih oblasti, s ciljem postizanja održive ekonomije, boljeg životnog okruženja i otvaranja novih radnih mesta.

Zelena tranzicija u Evropskoj uniji i na Zapadnom Balkanu

Zelena tranzicija razvijena je kao odgovor na klimatske promene i degradaciju životne sredine, s ciljem podsticanja rasta kroz zelene tehnologije, održivu industriju i smanjenje zagađenja (European Commission, 2019). Težeći pravednosti i inkluzivnosti, ona klimatske izazove pretvara u razvojne prilike. U tom kontekstu, ESG principi postaju sve važniji deo korporativnih strategija. Prema Petrović Tomić (2023), njihova primena doprinosi održivosti i konkurentnosti. Iako zemlje Zapadnog Balkana još ne sprovode nefinansijsko izveštavanje, njihova povezanost sa EU tržištem čini usklađivanje sa ESG standardima sve značajnijim. Kompanije u regionu moraju se proaktivno prilagođavati kako bi očuvale konkurentnost. Istovremeno, održivo finansiranje se prepoznaje kao ključ za ekonomsku otpornost, pri čemu finansijske institucije igraju sve aktivniju ulogu (European Environmental Agency, 2023). Bankarski sektor, kako ističu Sredojević i Sredojević (2021), prelazi iz reaktivnog ka proaktivnom pristupu, prateći evropske regulatorne trendove.

Zelena tranzicija će imati snažan ekonomski i društveni uticaj – otvaraće se nova radna mesta, dok će neka nestajati, a obrazovni i zdravstveni sistemi moraće da se prilagode. Prema Rodrigues-Pose i Bartalucci (2024), troškovi tranzicije nisu ravnomerno raspoređeni i često pogađaju već ranjive regione, dok su rasprave o nejednakostima uglavnom usmerene na posledice nečinjenja u borbi protiv klimatskih promena. Ipak, tranzicija donosi i značajne mogućnosti za razvoj i širenje zelenih tehnologija (European Commission, 2019). OECD više od dve decenije sprovodi politike podrške zelenoj tranziciji na Zapadnom Balkanu, procenjujući konkurentnost malih i srednjih preduzeća i podržavajući javni, privatni i civilni sektor u prelasku na održive modele, sa fokusom na klimatsku otpornost, čistu energiju, efikasno korišćenje resursa i zaštitu ekosistema (OECD, n.d.).

Sprovođenje Zelene agende za Zapadni Balkan koordinira Savet za regionalnu saradnju, kao krovna institucija Procesa saradnje u jugoistočnoj Evropi (SEEC). Prema Akcionom planu za sprovođenje Sofijske deklaracije (2021–2030), Savet ima zadatak da poveže relevantne institucije, omogući razmenu iskustava i identi-

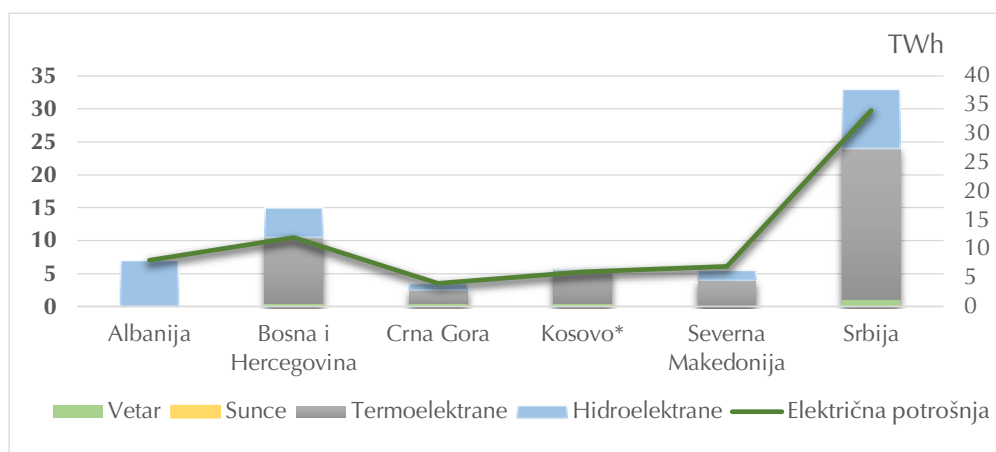
fikuje mogućnosti za širenje uspešnih inicijativa u regionu, uključujući i razvoj okvira za održivo finansiranje (Regional Cooperation Council, n.d.). U tom kontekstu, zelene obveznice postaju sve značajniji instrument finansiranja zelene tranzicije. Iako njihovo izdavanje podrazumeva dodatne troškove, poput pripreme dokumentacije i ocene od strane rejting agencija, one donose brojne koristi – od ekoloških efekata do veće transparentnosti i boljeg upravljanja rizicima. Srbija je prva u regionu plasirala zeleni evroobveznički zajam, a prikupljena sredstva usmerena su ka projektima održivog razvoja, energetske efikasnosti, obnovljivih izvora energije i smanjenja zagađenja (Olgić Draženović, 2025).

Energetski sektor na Zapadnom Balkanu

Energetski sektor ima značajan ekonomski, društveni i politički uticaj na Zapadnom Balkanu. Državne energetske kompanije, kao glavni proizvođači i snabdevači, među najvećim su privrednim subjektima, zapošljavaju veliki broj radnika i imaju snažnu ulogu u javnim finansijama i lancima snabdevanja (Kušljugić i saradnici, 2023). Energetsku politiku u velikoj meri oblikuju političke partije, pri čemu vlade, preko svojih predstavnika, kontrolišu sektor s ciljem očuvanja energetske suverenosti, socijalnog mira i zaposlenosti, često nauštrb efikasnosti i dugoročne održivosti. Takav pristup dovodi do lošeg upravljanja i neisplativih investicija (Kušljugić i saradnici, 2023).

Politički akteri na Zapadnom Balkanu još uvek ne raspolažu dovoljnim znanjem o važnosti dekarbonizacije energetskog sektora. Gašenje rudnika uglja bi imalo snažne ekonomske i društvene posledice, uključujući gubitak velikog broja radnih mesta i pad prihoda u lokalnim zajednicama. Skoro 70% električne energije u regionu i dalje se proizvodi iz uglja, izuzev Albanije, gde više od 99% dolazi iz hidroelektrana (Balkan Green Energy News, 2023). Prema Kušljugiću i saradnicima (2023), u 2022. godini na Zapadnom Balkanu proizvedeno je 69,5 TWh električne energije, od čega 63% iz termoelektrana na ugalj (Grafikon 1). Najveći udeo uglja u energetskom miksu imaju Kosovo* (92%), Severna Makedonija (72%) i Srbija (70%). U regionu je tada bilo aktivno 36 termoelektrana sa ukupnim kapacitetom od 8.255 MW, koje su zajedno sa rudnicima zapošljavale oko 46.000 direktno i do 100.000 radnika indirektno. Udeo hidroelektrana u proizvodnji iznosio je 34%, dok su varijabilni obnovljivi izvori (solarne i vetroelektrane) činili tek 3,5% ukupne proizvodnje. Iako je kapacitet solarnih elektrana porastao, njihov udeo je u 2022. godini iznosio svega 0,44%, dok je udeo vetroelektrana bio 3%. Instalirani kapaciteti obnovljivih izvora energije (OIE) po stanovniku iznose samo 0,0645 kW, što je 15,5 puta manje nego u EU, gde je proseka 1 kW po glavi stanovnika.

Grafikon 1 - Proizvodnja i potrošnja električne energije na Zapadnom Balkanu u 2022. godini



Izvor: obrada autora prema Kušljugić i saradnici (2023)

Potpisivanjem Ugovora o Energetskoj zajednici 2005. godine, zemlje Zapadnog Balkana započele su proces usklađivanja sa evropskim energetskim standardima, stvarajući zajedničko tržište električne energije i gasa sa EU. Usledilo je sprovođenje nacionalnih akcionih planova za energetsku efikasnost (NEEAP) i obnovljive izvore energije (NREAP). Prve dve faze NEEAP-a realizovane su između 2010. i 2015. godine, pri čemu je većina zemalja ostvarila oko 50% ciljeva; Albanija u transportu, BiH u sektoru stanovanja, a Srbija i Severna Makedonija u industriji (Filipović i Ignjatović, 2022). Treća faza (2017–2020) obuhvatila je Srbiju, Crnu Goru i delimično Severnu Makedoniju.

Inicijativa Berlinski proces (pokrenuta 2014. od strane Nemačke) dodatno je podstakla reforme, a lideri Zapadnog Balkana su se 2020. obavezali na sprovođenje Zelene agende. Ipak, napredak je bio ograničen, a fosilna goriva zadržala dominantan udeo. Prema Frey (2024), uzroci su hronično niska ulaganja, loše upravljanje i geopolitičke prepreke. Ipak, raste svest o obnovljivim izvorima i usklađivanju zakonodavstva sa EU standardima. Cena ugljenika postaje ključni instrument za dekarbonizaciju, a EU i Energetska zajednica predlažu zajednički regionalni model (engl. *Western Balkans Emissions Trading System*, WB ETS) radi stvarnog određivanja cene emisija ugljen-dioksida (CO₂) (Kušljugić i saradnici, 2023). Prvi korak ka tome je usvajanje Mehanizma za prilagođavanje granica ugljenika (engl. *Carbon Border Adjustment Mechanism*, CBAM), koji će funkcionisati kao carina na uvoz električne energije i proizvoda s visokim ugljeničnim otiskom (čelik, cement, đubriva, aluminijum, vodonik), koji stupa na snagu do 2026. godine (European Commission, 2023). Tokom prelazne faze predviđeno je testiranje metodologije za izračunavanje emisija i prilagođavanje cena. Uvođenje CBAM-a imaće različite posledice po zemlje Zapadnog Balkana, u zavisnosti od njihove izvozno-energetske strukture i stepena sprovedenih klimatskih mera.

Bosna i Hercegovina

U Bosni i Hercegovini (u daljem tekstu: BiH), termoelektrane učestvuju sa oko 60% u proizvodnji električne energije, hidroelektrane sa 36,7%, dok vetroelektrane i solarna energija čine svega 3,5%. Energetska tranzicija formalno je započeta 2013. godine usvajanjem Strategije za prilagođavanje klimatskim promenama i niskougljenični razvoj, ali većina ciljeva još uvek nije ostvarena. Prema Kušljugiću i Miljeviću (2023), u BiH prevladuje skepticizam prema obnovljivim izvorima energije, uz percepciju da EU kroz dekarbonizaciju nameće zavisnost i štiti sopstvene interese. Energetski sektor se i dalje oslanja na nisku cenu električne energije, koja se održava zahvaljujući izvoznim prihodima. Međutim, ova cena ne uključuje troškove za kontrolu lokalnog zagađenja (sumpor-dioksid - SO₂, azotni oksidi - NO_x, prašina), što ugrožava javno zdravlje. Uvođenje CBAM-a značilo bi dodatni trošak od 60 EUR/MWh, čime bi se smanjili izvozni profiti i sposobnost subvencionisanja domaćinstava i malih preduzeća.

Tehničko i finansijsko stanje termoelektrana i rudnika je loše, postrojenja su prosečno starija od 40 godina, posluju s gubicima, a pouzdanost je niska (npr. TE Ugljevik je 2022. zabeležila 22 havarije u osam meseci). BiH raspolaže značajnim potencijalom za obnovljive izvore (vetar, sunce, hidroenergiju i biomasu) koji bi uz postojeće hidrokapacitete mogli omogućiti punu tranziciju ka 100% OIE. Prema Miljeviću i Ribiću (2022), BiH ima pristup različitim izvorima finansiranja, uključujući IPA fondove, Zeleni klimatski fond (GCF) i podršku međunarodnih finansijskih institucija (Evropska investiciona banka, Evropska banka za obnovu i razvoj, Svetska banka). Ipak, tranzicija je odložena usled političke nespremnosti da se uhvati u koštac sa kompleksnim izazovima. Većina aktivnosti potiče od pojedinačnih kompanija, dok su investicije ograničene zbog regulatornih prepreka, uprkos visokom interesovanju investitora.

Srbija

Većinu električne energije, Srbija proizvodi iz domaćih izvora, pri čemu se oko 70% oslanja na lignit, dok hidroelektrane čine ostatak. Udeo vetroenergije je, uprkos rastu, 2021. godine iznosio svega 2,8%. Tradi-

cionalna energetska povezanost sa Rusijom dodatno otežava diversifikaciju sektora. Iako je Nacionalni plan za obnovljive izvore energije usvojen 2013. godine, većina mera nije realizovana. Novi Integrisani energetska i klimatski plan do 2030. (CEEnergynews, 2024) postavlja cilj od 45% OIE, što stručnjaci ocenjuju kao preambiciozno i politički motivisano (Energetski portal, 2024a). Uprkos ukorenjenom uverenju da je energija iz uglja jeftinija, stvarni troškovi su visoki. Termoelektrane u Srbiji su najveći regionalni emiteri SO₂, gotovo 300.000 tona u 2023., uz rast u odnosu na 2022. godinu (Energetski portal, 2024b). Zdravstvene posledice uključuju 2.326 hiljade preuranjenih smrti, 666.939 izgubljenih radnih dana i 5,16 milijardi evra troška (Climate Action Network Europe, 2021). Ipak, CBAM mehanizam verovatno neće značajno uticati na Srbiju, s obzirom na njen mali izvoz struje u EU (Taylor, 2023).

Srbiju karakteriše veliki potencijal za proizvodnju električne energije iz obnovljivih izvora, posebno iz biomase i hidroenergije. Međutim, da bi se povećala upotreba obnovljivih izvora energije, potrebno je doneti određene političke odluke i uspostaviti pravni okvir sa realnim ciljevima koji bi omogućili odgovarajuću energetska tranziciju. Pored IPA pretpripravnih fondova EU, Srbija ima na raspolaganju sredstva iz programa UN-a za smanjenje emisija CO₂, fondove Evropske banke za obnovu i razvoj (EBRD), Investicionog okvira za Zapadni Balkan i manje fondove za finansiranje projekata energetske efikasnosti. Ipak, i dalje postoji manjak velikih projekata vetroelektrana, solarnih elektrana i hidroelektrana. Da bi se ovo promenilo, u narednom periodu bi trebalo sprovesti određene mere za smanjenje rizika ulaganja u obnovljive izvore energije. Prema Radosavljeviću (2020), to uključuje pojednostavljenje procedura, proširenje mreže, stabilne podsticaje do 2030. godine i olakšanje korporativnih ugovora o kupovini energije. Neophodna je i javna kampanja za smanjenje otpora prema tranziciji, uz procene da bi smanjenje rizika moglo prepoloviti troškove finansiranja OIE.

Crna Gora

Unatoč dugoj tradiciji Crne Gore u korišćenju obnovljivih izvora energije, njihov ukupan udeo u proizvodnji električne energije iznosi 53,98%. Energetska tranzicija napreduje sporo, jer se dekarbonizacija uglavnom percipira kao spoljni zahtev EU. Prema Taylor (2023) izvoz električne energije značajno je porastao nakon puštanja u rad podmorskog kabla ka Italiji, te Crna Gora sada izvozi više od 50% ukupne proizvodnje.

Smernice za tranziciju navedene su u Operativnom programu za sprovođenje Strategije pametne specijalizacije 2021–2024, dok je Mapa puta ka cirkularnoj ekonomiji izrađena 2022. godine u saradnji sa Privrednom komorom Crne Gore i Programom Ujedinjenih nacija za međunarodni razvoj (engl. *United Nations Development Programme*, UNDP). Prema Government of Montenegro (2021), energetska sektor suočava se s preprekama vezanim uz nedostatak veze između energetike i inovacija, građani i privreda nemaju pristup ključnim informacijama, ne postoji plan za zatvaranje Termoelektrane Pljevlja koja posluje nelegalno kao ni za prekvalifikaciju radnika, a istraživački projekti trpe zbog nepovezanosti i ograničenog finansiranja (pristup „odozdo nagore“).

Crna Gora je 2020. godine uvela mehanizam za trgovinu jedinicama emisije po ceni od najmanje 24 evra po toni ekvivalenta ugljen-dioksida. Korisnik sredstava je Fond za zaštitu životne sredine, a prikupljena sredstva moraju biti usmerena na projekte obnovljivih izvora energije. Prema UNDP-u (2022), Crna Gora ima nekoliko dostupnih izvora finansiranja za energetska tranziciju: državna sredstva se obezbeđuju putem Elektroprivrede Crne Gore, individualnih fondova, direktija i pojedinačnih banaka. Sredstva takođe obezbeđuju EU putem Pretpripravnih fondova, Francuska razvojna agencija kroz podršku projektima održivog i inkluzivnog razvoja u Crnoj Gori, Regionalna inicijativa za cirkularnu ekonomiju u Turskoj i na Zapadnom Balkanu, kao i Evropska banka za obnovu i razvoj (EBRD).

Albanija

Gotovo 99% svojih potreba za električnom energijom, Albanija zadovoljava iz hidroenergije, čime spada među energetske najodrživije zemlje regiona (Balkan Green Energy News, 2023). Ipak, ovakva zavisnost čini je ranjivom na klimatske promene, posebno u sušnim periodima kada dolazi do konkurencije za vodne resurse s poljoprivredom. Prema podacima European Training Foundation (2022), godišnja proizvodnja električne energije u Albaniji iznosi 5,8 TWh, što pokriva 79% potrošnje, dok se ostatak uvozi. Gubici u mreži dostižu 26%, a emisije CO₂ po glavi stanovnika su niske (1,94 tone). Zemlja poseduje rezerve uglja, nafte i gasa, ali su slabo iskorišćene.

Glavni izazovi u sektoru su diverzifikacija izvora energije, povećanje efikasnosti i upravljanje mrežom. Ključni infrastrukturni koraci uključuju Transjadranski gasovod (TAP) i planiranu izgradnju gasne termoelektrane (GTPP) snage 500 MWe kod Korče, koja bi smanjila korišćenje biomase i doprinosila smanjenju загаđenja. Pored hidroenergije, Albanija raspolaže značajnim potencijalom za razvoj solarne i vetroenergije, naročito u planinskim predelima. Poslednjih godina uvedeni su tržišni mehanizmi za podršku obnovljivim izvorima, uz razvoj regulatornog okvira i formiranje nadležnog tela za sprovođenje aukcijskih procedura.

Severna Makedonija

U velikoj se meri Severna Makedonija oslanja na lignit, gas niskog kvaliteta i hidroenergiju, ali i dalje značajno uvozi električnu energiju. U 2022. godini proizvedeno je 5.634 GWh, a dodatnih 1.471 GWh je uvezeno (CEE Bankwatch Network, 2023). Strategija razvoja energetike 2020–2040 predviđa tri scenarija, pri čemu zeleni scenario podrazumeva potpuno napuštanje uglja do 2025. godine, čime bi Severna Makedonija bila prva zemlja regiona sa takvim planom. Nacionalni energetske i klimatski plan (NECP) iz 2022. prati ovaj progresivni pravac i uključuje zatvaranje termoelektrana Oslomej i Bitola. Ipak, prema CEE Bankwatch Network (2023), energetske sektor Severne Makedonije suočen je s nizom nedoslednosti: eksploatacija rudnika Živojno produžava rad TE Bitola za više od decenije; NECP predviđa novu termoelektranu na fosilna goriva, uz dodatne gasne elektrane koje nisu deo strateških dokumenata; uvoz gasa zavisi od Bugarske i koristi se uglavnom u industriji i toplanama; a cilj za obnovljive izvore do 2020. smanjen je sa 28% na 23%, dok je ostvareno 19,2%.

Od 2020. godine, Severna Makedonija je pustila u rad vetropark Bogdanci (36,8 MW), uz podršku EU i KfW razvojne banke. Vetropark Bogoslovec (36 MW) počeo je s radom 2023. Fotonaponski kapaciteti dostigli su 144 MW krajem 2022. godine, s daljim rastom. Strategija predviđa dodatnih 998 MW hidroenergije do 2040. Distribicioni gubici iznosili su 13,5% u 2022, dok energetska efikasnost ostaje nizak prioritet. Stari sistemi grejanja povećavaju troškove domaćinstvima. U skladu s ciljevima Energetske zajednice, Severna Makedonija mora povećati udeo OIE na 38% i smanjiti emisije GHG za 82% u odnosu na 1990. godinu, što zahteva ambiciozne reforme i ulaganja.

Kosovo*

Ukupni instalirani kapacitet na Kosovu* iznosi 1.568 MW, od čega se 82% zasniva na lignitu (Bankwatch Network, n.d.). Poslednjih godina pokrenuti su novi kapaciteti obnovljivih izvora, posebno vetroelektrane i hidroelektrane, ali sektor se i dalje suočava s brojnim izazovima. Postrojenja su zastarela, česti su kvarovi, a sektor transporta gotovo da ne koristi obnovljive izvore zbog neusaglašenosti sa direktivama EU (2009/28/EC i 2018/2001). Energetska intenzivnost, iako smanjena za 40% u protekloj deceniji, i dalje premašuje regionalni prosek za 25%, a emisije gasova staklene bašte (engl. *Greenhouse Gases*, GHG) iz privrede su više nego duplo veće od proseka EU. S obzirom na skroman izvoz električne energije u EU, CBAM verovatno neće imati značajan uticaj.

Od 2020. godine, albansko-kosovski blok (AK blok) funkcioniše kao nezavisno regulatorno telo, a us-

postavljanjem jedinstvene albanske berze električne energije (ALPEX) ojačana je tržišna integracija (IFC, 2020). U tom okviru razmatraju se i tehnološke inovacije poput zelenog vodonika, geotermalne energije i malih modularnih reaktora. Kosovo* ima visoku energetska povezanost u regionu – neto kapaciteti za uvoz i izvoz iznose 1.316 MW i 1.175 MW, čime je stopa interkonekcije 78%, što premašuje ciljeve EU do 2030. godine. Ipak, s obzirom na višedecenijski izostanak investicija, sektor zahteva temeljnu transformaciju i značajna finansijska ulaganja radi povećanja efikasnosti, sigurnosti i otpornosti sistema, kao i bolje zaštite potrošača.

Rezultati istraživanja

Analiza pokazuje da su zemlje Zapadnog Balkana u različitim fazama spremnosti za sprovođenje zelene tranzicije. Iako je zajednički imenitelj izražena zavisnost od uglja i niska diversifikacija energetske miksa, ipak postoje značajne razlike u dostignutoj zelenoj tranziciji. Nalazi se mogu sistematizovati kroz četiri dimenzije modela: regulatorni okvir, institucionalni kapacitet, energetska miks i finansijski instrumenti. Na osnovu navedenih dimenzija, sprovedena je procena spremnosti zemalja Zapadnog Balkana, prikazana u sledećoj tabeli.

Tabela 1 - Procena spremnosti zemalja Zapadnog Balkana za zelenu tranziciju po ključnim indikatorima

Indikatori	BiH	Srbija	Crna Gora	Albanija	Severna Makedonija	Kosovo*
Regulatorni okvir						
Nacionalna strategija za klimatske promene / zelenu tranziciju	Strategija postoji, ali neprimenjiva u celosti	Strategija usvojena, NECP usvojen 2024. sa projekcijama do 2050. godine, zakon o klimi usvojen	Fragmentiran regulatorni okvir, NECP u izradi, smernice kroz Operativni program i Mapu puta za cirkularnu ekonomiju	Usvojena Zelena strategija 2023–2025, u toku implementacija tržišne podrške za OIE kroz aukcijske mehanizme	NECP i strategija usvojeni, politički okvir razvijen	Regulatorni okvir u izradi, fali usklađenost sa EU direktivama za biogoriva
Usklađenost sa EU pravnim okvirom (NEEAP, NECP, direktive)	Delimična usklađenost, NECP izrađen ali neoperativan	Srednji do visok nivo usklađenosti	Nizak nivo usklađenosti s EU direktivama	Usklađenost u porastu, NECP izrađen	Visok stepen usklađenosti sa EU	Veoma nizak stepen
Institucionalni kapacitet						
Postojanje nadležnog tela za zelenu tranziciju (ministarstvo/agencija)	Entitetska fragmentacija, slaba koordinacija na državnom nivou	Postoji centralizovano ministarstvo, radna grupa za ZO	Postoji, ali nedovoljna koordinacija	Postoji funkcionalna agencija, član SBFN, uspostavljanje tela za sprovođenje programa OIE	Postoji, saradnja sa EBRD i GGF	Postoje tela, ali nejasne nadležnosti

Transparentnost i dostupnost podataka za planiranje i monitoring	Loša transparentnost i nedovoljno javno dostupni podaci	Delimična dostupnost, uvođenje sistematizovanih izveštaja	Ograničena dostupnost podataka	Poboljšana dostupnost podataka	Postoje javni izveštaji i baze	Ne postoji centralizovani sistem podataka
Energetski miks						
Udeo OIE u proizvodnji električne energije	~40% (dominantno hidro)	~30% (pretežno hidro, vetar 2,8%)	~54% (dominantno hidro)	~99% (hidro)	~20%	<10% (novi vetro i hidro kapaciteti u razvoju)
Udeo uglja u proizvodnji električne energije	~60%	~70%	~40%	~0%	~50%	~90%
Kapacitet OIE po stanovniku (kW/stan.)	Niska	Niska	Niska	Srednja	Niska	Veoma niska
Finansijski instrumenti						
Postojanje GSSS instrumenata	ESG obveznice (Naša Banka, 2023, 2024)	Zelene obveznice (Eurobond 2021, 1 mlrd EUR)	Ne	Ne	Zelene obveznice (2023)	Ne
Ukupan broj i vrednost izdanja	2 izdanja, ukupno 5,73 mil. EUR	1 izdanje, 1.000 mil. EUR	0	0	1 izdanje, 10 mil. EUR	0
Učešće međunarodnih organizacija	Visoko (grantovi i IFI učestvuju u velikoj meri)	Visoko (snažna podrška IFI, NGFS članstvo NBS, UN programi za smanjenje emisije CO ₂ , fondovi za EE projekte)	Niska mobilizacija sredstava, prisustvo IFI, IPA fondova, EBRD, Francuske razvojne agencije i regionalnih inicijativa	Pristup fondovima (IPA III), SBFN članstvo	Podrška IFI, aktivan energetski fond, finansiranje OIE projekata kroz EU, KfW i druge partnere	Niska uključenost IFI, uglavnom bilateralna pomoć
Postojanje nacionalnog zelenog okvira za obveznice	Ne	Postoji okvir, evaluacija, SPO, ESG rejting	Ne	U pripremi	U pripremi	Ne

Izvor: obrada autorki

Opšti nalazi ukazuju na to da su zemlje Zapadnog Balkana u različitom stepenu razvijenosti kada je reč o spremnosti za zelenu tranziciju. Dok pojedine zemlje, poput Srbije i Severne Makedonije, pokazuju relativno više ocene u regulatornom okviru i institucionalnim kapacitetima, druge zaostaju zbog fragmentiranih institucija i nedostatka zakonodavne usklađenosti. Energetski miks ostaje glavni izazov u

većini zemalja, sa izraženom zavisnošću od uglja i niskim udelom obnovljivih izvora, dok je napredak u oblasti finansijskih instrumenata i dalje ograničen i u početnim fazama razvoja.

U pogledu usklađenosti sa Zelenom agendom i pravnom stečevinom EU, Srbija i Severna Makedonija su ostvarile najvidljiviji napredak. Srbija je usvojila zakon o klimatskim promenama, razvila NECP i kreirala okvir za emisiju zelenih obveznica, uključujući evaluaciju ESG rejtinga. Severna Makedonija je, osim što je usvojila NECP, razvila i jasan politički okvir za podršku tranziciji. Bosna i Hercegovina, iako poseduje strategiju, suočava se s institucionalnom fragmentacijom koja ograničava njezinu efikasnu implementaciju. Kosovo* i Crna Gora zaostaju u usklađivanju zakonodavstva, dok Albanija pokazuje napredak donošenjem Zelene srednjoročne strategije.

Institucionalna infrastruktura pokazuje nizak stepen koordinacije između nadležnih tela i često ograničene tehničke i administrativne kapacitete. Srbija i Severna Makedonija imaju formirane stručne radne grupe i nadležna ministarstva sa jasno definiranim nadležnostima. U BiH, nadležnosti su raspršene na entitetske razine, što otežava sprovođenje politika. Albanija i Crna Gora su uspostavile institucije, ali bez dovoljnog kapaciteta ili međusobne koordinacije. Kosovo* nema jasan institucionalni okvir, a nedostatak centralizirane baze podataka dodatno ograničava planiranje. Pristup relevantnim podacima i transparentnost takođe su slabo razvijeni u gotovo svim zemljama. Zavisnost o uglju ostaje ključna prepreka za dekarbonizaciju, posebno u Srbiji, BiH, Severnoj Makedoniji i na Kosovu*, gde termoelektrane i dalje dominiraju proizvodnjom. Crna Gora ima uravnoteženiji miks, ali bez značajnog udela solarne i vetroenergije. S druge strane, Albanija se ističe kao pozitivan primer, jer 99% električne energije proizvodi iz hidroelektrana. Ipak, udeo solarne i vetroenergije u celokupnom energetsom miksu regiona ostaje marginalan – ispod 5%. Ukupan kapacitet OIE po stanovniku u regionu je 15 puta niži u odnosu na prosek EU.

Zelene i ESG obveznice su u začetku. Srbija je prva i jedina zemlja izvan EU koja je izdala zelenu euroobveznicu u iznosu od 1 mlrd EUR, dok su BiH i Severna Makedonija pokrenule manja izdanja ESG i zelenih obveznica. Međutim, prisutnost međunarodnih finansijskih institucija (EBRD, GGF, IPA III) pruža značajan potencijal za podršku. Nedostatak formalnih okvira za zelene obveznice u većini zemalja predstavlja prepreku za širu primenu ovih instrumenata.

Zaključak

Zelena tranzicija na Zapadnom Balkanu odražava jedan od najvažnijih izazova za budućnost ekonomskog, društvenog i političkog razvoja regiona. Analiza sprovedena u ovom radu pokazala je da zemlje Zapadnog Balkana ulaze u tranziciju sa izraženim strukturnim slabostima koje proističu iz visoke zavisnosti od fosilnih goriva, pre svega uglja, niske diversifikacije energetske miksa, kao i institucionalnih i finansijskih ograničenja. Regulatorni okvir za sprovođenje zelene tranzicije u većini zemalja formalno je uspostavljen kroz strategije i planove usklađene sa ciljevima Evropskog zelenog plana i Zelene agende za Zapadni Balkan. Međutim, vidljivo je da zakonodavne reforme nisu uvek praćene doslednom implementacijom, što ukazuje na potrebu za jačanjem pravne sigurnosti, boljom koordinacijom između različitih nivoa vlasti i efikasnijom primenom postojećih propisa. Srbija i Severna Makedonija ostvarile su najznačajniji napredak u normativnom usklađivanju, dok Bosna i Hercegovina, Crna Gora, Albanija zaostaju, prvenstveno zbog institucionalne fragmentacije i ograničenih administrativnih kapaciteta. Institucionalni kapaciteti za sprovođenje zelene tranzicije generalno su nedovoljni i neujednačeni. U većini zemalja regiona uočava se slab nivo među resorne saradnje, nedostatak specijalizovanih stručnih tela i ograničen pristup pouzdanim podacima neophodnim za izradu i praćenje politika održivog

razvoja. Odsustvo sistemske podrške inovacijama i nedovoljno razvijeni mehanizmi za participaciju civilnog društva dodatno usporavaju procese tranzicije.

Kada je reč o energetsom sektoru, zavisnost od uglja i termoelektrana ostaje dominantna karakteristika svih zemalja osim Albanije. Udeo varijabilnih obnovljivih izvora energije u proizvodnji električne energije i dalje je nizak, u proseku ispod 5%, dok je instalirani kapacitet obnovljivih izvora po stanovniku čak petnaest puta manji nego u državama članicama EU. Poređenje sa EU jasno ukazuje na ogromne razlike u stepenu dekarbonizacije i energetske modernizacije. Problemi poput zastarele infrastrukture, visokih emisija gasova sa efektom staklene bašte i niske energetske efikasnosti dodatno otežavaju energetska tranziciju i ugrožavaju ekološku bezbednost regiona.

Finansijski aspekt zelene tranzicije pokazuje slične izazove. Iako su međunarodni mehanizmi finansiranja, poput IPA III fonda, Investicionog okvira za Zapadni Balkan, i zelenih finansijskih instrumenata (GGF, REEP), dostupni, njihova iskorišćenost ostaje ograničena. Nedostatak razvijenog tržišta zelenih obveznica i spor razvoj ESG standarda dodatno ukazuju na potrebu za jačanjem kapaciteta finansijskog sektora i unapređenjem regulatornih okvira za održivo finansiranje. Pojava mehanizama poput CBAM dodatno komplikuje položaj zemalja regiona, jer ih suočava sa direktnim ekonomskim posledicama nepravovremenog sprovođenja dekarbonizacije. Uslovi izvoza u EU postaju sve stroži, a zemlje koje ne uspeju da se prilagode novim zahtevima rizikuju gubitak konkurentnosti i tržišnih pozicija. Uprkos navedenim izazovima, zelena tranzicija nudi jedinstvenu razvojnu priliku za zemlje Zapadnog Balkana. Kroz diversifikaciju izvora energije, unapređenje regulatornih okvira, jačanje institucionalnih kapaciteta i efikasnije korišćenje dostupnih finansijskih mehanizama, region može postati atraktivniji za investicije, unaprediti kvalitet života građana i ostvariti dugoročno održiv ekonomski rast. Budućnost zelene tranzicije na Zapadnom Balkanu zavišće od dosledne implementacije reformi, sposobnosti institucija da razvijaju inovativne pristupe održivosti, kao i od spremnosti društava da prepoznaju značaj ovog procesa za svoju ekonomsku, ekološku i socijalnu otpornost.

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POTENTIALS AND CHALLENGES OF GREEN TRANSITION IN THE WESTERN BALKANS

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Abstract: *The green transition is a long-term process that requires transforming the outdated fossil fuel-based economic model into a circular economy model. This paper analyzes the readiness of Western Balkan countries to implement green transition, in the context of obligations arising from the European Green Deal and the Green Agenda. The aim is to determine the capacities and challenges related to the regulatory framework, institutional infrastructure, energy mix, and the availability of sustainable financial instruments. A comparative analysis of secondary data has been applied, and the results indicate a high dependence on coal (over 70% in Serbia), limited use of renewable sources (less than 5% in most countries), and underutilization of EU financial mechanisms. Institutional capacities are uneven, and ESG standards are only in the early stages of implementation. The conclusion is that green transition is a strategic challenge, but also an opportunity for the modernization of regional economies, highlighting the need for a stronger regulatory framework, more transparent governance, and better utilization of available investment funds.*

Keywords: green transition; green bonds; Green Agenda for the Western Balkans; carbon footprint

JEL: G1, Z0, Q0, Q5

Introduction

Western Balkan countries are candidates for accession to the European Union (with the exception of Kosovo*, which holds the status of a potential candidate) and are faced with the task of aligning their legal frameworks, economic strategies, and political initiatives with European Union (hereinafter: EU) standards. In this context, the implementation of sustainable financial policy holds particular significance, as it is crucial for initiating the transition toward sustainable economies. The EU is facing serious challenges in the areas of environmental protection, climate change, geopolitical instability, and widespread socio-economic inequalities. Vitošević et al. (2020) emphasize that climate change and environmental protection issues have introduced new challenges to economic development, with the energy sector, as the largest emitter of carbon dioxide, under the greatest pressure to implement reforms.

The adoption of the European Green Deal laid the foundation for the integration of sustainable finance in EU member states. In order to involve neighboring regions in achieving the goals of this plan, the Green Agenda for the Western Balkans was adopted, as analyzed by Filipović and Ignjatović (2022). This agenda introduces a new development concept that encourages key initiatives, such as the transition to a circular economy. One of the most important instruments supporting this transition process are green bonds and other sustainable financial instruments, which have gained significant popularity as tools for financing projects aimed at reducing carbon emissions and enhancing environmental sustainability in the region. Green bonds are the most commonly used form of investment and the most developed instrument among GSSS bonds (green, social, sustainable, and sustainability-linked bonds). Their use is increasingly widespread in financing emission reduction projects, sustainable development, and investments in cleaner production, thus contributing to the achievement of the 2°C target defined by the Paris Agreement (Olgić Draženović, 2025). In addition to financial instruments, ESG standards play an important role in the transition to sustainability, serving as a key pillar of business resilience in the context of the green transition (Suljić Nikolaj et al., 2024). According to Petrović Tomić (2023), ESG criteria (environmental, social, and governance) are no longer merely a matter of ethical commitment, but a strategic necessity for long-term competitiveness and effective risk management. Given that all Western Balkan countries aspire to EU membership, the Green Deal outlines measures that should be integrated into the accession negotiation chapters, as well as into economic cooperation programs based on existing Stabilization and Association Agreements (Vasilkov et al., 2021). Therefore, it is of crucial importance to explore the dynamics of the green transition in the Western Balkan countries, observed through the lens of their institutional, regulatory, and economic capacities, as well as their readiness to implement the requirements set by the Green Deal and the regional Green Agenda. This paper focuses on analyzing the key challenges in the process of moving from a conventional fossil fuel-based development model to sustainable, decarbonized, and circular economic models.

The aim of this paper is multifaceted: (1) to analyze the regulatory and institutional framework of the green transition in the Western Balkan countries, (2) to identify the challenges and potentials of implementing the Green Agenda in light of the goals of the Green Deal, (3) to conduct a comparative analysis of energy policies and the availability of financial instruments for sustainable development, and (4) to assess the level of readiness of individual countries to carry out the green transition.

* [1] All reference to Kosovo, whether the territory, institutions or population, in this text shall be understood in full compliance with United Nations Security Council Resolution 1244 and without prejudice to the status of Kosovo.

The first part of the paper analyzes key EU legal acts relevant to the green transition in the Western Balkans, including the Green Deal and the Green Agenda for the Western Balkans. The second part provides a theoretical discussion of the green transition concept, with a particular focus on the Western Balkans. The third part offers an overview of the energy sector and an analysis of the current development of the energy transition in the region, while the fourth and most comprehensive part of the paper provides a detailed analysis of the energy sector in each Western Balkan country. The fifth part contains the conclusion.

Methodology

This paper is based on a qualitative-descriptive and comparative research approach, which enables an assessment of the readiness of Western Balkan countries to implement the green transition. Secondary data were used from relevant academic and professional literature, official documents of the countries, EU institutions, as well as reports from international financial organizations such as the Organization for Economic Cooperation and Development (OECD), European Environmental Agency (EEA), European Bank for Reconstruction and Development (EBRD), World Bank (WB), along with national strategic documents of the countries in the region: National Energy and Climate Plan (NECP), National Energy Efficiency Action Plan (NEEAP), energy development strategies, and data from energy companies. Statistical data from databases such as Eurostat and the European Training Foundation (ETF) were also utilized.

For the purpose of analyzing the readiness of Western Balkan countries to implement the green transition, a comparative method and a descriptive-analytical approach were used, enabling the comparison of key indicators and policies across countries. Based on the collected data, an interpretation was made of the existing legal and institutional frameworks, energy mixes, and the level of development of sustainable financial instruments. The analysis covers the period from 2019 to 2024, in order to include key implementation processes of the Green Deal and the Green Agenda for the Western Balkans, which were initiated at the end of 2019 and during 2020. This methodological framework allows for an assessment of the current state and the identification of key factors influencing the effectiveness of green transition policy implementation in the countries of the region.

The structuring of findings is based on four key dimensions: (1) regulatory framework, (2) institutional capacity, (3) energy mix, and (4) availability and applicability of financial instruments for the green transition. This model provides a holistic overview of the factors that determine the potential for successful implementation of the Green Agenda for the Western Balkans.

The European Green Deal and the Green Agenda for the Western Balkans

In 2019, the EU adopted the European Green Deal, which the European Commission (2019b) defines as a new growth strategy aimed at transforming Europe into a fair and prosperous society, with a modern, resource-efficient, and competitive economy. The goal is to achieve net-zero greenhouse gas emissions by 2050, and to decouple economic growth from increased use of natural resources. The implementation of the Green Deal requires numerous reforms and legislative improvements to ensure clean energy across all sectors: ranging from the economy and industry, to production and consumption, infrastructure, transport, food systems, agriculture, construction, taxation, and social services. Through this approach, the EU aims to leverage its collective capacity to transform society and the economy, making them gradually more sustainable, while protecting, securing, and enhancing natural capital, public health, and citizens' well-being from environmen-

tal risks. At the same time, the objective is to ensure a just social transition, in which no individual or region is left behind. The initiatives of the Green Deal include (Jadreškić, 2024):

- The EU Strategy on Climate Change Adaptation, as a long-term vision for a climate-resilient society by 2050;
- The EU Biodiversity Strategy for 2030, aimed at contributing to the recovery of biodiversity in Europe;
- The Farm to Fork Strategy, focused on achieving climate neutrality through sustainable food production;
- The European Industrial Strategy, which supports industry as a driver of change, innovation, and growth;
- The Circular Economy Action Plan, serving as a framework for transitioning to sustainable models of production and consumption in the post-pandemic recovery;
- The Batteries and Waste Regulation, aimed at establishing a circular economy throughout the entire battery lifecycle, from design to recycling;
- The Just Transition, which provides financial and technical support to regions affected by the shift to a low-carbon economy;
- Clean, affordable, and secure energy, focused on decarbonizing the energy sector;
- The EU Chemicals Strategy for Sustainability, aimed at protecting health, enhancing competitiveness, and promoting a toxic-free environment;
- The Forest and Deforestation Strategy, which seeks to balance environmental, social, and economic aspects of sustainable forest management.

The European Commission (2019a) emphasizes that the Green Deal plays a key role in implementing the UN 2030 Agenda and the Sustainable Development Goals. For the green transition to be successful, it is essential that the countries neighboring the EU also take concrete actions – this contributed to the adoption of the Green Agenda for the Western Balkans. According to the European Commission (2020), this agenda is a development strategy focused on climate-related challenges and the alignment of Western Balkan regulations with EU standards. It was adopted at the Sofia Summit in 2020, with the participation of all six countries of the region.

The Green Agenda is based on the Green Deal and its investment framework, and is funded through IPA (Instrument for Pre-Accession Assistance) funds. A support package of €9 billion is planned to finance environmental priorities within the framework of economic recovery until 2027 (Vasilkov et al., 2021). According to the same authors, countries in the region should develop cooperation at all levels, in line with EU legislation and the objectives of the Green Deal. The OECD (2022) reports that carbon intensity in Serbia, Bosnia and Herzegovina, and Kosovo* is two to three times higher than the OECD average. High pollution levels and low energy efficiency are the result of coal dependency and outdated energy infrastructure.

Pillars of the Green Agenda for the Western Balkans (European Commission, 2020):

1. Decarbonization (climate action, clean energy, and sustainable transport)

2. Circular economy
3. Fighting pollution of water, air, and soil
4. Sustainable food production
5. Biodiversity (protection and restoration of nature and ecosystems).

These pillars will be explained in detail below; however, the analysis of the green transition potential in the remainder of the paper will focus on Pillars 1 and 3.

The Western Balkans faces pronounced consequences of climate change, making decarbonization a key priority for the region. Reducing greenhouse gas emissions and transitioning to renewable energy sources are essential, particularly given the region's dependency on coal and outdated energy infrastructure. In this context, EU support comes through carbon quotas and carbon pricing mechanisms, in line with its climate legislation. The role of the circular economy is gaining additional importance, as it contributes to waste reduction, more efficient resource use, and the development of sustainable production and consumption systems. Regional agreements are also being planned to reduce plastic pollution, especially in protecting marine ecosystems (UNEP, 2021). Air pollution is another urgent concern, as pollution levels in the region are among the highest in Europe (UNEP, 2021). Alignment with EU standards in air, water, and wastewater quality, along with modernization of monitoring and management systems, forms the foundation for improving public health. Given that agriculture accounts for around 10% of GDP in the region's countries, it is important to promote sustainable rural development that improves food quality and safety, reduces waste, and encourages organic production (Županić et al., 2021; Smart Kolektiv, 2021). These efforts also contribute to the gradual alignment with European standards on food safety and animal welfare. Biodiversity protection is another strategic goal, especially considering the region's rich natural resources. In this direction, plans are being developed for habitat preservation and reforestation (Smart Kolektiv, 2021). According to Filipović and Ignjatović (2022), the successful implementation of the Green Agenda for the Western Balkans requires the development of national action plans that include coordinated projects across all key areas, with the aim of achieving a sustainable economy, a better living environment, and the creation of new jobs.

Green Transition in the European Union and the Western Balkans

The green transition was developed as a response to climate change and environmental degradation, with the aim of promoting growth through green technologies, sustainable industry, and pollution reduction (European Commission, 2019). Striving for fairness and inclusivity, it transforms climate challenges into development opportunities. In this context, ESG principles are becoming an increasingly important part of corporate strategies. According to Petrović Tomić (2023), their implementation contributes to both sustainability and competitiveness. Although Western Balkan countries do not yet implement non-financial reporting, their connection to the EU market makes alignment with ESG standards increasingly important. Companies in the region must adapt proactively to maintain their competitiveness. At the same time, sustainable finance is recognized as a key driver of economic resilience, with financial institutions playing an increasingly active role (European Environmental Agency, 2023). As noted by Sredojević and Sredojević (2021), the banking sector is shifting from a reactive to a proactive approach, following European regulatory trends.

The green transition will have a strong economic and social impact – new jobs will be created while some will disappear, and education and healthcare systems will need to adapt. According to Rodríguez-Pose and Bartalucci (2024), the costs of the transition are not evenly distributed and often affect already vulnerable regions, while discussions on inequality are largely focused on the consequences of inaction in addressing climate change. Nevertheless, the transition also brings significant opportunities for the development and expansion of green technologies (European Commission, 2019). For over two decades, the OECD has been implementing policies supporting the green transition in the Western Balkans, assessing the competitiveness of small and medium-sized enterprises and assisting the public, private, and civil sectors in the shift toward sustainable models, with a focus on climate resilience, clean energy, efficient resource use, and ecosystem protection (OECD, n.d.).

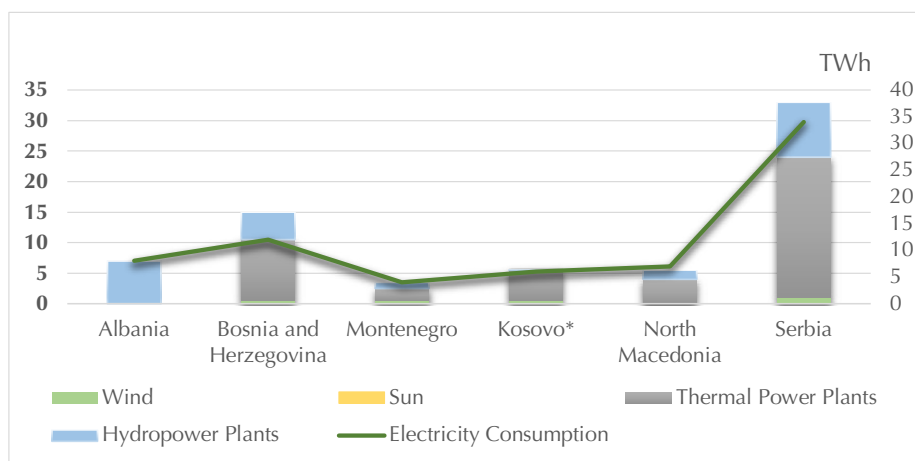
The implementation of the Green Agenda for the Western Balkans is coordinated by the Regional Cooperation Council (RCC), the overarching institution of the South-East European Cooperation Process (SEECP). According to the Action Plan for the Implementation of the Sofia Declaration (2021–2030), the Council is tasked with connecting relevant institutions, enabling the exchange of experiences, and identifying opportunities to scale successful initiatives across the region, including the development of a framework for sustainable finance (Regional Cooperation Council, n.d.). In this context, green bonds are becoming an increasingly important instrument for financing the green transition. Although their issuance involves additional costs, such as documentation preparation and credit rating assessments, they offer numerous benefits, ranging from environmental impact to greater transparency and improved risk management. Serbia was the first in the region to issue a green Eurobond, with the raised funds directed toward sustainable development projects, energy efficiency, renewable energy sources, and pollution reduction (Olgjić Draženović, 2025).

The Energy Sector in the Western Balkans

The energy sector has significant economic, social, and political influence in the Western Balkans. State-owned energy companies, as the main producers and suppliers, are among the largest economic entities, employing a large number of workers and playing a strong role in public finances and supply chains (Kušljugić et al., 2023). Energy policy is largely shaped by political parties, with governments, through their representatives, exerting control over the sector in order to maintain energy sovereignty, social stability, and employment, often at the expense of efficiency and long-term sustainability. This approach leads to poor governance and unprofitable investments (Kušljugić et al., 2023).

Political actors in the Western Balkans still lack sufficient understanding of the importance of decarbonizing the energy sector. The closure of coal mines would have significant economic and social consequences, including the loss of a large number of jobs and a decline in revenues for local communities. Nearly 70% of electricity in the region is still produced from coal, except in Albania, where more than 99% comes from hydropower (Balkan Green Energy News, 2023). According to Kušljugić et al. (2023), in 2022, the Western Balkans generated 69.5 TWh of electricity, of which 63% came from coal-fired power plants (see Graph 1). The countries with the highest share of coal in their energy mix were Kosovo (92%)*, North Macedonia (72%), and Serbia (70%). At that time, there were 36 active coal power plants in the region, with a total capacity of 8,255 MW, employing approximately 46,000 workers directly and up to 100,000 indirectly, including coal mining operations. Hydropower accounted for 34% of electricity generation, while variable renewable energy sources (solar and wind) made up only 3.5% of total production. Although solar capacity has increased, its share in 2022 was just 0.44%, while wind power accounted for 3%. The installed capacity of renewable energy sources (RES) per capita is only 0.0645 kW, which is 15.5 times lower than in the EU, where the average is 1 kW per capita.

Figure 1 - Electricity Production and Consumption in the Western Balkans in 2022



Source: author's compilation based on Kušljugić et al. (2023)

With the signing of the Energy Community Treaty in 2005, the Western Balkan countries began the process of aligning with European energy standards, creating a common electricity and gas market with the EU. This was followed by the implementation of National Energy Efficiency Action Plans (NEEAPs) and National Renewable Energy Action Plans (NREAPs). The first two phases of the NEEAPs were implemented between 2010 and 2015, during which most countries achieved around 50% of their targets: Albania in the transport sector, Bosnia and Herzegovina in the residential sector, and Serbia and North Macedonia in industry (Filipović and Ignjatović, 2022). The third phase (2017-2020) included Serbia, Montenegro, and partially North Macedonia.

The Berlin Process initiative (launched in 2014 by Germany) further encouraged reforms, and in 2020, Western Balkan leaders committed to implementing the Green Agenda. However, progress has been limited, and fossil fuels have maintained a dominant share. According to Frey (2024), the reasons include chronically low investment, poor governance, and geopolitical obstacles. Nonetheless, awareness of renewable energy and alignment of legislation with EU standards is growing. Carbon pricing is becoming a key instrument for decarbonization, and the EU and the Energy Community have proposed a joint regional model, the Western Balkans Emissions Trading System (WB ETS), to establish a real market price for CO₂ emissions (Kušljugić et al., 2023). The first step toward this is the adoption of the Carbon Border Adjustment Mechanism (CBAM), which will act as a tariff on imports of electricity and carbon-intensive goods (such as steel, cement, fertilizers, aluminum, and hydrogen) and is set to take effect by 2026 (European Commission, 2023). During the transitional phase, the methodology for calculating emissions and adjusting prices is expected to be tested. The introduction of CBAM will have varying impacts on Western Balkan countries depending on their export-energy structure and the degree to which they have implemented climate measures.

Bosnia and Herzegovina

In Bosnia and Herzegovina (hereinafter: BH), thermal power plants account for approximately 60% of electricity production, hydropower plants for 36.7%, while wind and solar energy make up only 3.5%. The energy transition formally began in 2013 with the adoption of the Strategy for Climate Change Adaptation and Low-Carbon Development, but most of its goals have yet to be achieved. According to Kušljugić

and Miljević (2023), skepticism toward renewable energy sources prevails in BH, accompanied by the perception that the EU, through decarbonization, imposes dependency and protects its own interests. The energy sector still relies on low electricity prices, which are maintained thanks to export revenues. However, this price does not account for the costs of controlling local pollution (sulfur dioxide – SO₂ nitrogen oxides – NO_x, and particulate matter), which poses a threat to public health. The introduction of CBAM would result in an additional cost of €60/MWh, thereby reducing export profits and the ability to subsidize households and small businesses.

The technical and financial condition of thermal power plants and coal mines in BH is poor – plants are on average over 40 years old, operate at a loss, and have low reliability (e.g., Ugljevik TPP recorded 22 breakdowns in just eight months in 2022). BH has significant potential for renewable energy sources (wind, solar, hydropower, and biomass), which, combined with existing hydro capacity, could enable a full transition to 100% renewables (RES). According to Miljević and Ribić (2022), BH has access to various funding sources, including IPA funds, the Green Climate Fund (GCF), and support from international financial institutions such as the European Investment Bank, European Bank for Reconstruction and Development, and the World Bank. However, the transition has been delayed due to political unwillingness to confront complex challenges. Most activities originate from individual companies, while investments remain limited due to regulatory barriers, despite high interest from investors.

Serbia

Serbia produces the majority of its electricity from domestic sources, with around 70% relying on lignite, while hydropower accounts for the remainder. Despite growth, wind energy accounted for only 2.8% in 2021. Serbia's traditional energy ties with Russia further complicate sectoral diversification. Although the National Renewable Energy Action Plan was adopted in 2013, most of its measures have not been implemented. The new Integrated National Energy and Climate Plan (INECP) for 2030 (CEEnergynews, 2024) sets a target of 45% RES, which experts consider overly ambitious and politically motivated (Energetski portal, 2024a). Despite the entrenched belief that coal-based energy is cheaper, the actual costs are high. Thermal power plants in Serbia are the region's largest emitters of SO₂, releasing nearly 300,000 tons in 2023, with an increase compared to 2022 (Energetski portal, 2024b). The health consequences include 2,326 premature deaths, 666,939 lost workdays, and an estimated €5.16 billion in costs (Climate Action Network Europe, 2021). Nevertheless, the CBAM mechanism is unlikely to significantly affect Serbia, given its low electricity exports to the EU (Taylor, 2023).

Serbia has significant potential for electricity production from renewable energy sources, particularly biomass and hydropower. However, in order to increase the use of renewables, certain political decisions must be made and a legal framework with realistic targets established to enable an effective energy transition. In addition to EU IPA pre-accession funds, Serbia also has access to financing from UN programs for CO₂ emissions reduction, the European Bank for Reconstruction and Development (EBRD), the Western Balkans Investment Framework, and smaller funds for energy efficiency projects. Nevertheless, there is still a lack of large-scale projects in wind, solar, and hydropower. To change this, measures must be implemented to reduce investment risks in renewable energy sources. According to Radosavljević (2020), this includes simplifying procedures, expanding the grid, stable incentives through 2030, and facilitating corporate power purchase agreements (PPAs). A public campaign is also needed to reduce resistance to the transition, with estimates suggesting that lowering investment risk could cut RES financing costs in half.

Montenegro

Despite Montenegro's long tradition in utilizing renewable energy sources, their total share in electricity production stands at 53.98%. The energy transition is progressing slowly, as decarbonization is largely perceived as an external EU demand. According to Taylor (2023), electricity exports increased significantly following the commissioning of the undersea cable to Italy, and Montenegro now exports more than 50% of its total electricity production.

The guidelines for the transition are outlined in the Operational Programme for the Implementation of the Smart Specialization Strategy 2021–2024, while the Roadmap toward a Circular Economy was developed in 2022, in cooperation with the Chamber of Commerce of Montenegro and the United Nations Development Programme (UNDP). According to the Government of Montenegro (2021), the energy sector faces several obstacles, including a lack of integration between energy and innovation, limited access to key information for both citizens and businesses, no plan for the closure of the Pljevlja Thermal Power Plant, which operates illegally, nor a retraining plan for its workers. In addition, research projects are hindered by fragmentation and limited funding, due to a bottom-up approach.

In 2020, Montenegro introduced an emissions trading mechanism, with a minimum price of €24 per ton of CO₂ equivalent. The recipient of the funds is the Environmental Protection Fund, and the collected revenues must be directed toward renewable energy projects. According to UNDP (2022), Montenegro has several sources of funding available for the energy transition: state funds are provided through Elektroprivreda Crne Gore, individual funds, directorates, and specific banks. Additional funding is also provided by the EU through pre-accession funds, the French Development Agency (supporting sustainable and inclusive development projects in Montenegro), the Regional Circular Economy Initiative in Turkey and the Western Balkans, and the European Bank for Reconstruction and Development (EBRD).

Albania

Albania meets nearly 99% of its electricity needs from hydropower, making it one of the most energy-sustainable countries in the region (Balkan Green Energy News, 2023). However, such dependency also makes it vulnerable to climate change, particularly during dry periods when competition for water resources arises, especially with agriculture. According to the European Training Foundation (2022), Albania produces 5.8 TWh of electricity annually, covering 79% of domestic consumption, while the remainder is imported. Grid losses reach 26%, and CO₂ emissions per capita are low (1.94 tons). The country possesses coal, oil, and gas reserves, but they are underutilized.

The main challenges in the sector include diversifying energy sources, increasing efficiency, and grid management. Key infrastructure developments include the Trans-Adriatic Pipeline (TAP) and the planned construction of a 500 MWe gas-fired power plant (GTPP) near Korçë, which would reduce biomass usage and contribute to lowering pollution levels. In addition to hydropower, Albania has significant potential for the development of solar and wind energy, especially in mountainous areas. In recent years, market mechanisms have been introduced to support renewable energy sources, alongside the development of a regulatory framework and the establishment of a dedicated authority for implementing auction procedures.

North Macedonia

North Macedonia relies heavily on lignite, low-quality gas, and hydropower, but still imports a significant amount of electricity. In 2022, the country produced 5,634 GWh and imported an additional 1,471 GWh (CEE Bankwatch Network, 2023). The Energy Development Strategy 2020–2040 outlines three

scenarios, with the green scenario aiming for a complete coal phase-out by 2025, which would make North Macedonia the first country in the region with such a plan. The National Energy and Climate Plan (NECP) from 2022 follows this progressive direction and includes the planned closure of the Oslomej and Bitola thermal power plants. However, according to the CEE Bankwatch Network (2023), North Macedonia's energy sector faces several inconsistencies: the exploitation of the Živojno coal mine is set to extend the operation of Bitola TPP by more than a decade; the NECP includes a new fossil-fuel power plant, along with additional gas-fired plants that are not mentioned in strategic documents; gas imports depend on Bulgaria and are mainly used in industry and district heating; the renewable energy target for 2020 was reduced from 28% to 23%, with actual achievement at only 19.2%.

Since 2020, North Macedonia has commissioned the Bogdanci wind farm (36.8 MW), with support from the EU and the KfW Development Bank. The Bogoslovec wind farm (36 MW) began operation in 2023. Photovoltaic capacity reached 144 MW by the end of 2022, with continued growth expected. The strategy envisions an additional 998 MW of hydropower by 2040. Distribution losses amounted to 13.5% in 2022, while energy efficiency remains a low priority. Outdated heating systems continue to increase costs for households. In line with the Energy Community's targets, North Macedonia must raise the share of renewables (RES) to 38% and reduce GHG emissions by 82% compared to 1990 levels, requiring ambitious reforms and investment.

Kosovo*

The total installed capacity in Kosovo* amounts to 1,568 MW, of which 82% is based on lignite (Bankwatch Network, n.d.). In recent years, new renewable energy capacities have been introduced, particularly wind and hydropower, but the sector still faces numerous challenges. The facilities are outdated, frequent breakdowns occur, and the transport sector makes almost no use of renewables due to non-alignment with EU directives (2009/28/EC and 2018/2001). While energy intensity has decreased by 40% over the past decade, it still exceeds the regional average by 25%, and GHG emissions from the economy are more than twice the EU average. Given Kosovo's* modest electricity exports to the EU, CBAM is unlikely to have a significant impact.

Since 2020, the Albanian-Kosovar bloc (AK bloc) has operated as an independent regulatory body, and the establishment of the unified Albanian electricity exchange (ALPEX) has strengthened market integration (IFC, 2020). Within this framework, technological innovations such as green hydrogen, geothermal energy, and small modular reactors are also being explored. Kosovo* has a high level of regional energy interconnection – net import and export capacities amount to 1,316 MW and 1,175 MW, respectively, resulting in an interconnection rate of 78%, which exceeds the EU's 2030 targets. However, due to decades of underinvestment, the sector requires comprehensive transformation and substantial financial investment to improve efficiency, system reliability, and consumer protection, as well as to ensure greater energy security and resilience.

Research Findings

The analysis shows that the Western Balkan countries are at different stages of readiness for implementing the green transition. While they share a common dependence on coal and low diversification of the energy mix, there are significant differences in the progress achieved toward the green transition. The findings can be systematized through the four dimensions of the model: regulatory framework, institutional capacity, energy mix, and financial instruments. Based on these dimensions, an assessment of the readiness of the Western Balkan countries has been conducted and is presented in the following table.

Table 1 - Assessment of Western Balkan Countries' Readiness for the Green Transition by Key Indicators

Indicators	BH	Serbia	Montenegro	Albania	North Macedo-	Kosovo*
Regulatory Framework						
National Strategy for Climate Change / Green Transition	Strategy exists, but not fully implemented	Strategy adopted, NECP adopted in 2024 with projections to 2050, Climate Law adopted	Fragmented regulatory framework, NECP in development, guidelines provided through Operational Programme and Circular Economy Roadmap	Green Strategy 2023–2025 adopted, implementation of market support for RES underway through auction mechanisms	NECP and strategy adopted, political framework developed	Regulatory framework under development, lacking alignment with EU directives on biofuels
Alignment with the EU legal framework (NEEAP, NECP, directives)	Partial alignment, NECP developed but not operational	Medium to high level of alignment	Low level of alignment with EU directives	Alignment improving, NECP developed	High level of alignment with EU legislation	Very low level of alignment
Institutional Capacity						
Existence of a competent authority for the green transition (ministry/ agency)	Entity-level fragmentation, weak coordination at the national level	Centralized ministry in place, working group for environmental protection established	Exists, but coordination is insufficient	Functional agency in place, SBFN member, establishment of body for RES program implementation	Exists, co-operation with EBRD and GGF	Bodies exist, but responsibilities are unclear

Transparency and availability of data for planning and monitoring	Poor transparency and insufficient publicly available data	Partial availability, introduction of standardized reporting	Limited data availability	Improved data availability	Public reports and databases exist	No centralized data system exists
Energy Mix						
Share of RES in electricity production	~40% (predominantly hydro)	~30% (mainly hydro, wind 2.8%)	~54% (predominantly hydro)	~99% (hydro)	~20%	<10% (new wind and hydro capacities under development)
Share of coal in electricity production	~60%	~70%	~40%	~0%	~50%	~90%
RES capacity per capita (kW/capita)	Low	Low	Low	Medium	Low	Very low
Financial Instruments						
Existence of GSSS instruments	ESG bonds (Naša Banka, 2023, 2024)	Green bonds (Eurobond 2021, €1 billion)	No	No	Green bonds (2023)	No
Total number and value of issuances	2 issuances, totaling €5.73 million	1 issuance, €1,000 million	0	0	1 issuance, €10 million	0

Involvement of international organizations	High (grants and IFIs heavily involved)	High (strong IFI support, NBS is an NGFS member, UN programs for CO ₂ emission reduction, funds for energy efficiency projects)	Low capital mobilization, presence of IFIs, IPA funds, EBRD, French Development Agency, and regional initiatives	Access to funds (IPA III), SBFN membership	IFI support, active energy fund, RES project financing through the EU, KfW, and other partners	Low IFI involvement, mainly bilateral assistance
Existence of a national green bond framework	No	Framework, evaluation, SPO, and ESG rating in place	No	In preparation	In preparation	No

Source: authors' compilation

General findings indicate that the Western Balkan countries are at different levels of development when it comes to readiness for the green transition. While some countries, such as Serbia and North Macedonia, show relatively higher scores in regulatory frameworks and institutional capacities, others lag behind due to fragmented institutions and a lack of legislative alignment. The energy mix remains a major challenge in most countries, with a strong dependence on coal and a low share of renewable sources, while progress in financial instruments remains limited and still at an early stage of development.

In terms of alignment with the Green Agenda and the EU acquis, Serbia and North Macedonia have made the most visible progress. Serbia has adopted a Climate Change Law, developed an NECP, and created a framework for issuing green bonds, including ESG rating evaluation. North Macedonia, in addition to adopting its NECP, has developed a clear political framework to support the transition. Bosnia and Herzegovina, although it has a strategy in place, faces institutional fragmentation that limits its effective implementation. Kosovo* and Montenegro lag behind in legal harmonization, while Albania has shown progress through the adoption of a Green Mid-Term Strategy.

The institutional infrastructure shows a low level of coordination between relevant bodies and often limited technical and administrative capacities. Serbia and North Macedonia have established expert working groups and competent ministries with clearly defined responsibilities. In Bosnia and Herzegovina, responsibilities are dispersed across entity levels, making policy implementation more difficult. Albania and Montenegro have set up institutions, but lack sufficient capacity or inter-institutional coordination. Kosovo* lacks a clear institutional framework, and the absence of a centralized data system further limits planning. Access to relevant data and transparency are also underdeveloped in nearly all countries. Coal dependency remains a major obstacle to decarbonization, particularly in Serbia, BH, North Macedonia, and Kosovo*, where thermal power plants still dominate electricity production. Montenegro has a more balanced mix, though with no significant share of solar or wind energy. On the other hand, Albania stands out as a positive example, generating 99% of its electricity from hydropower. However, the share of solar and wind energy in the overall energy mix of the region

remains marginal – below 5%. The total renewable energy capacity per capita in the region is 15 times lower than the EU average.

Green and ESG bonds are still in the early stages of development. Serbia is the first and only non-EU country to issue a green Eurobond, amounting to €1 billion, while Bosnia and Herzegovina and North Macedonia have launched smaller ESG and green bond issuances. However, the presence of international financial institutions such as the EBRD, GGF, and IPA III provides significant potential for support. The lack of formal frameworks for green bonds in most countries remains a barrier to broader application of these instruments.

Conclusion

The green transition in the Western Balkans represents one of the most important challenges for the future economic, social, and political development of the region. The analysis conducted in this paper has shown that Western Balkan countries are entering the transition with pronounced structural weaknesses, stemming from a high dependence on fossil fuels, particularly coal, a low diversification of the energy mix, as well as institutional and financial constraints. The regulatory framework for implementing the green transition has been formally established in most countries through strategies and plans aligned with the goals of the European Green Deal and the Green Agenda for the Western Balkans. However, it is evident that legislative reforms are not always accompanied by consistent implementation, pointing to the need for stronger legal certainty, improved coordination between different levels of government, and more effective enforcement of existing regulations. Serbia and North Macedonia have made the most significant progress in normative alignment, while Bosnia and Herzegovina, Montenegro, and Albania lag behind, primarily due to institutional fragmentation and limited administrative capacity. Institutional capacities for implementing the green transition are generally insufficient and uneven. In most countries in the region, there is a low level of intersectoral cooperation, a lack of specialized expert bodies, and limited access to reliable data necessary for the design and monitoring of sustainable development policies. The absence of systemic support for innovation and underdeveloped mechanisms for civil society participation further slow down the transition process.

When it comes to the energy sector, coal dependency and the dominance of thermal power plants remain defining characteristics in all countries except Albania. The share of variable renewable energy sources in electricity generation is still low, averaging below 5%, while the installed renewable energy capacity per capita is fifteen times lower than in EU member states. A comparison with the EU clearly highlights vast differences in the level of decarbonization and energy modernization. Issues such as outdated infrastructure, high greenhouse gas emissions, and low energy efficiency further complicate the energy transition and threaten the environmental security of the region.

The financial aspect of the green transition reflects similar challenges. Although international financing mechanisms, such as the IPA III fund, the Western Balkans Investment Framework, and green financial instruments (GGF, REEP), are available, their utilization remains limited. The lack of a developed green bond market and the slow development of ESG standards further highlight the need to strengthen the financial sector's capacity and improve regulatory frameworks for sustainable finance. The emergence of mechanisms like CBAM adds complexity to the region's position, exposing countries to direct economic consequences for delayed decarbonization efforts. Export conditions to the EU are becoming increasingly stringent, and countries that fail to adapt to the new requirements risk losing competitiveness and market access. Despite these challenges, the green transition offers a unique develop-

ment opportunity for Western Balkan countries. Through energy source diversification, regulatory improvement, institutional capacity building, and more efficient use of available financial mechanisms, the region can become more attractive for investment, enhance citizens' quality of life, and achieve long-term sustainable economic growth. The future of the green transition in the Western Balkans will depend on the consistent implementation of reforms, the ability of institutions to develop innovative approaches to sustainability, and the readiness of societies to recognize the importance of this process for their economic, environmental, and social resilience.

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EVOLUCIJA VEŠTAČKE INTELIGENCIJE U BANKARSKOM SEKTORU: SISTEMATSKI PREGLED LITERATURE

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Rezime: Integracija veštačke inteligencije (AI) u bankarskom sektoru revolucionizovala je način na koji finansijske institucije rade, komuniciraju sa klijentima i upravljaju rizicima. Ovaj sistematski pregled literature istražuje evoluciju AI aplikacija u bankarstvu, naglašavajući tehnološki napredak, izazove implementacije i buduće pravce. Analizom istraživanja iz protekle decenije, ovaj pregled pruža uvid u to kako su AI tehnologije transformisale bankarske operacije, korisničke usluge i finansijske proizvode.

Bankarski sektor je bio svedok značajnih transformacija zbog veštačke inteligencije, sa inovacijama koje imaju za cilj povećanje efikasnosti, poboljšanje korisničkog iskustva i sigurnosti. Uvođenje veštačke inteligencije u bankarstvo nije samo nedavna pojava, već kontinuirana evolucija koja se ubrzala u protekloj deceniji, pod uticajem napretka u mašinskom učenju, obradi prirodnog jezika i tehnologijama za analizu podataka.

Evolucija veštačke inteligencije u bankarskom sektoru je dokaz transformativnog potencijala tehnologije u finansijama. Iako izazovi ostaju, tekući napredak veštačke inteligencije obećava budućnost u kojoj je bankarstvo efikasnije, sigurnije i usmereno prema klijentima. Nastavak istraživanja i razvoja AI tehnologija biće presudan u oblikovanju sledeće generacije bankarskih usluga.

Ključne reči: veštačka inteligencija u bankarstvu, AI u finansijskim uslugama, mašinsko učenje u bankarstvu.

JEL klasifikacija: G17, G21, B26, D10

Uvod

U današnjem dinamičnom bankarskom okruženju, digitalni napredak nije više samo opcija, već imperativ za finansijske institucije. Da bi ostale konkurentne i zadovoljile rastuće zahteve kupaca, banke moraju prihvatiti ove inovacije (Pramanik 2019).

Veštačka inteligencija (AI) pojavila se kao ključna pokretačka snaga brojnih digitalnih tehnologija u savremenom bankarskom okruženju (Dvivedi. Y 2021). Veštačka inteligencija je katalizator inovativnih transformacija u bankarskim kanalima, uslugama i rešenjima, uključujući automatizovane bankomate, onlajn bankarstvo, mobilno bankarstvo, digitalizovane čekove, prepoznavanje glasa, četbotove, AI savetnike za investiranje i AI kreditne selektore (Azevedo N. 2023). Integracija veštačke inteligencije u bankarstvu obuhvata različite sektore, uključujući front-office, middle-office i back-office. (Ramakant. V 2022)

Skoro 80% banaka u SAD-u priznaje potencijalne koristi povezane sa veštačkom inteligencijom, što je dovelo do mnoštva mogućnosti, ali i izazova - upotreba veštačke inteligencije u bankarskoj sferi olakšala je prodajne procese, informisala razvoj robusnih sistema za upravljanje odnosima sa klijentima i proširila je mogućnosti sistema da obuhvati interne sisteme i procese (Bueno. L 2024).

Termin "AI" je skovao Džon Mekarti 1956. godine, opisujući sisteme sposobne za racionalno delovanje i razmišljanje nalik ljudskom (Samoili. S 2020). Nakon što je dot-com balon pukao u 2000. godini, putanja AI je prešla ka eri Veb 2.0 do 2005. godine, podstaknuta porastom rasta obima podataka i povećanom dostupnošću informacija (Dvivedi. Y 2022).

Tehnološki napredak omogućio je veštačkoj inteligenciji da igra ključnu ulogu u olakšavanju kognitivnog računarstva u kompanijama, ubrzavanju analize informacija, postizanju preciznih izlaza podataka i osnaživanju zaposlenih da se uključe u zadatke na visokom nivou (Zhang. J; Dacheng. T, 2021). Međutim, mnogi korporativni lideri i dalje ne znaju kako da strateški iskoriste AI u svojim organizacijama, što dovodi do nedostatka strateških planova za implementaciju AI (Jarrahi. M, Kenion. S, Braun. A, Donahue. C, Vicher. C 2023).

U ovoj studiji sistematski analiziramo i istorijsku i savremenu literaturu o korišćenju AI u bankarskom sektoru. Naš cilj je da steknemo uvid u dosadašnje primene i definišemo potencijalne puteve za buduća istraživanja. Dok su prethodni sistematski pregledi literature istraživali AI u disciplini upravljanja, ostaje praznina u literaturi koja se odnosi na dubinu obima istraživanja ili fokusa industrije. Stoga, naša studija se izdvaja po tome što se posebno koncentriše na bankarski sektor i sprovodi sveobuhvatniju analizu koristeći više načina ispitivanja.

S obzirom na to, naša studija nastoji da se pozabavi sledećim istraživačkim pitanjima:

Koje sveobuhvatne teme i podteme proizilaze iz postojeće literature koja se odnosi na integraciju AI u bankarski sektor?

Kako upotreba AI utiče na proces iskustva klijenata u bankarskoj industriji, koji se proteže od akvizicije klijenata do pružanja usluga?

Koje su postojeće praznine u istraživanju i koja putanja treba dalje istražiti u ovom domenu?

Metodologija

Izbor članaka

Pokrenuli smo naš Sistematični pregled literature (SLR) u skladu sa utvrđenim smernicama (Ksiao. I, Votson. M, 2019) počevši od izbora baze podataka i identifikacije ključnih reči putem sveobuhvatnog pregleda literature. Istraživački radovi potiču iz Web of Science (WoS) i Scopus-a zbog njihove komplementarne prirode i pristupa naučnim člancima (Abrizah. A, Zainab. A, Kiran. K, Raj. R, 2013). Ovaj proces selekcije imao je za cilj da obezbedi uključivanje visokokvalitetnih članaka. (Kotter. Th, Blozik. E & Šerer. M, 2012) Naš upit za pretragu uključivao je termine kao što su „Veštačka inteligencija“, „mašinsko učenje“, „duboko učenje“, „neuronske mreže“ i „inteligentni sistemi“, upareni sa terminima „banka“, „potrošač“, „klijent“ ili „korisnik“. Izbor ključnih reči je vođen prethodnim pregledima literature, fokusirajući se na različite poslovne funkcije u bankarskom sektoru. U početku smo preuzeli 5.000 radova, koji su naknadno selektovani prema jeziku (engleski), vrsti publikacije (samo članak) i filteru predmetne oblasti („menadžment, poslovne finansije, računovodstvo i poslovanje“), što je rezultiralo sa 500 radova (Azarian. M, Hao. Y, Shiferaw.A Stevik.K 2023).

Da bismo održali sistematski pristup i osigurali transparentan protok podataka u različitim fazama SLR-a, pridržavali smo se željenog načina izveštavanja, PRISMA (Azarian. M, Hao. Y, Shiferaw.A Stevik.K (2023). Svakom od 500 radova je dodeljen jedinstveni ID broj kako bi se olakšala diferencijacija tokom analize. Podaci su organizovani u kolone, uključujući „ID broj“, „izvor baze podataka“, „autor“, „naslov“, „sažetak“, „ključne reči“, „godina“, časopisi Australijskog poslovnog saveta (ABDC) i kolone za validaciju ključnih reči.

Sistematsko isključivanje radova rađeno je prema strukturiranoj procedure: a) eliminacija duplih radova b) uklanjanje radova koji nisu objavljeni u ABDC časopisima radi održavanja standarda kvaliteta u skladu sa nedavnim SLR (Kraus. S, Breier. M, Lim. W, Dabić. M, Kumar. S 2022) c) isključivanje radova koji nisu vezani za potrošače, pretraživanjem relevantnih termina u naslovu, sažetku i ključnim rečima; d) ručna provera relevantnosti za preostale radove kako bi se osiguralo usklađivanje sa našim istraživačkim ciljevima, što je dovelo do uklanjanja radova koji se fokusiraju isključivo na tehnički računarski proces AI. Ovaj pedantan proces kulminirao je izborom 39 članaka za naknadne analize.

Za tematsku analizu koristili smo, kako deduktivne, tako i induktivne pristupe. U početku, članci su klasifikovani u unapred definisane teme, nakon čega je usledila identifikacija podtema i konteksta za primarne teme. Ovaj proces je uključivao pregled prethodnih sistematičnih pregleda literature, identifikovanje ključnih reči i uspostavljanje kodova (tema) iz odabranih radova. Nakon toga, naslovi, sažeci i puni radovi su pomno ispitani kako bi se na odgovarajući način podelili u okviru ovih tema, što je rezultiralo izdvajanjem tri osnovne teme: strategija, procesi i klijenti.

Nalaze

RK 1: Koje sveobuhvatne teme i podteme proizilaze iz postojeće literature koja se odnosi na integraciju AI u bankarski sektor?

Strategija

U okviru teme Strategije, rana istraživanja naglašavaju potencijalnu upotrebu i usvajanje AI iz organizacione perspektive (Borges.A, et al 2021), rudarenje podataka, integralni aspekt veštačke inteligencije, korišćen je

za predviđanje bankrota (Sung.T, Chang.N, Lee. G 2015) i optimizaciju modela rizika (Kotsiantis.S, Koumanakos. E, Tzelepis. D, Tampakas. V, 2006). Sve veća upotreba alata vođenih veštačkim inteligencijom za poboljšanje organizacione efikasnosti predstavlja veće mogućnosti za efikasnost u finansijskim institucijama u poređenju sa tradicionalnim metodama razvoja strategija i modela rizika. Podtema Organizaciona upotreba veštačke inteligencije obuhvata različite aktivnosti u kojima banke koriste AI za pokretanje organizacione vrednosti, uključujući i implementaciju modela zasnovanih na veštačkoj inteligenciji za predviđanje uspeha outsorcinga (Olan. F 2022). Dok AI alati pokazuju efikasnost u pokretanju efikasnih organizacionih strategija, i dalje postoje izazovi u implementaciji AI tehnologija, kao što su ograničenja ljudskih resursa i barijere organizacione kulture (Krishnan. N et al., 2022). Skorije objavljena literatura takođe govori o izazovima vezanim za implementaciju AI u bankarskim institucijama (Hentzen.J et al. 2022; Šet. J et al. 2022), naglašavajući potrebu za održivim interakcijama na relaciji čovek-mašina za uspešnu implementaciju AI u bankarstvu. Podtema Izazovi sa AI bavi se nizom izazova sa kojima se organizacije suočavaju, uključujući integraciju AI u svoje operacije. Takođe, identifikuju se i ključni izazovi vezani za interakcije čoveka i mašine ključne za održivu implementaciju AI u bankarstvu (Akter.Sh et al 2023), a dok se trenutna istraživanja uglavnom fokusiraju na tehnološke aspekte, buduće mogućnosti leže u usvajanju i integraciji. Podtema AI i usvajanje u finansijskim institucijama (šest radova) bavi se motivacijom i preprekama za usvajanje AI tehnologije iz organizacione perspektive, (Saurabh. K na AI 2022) konceptualizacijom prepreka organizacionom usvajanju, uključujući strah zaposlenih, organizacionu kulturu i budžetska ograničenja. Sve u svemu, u okviru teme Strategije, organizaciona upotreba AI se pojavljuje najčešće, naglašavajući kontinuirani naglasak na razvoju tehnologije u odnosu na implementaciju. Međutim, diskusije o literaturi vezane za organizacione izazove povezane sa implementacijom AI ostaju ograničene.

Procesi

U sklopu teme Procesi, nakon što je dot-com balon pukao, i nakon pojave Veb 2.0, počelo je istraživanje veštačke inteligencije u bankarskom sektoru, verovatno podstaknuto sugestijama da se AI zaduže za predviđanje kretanja na berzi i izbor akcija. Tokom ove faze, veštačka inteligencija u bankarskoj literaturi prvenstveno je korišćena za analizu kredita. U početnim fazama implementacije veštačke inteligencije, razvoj brze i pouzdane AI infrastrukture smatra se neophodnim pristupom stvaranja neuronske mreže za poboljšanje predviđanja neplaćanja kredita i prevremene otplate (Kataria. M, 2021) koristi tehnike rudarenja podataka za analizu kreditnih rezultata, uz zaključak je rudarenje podataka uz pomoć AI efikasnije od tradicionalnih metoda. Slično tome, (Sadok.H, et al 2022) primetili su da su modeli vođeni mašinskim učenjem efikasni u analizi potrošačkog kreditnog rizika. Podtema AI i krediti, istražuje upotrebu AI tehnologija, kao što su mašinsko učenje i rudarenje podataka, kako bi se poboljšali procesi kreditnog bodovanja, analize i odobravanja. Na primer, (Donepudi, Praveen Kumar; 2017) istraživali su razvoj modela kreditnog bodovanja klijenata koristeći tehnike neuronske mreže za rudarenje podataka. Posle 2013. godine, istraživanje se proširilo kako bi ispitalo kako AI poboljšava procese izvan kreditne analize. Podtema AI i usluge obuhvata upotrebu AI za poboljšanje i unapređenje procesa, uključujući institucionalne aplikacije za optimizaciju internih procesa pružanja usluga. Na primer, (Gonzalez. Ja; Jiménez-Marquez. J; López-Cuadrado. J; Ruiz-Mezcua. B; 2019) proučavali su upotrebu mašinskog učenja za optimizaciju zakazivanja sastanaka i smanjenje vremena potrebnog za pružanje usluge. Sve u svemu, što se tiče teme procesa, naši nalazi naglašavaju korisnost AI u poboljšanju bankarskih procesa, ali ostaje jaz u praktičnim istraživanjima o primenjenoj integraciji tehnologije u bankarskom sektoru. Pored toga, iako postoji dovoljno istraživanja o kreditnom riziku, istraživanje drugih finansijskih proizvoda ostaje ograničeno.

Klijenti

U okviru teme Klijenti primećena je sve veću upotrebu veštačke inteligencije kao metodološkog alata za bolje razumevanje načina na koji klijenti usvajaju digitalne bankarske usluge. Podtema AI i usvajanje od strane klijenata istražuje ulogu AI kao metodološkog alata u ispitivanju usvajanja digitalnih bankarskih tehnologija od strane klijenata, uključujući i barijere i motivacione faktore. Na primer, (Lav.M; Šarma. S; Madduleti. K; 2019) koristili su pristup neuronske mreže kako bi istražili prepreke za usvajanje internet bankarstva od strane klijenata. (Beutel. J; Lista. S; Schweinitz.G; 2019) istraživali su faktore vezane za usvajanje tehnologije vođene veštačkom inteligencijom u bankarskom sektoru. (Petrooulos. A; Siakoulis.V; Stavroulakis.E; Vlachogiannakis.N, 2020) ispitali su AI podsticaje za korišćenja usluga mobilnog bankarstva. Osim toga, bankari koriste AI za bolju segmentaciju, targetiranje i pozicioniranje bankarskih proizvoda i usluga. Podtema, AI i marketing istražuje ulogu AI u različitim marketinškim aktivnostima, uključujući segmentaciju kupaca, razvoj marketinških modela i isporuku efikasnijih marketinških kampanja. Na primer, (Gonzalez.I et al. 2019) predložili su tehniku mašinskog učenja za segmentaciju bankarskih klijenata i koristili su metode zasnovane na AI za dodelu resursa u ciljanim oglasima. Poslednjih godina primetan je trend u istraživanju principa kako AI oblikuje korisničko iskustvo. Podtema AI i korisničko iskustvo istražuje ulogu AI u poboljšanju bankarskog iskustva i usluga za klijente. Na primer, (Okuda.T; Shoda.S; 2018) ispitali su uticaj četbotova u bankarstvu na korisničko iskustvo.

Od 2013. godine pa nadalje, evidentno je povećanje međusobne povezanosti između sve tri oblasti: Strategije, Procesu i Klijenata. Od 2016. godine došlo je do porasta broja istraživanja koja povezuju temu procesa i kupaca. Štaviše, od 2017. godine, radovi koji kombinuju temu Klijent i Strategija postali su učestaliji.

RK 2: Kako upotreba AI utiče na proces iskustva klijenata u bankarskoj industriji?

AI u bankarstvu, kao jedna od ključnih oblasti ovog istraživanja fokusirana je na zahteve za kredit i procese donošenja odluka, i direktno utiče na dostupnost i akviziciju kupaca.

Izdvojili smo buduće pravce istraživanja iz članaka uključenih u ovu studiju. Ovaj odeljak opisuje korake za podnošenje zahteva za kreditna rešenja onlajn i pokazuje integraciju i korišćenje AI u procesu, sa primerima iz literature.

Akvizicija klijenta

Počinjemo sa početnim korakom akvizicije klijenta, pa prelazimo na kreditno odlučivanje i faze nakon donošenja odluke. Tokom faze akvizicije, klijenti su targetirani sa ciljem usmeravanja na veb stranicu i konverzije u aktivne klijente. Frontstage obuhvata ciljane reklame prilagođene pojedinačnim klijentima. Na primer, (Satheesh. M; Nagaraj. S; 2021) koriste multi-armed bandit pristup za veliku retail banku kako bi poboljšali akviziciju klijenata, predlažući metod koji omogućava bankarima da usaglase učenje iz podataka iz oglašavanja sa optimizacijom ulaganja u oglašavanje. U ovoj fazi, procesi podrške fokusiraju se na integraciju AI kao metodološkog alata za bolje razumevanje ponašanja klijenata prilikom akvizicije, kao i na korišćenje mašinskog učenja za procenu i ažuriranje aktivnosti segmentacije. Osnovni aspekt u ovoj fazi je razumevanje faktora koji utiču na onlajn akviziciju. (Manser. P et al. 2021) koristili su pristup neuronske mreže kako bi ispitali faktore koji utiču na usvajanje mobilnog bankarstva i nivo udobnosti i stavove digitalne generacije prema aktivnostima u mobilnom bankarstvu koje omogućava AI. Sadok.H et al. 2022 koristili su mašinsko učenje za kategorizaciju klijenata banaka na osnovu njihovih odgovora na reklame.

Posete sajtu banke i prijave za kredit

Tokom ove faze, banke imaju za cilj da pretvore saobraćaj na veb lokaciji u podnosiocima zahteva za kredit. Integracija robo-savetnika pomaže klijentima u odabiru kreditnih rešenja za koja se kvalifikuju i koja najbolje odgovaraju njihovim bankarskim potrebama. Robo-savetnici poboljšavaju ponudu usluga pomažući klijentima u odabiru odgovarajućih rešenja nakon prikupljanja osnovnih ličnih finansijskih podataka i brzog potvrđivanja sa agencijama za kreditno izveštavanje. (Belanche. D; Kazalo. L; Flavijan. C; 2019) otkrili su da su kvalitet informacija, sistema i usluga ključni u obezbeđivanju besprekornog korisničkog iskustva sa četbotovima, uz personalizaciju koja moderira ove konstrukcije. Robo-savetnici poseduju funkcije orijentisane na zadatke (npr. provera bankovnih računa), kao i funkcije za rešavanje problema (npr. obrada zahteva za kredit). Samim tim, prikupljeni podaci prolaze kroz kontinuirano ispitivanje putem mašinskog učenja, kako bi se poboljšale ponude i korisnička iskustva. U Giudici. P; 2018. korišćeno je mašinsko učenje za optimizaciju podataka prikupljenih putem različitih kanala, pomažući u stvaranju odgovarajućih i inkluzivnih preporuka za kredite. Neophodno je napomenuti da, iako predloženi proces nudi značajnu vrednost klijentima i bankarskim institucijama, mnogi klijenti i dalje nerado dele svoje podatke; Dakle, poverenje u bankarsku instituciju je najvažnije za poboljšanje korisničkog iskustva.

Primanje odluke

Nakon što se podaci prikupljaju putem onlajn kanala, rudarenje podataka i mašinsko učenje olakšavaju analizu i omogućavaju optimalne kreditne odluke. U ovoj fazi, kupci dobijaju kreditne odluke putem robo-savetnika. Tradicionalni pristupi kreditnim odlukama obično traju do dve nedelje, uključujući podnošenje zahteva savetodavnoj mreži, evaluaciju i komunikaciju sa klijentom. Međutim, sa AI integracijom, korisnici mogu dobiti odluke o kreditu u trenutku, štedeći vreme i osećajući se više osnaženim i pod kontrolom. Procesi donošenja odluka treba da uspostave ravnotežu između upravljanja organizacionim rizikom, maksimiziranja profita i promovisanja finansijske inkluzije. Na primer, Sadok.H et al 2022 koristili su tehnike mašinskog učenja kako bi razvili model koji predviđa kreditni rizik kupaca. Oni su takođe predložili model rudarenja podataka kojim bi se usadilo veće poverenje u sisteme kreditnog bodovanja. Iz perspektive organizacionog rizika, koristili su pristup neuronske mreže za analizu neispunjavanja obaveza kod klijenata, sa ciljem minimiziranja kreditnog rizika i povećanja profitabilnosti za kreditne institucije.

Klijent kontaktira kol centar

U ovom koraku, istražili smo interakciju između ljudi i AI i otkrili da klijenti preferiraju razgovor sa ljudima za zadatke visoke složenosti, naglašavajući važnost integracije ljudskih zaposlenih za slučajeve koji zahtevaju ručni pregled, jer AI može doneti pogrešnu procenu o kreditnoj sposobnosti. Dok AI nudi brojne pogodnosti za klijente i organizacije, Jakšić, M. ; Matej. M; 2019 naglašavaju da međuljudski odnosi u bankarstvu i dalje igraju ključnu ulogu u obezbeđivanju konkurentne prednosti za finansijske institucije. Integracija AI u ovoj fazi može se postići optimizacijom bankarskih kanala. Na primer, bankarske institucije mogu poboljšati uslugu optimizacijom zakazivanja sastanaka i smanjenjem vremena usluge kroz mašinsko učenje.

Opšta diskusija

Istraživači priznaju praktičnu upotrebu AI u pružanju poboljšane usluge klijentima. Mogućnosti poput robo-savetnika mogu pomoći u izboru proizvoda, kod zahteva za bankarska rešenja ili kod uštede vremena u zadacima niske složenosti. Kako se AI pokazuje efikasnim u automatizaciji bankarskih procesa, povećanju zadovoljstva kupaca i povećanju profitabilnosti, polje AI se razvilo kako bi se bavilo i strateškim uvidima. Nedavna istraživanja su se fokusirala na ispitivanje uloge AI u pokretanju poslovnih strategija. Na primer, istraživači su proučavali korišćenje AI za pojednostavljenje izveštaja interne revizije i procenu strateških inicijativa. Nedavne studije takođe ističu izazove povezane sa AI, govoreći o perspektivama za otpor u polju implementacije, kulture ili na organizacionom nivou. Kako AI tehnologije nastavljaju da napreduju u bankarskom sektoru, paradoks privatnosti i personalizacije se pojavio kao ključna istraživačka oblast koja zahteva dalje istraživanje (Guo, Haochen; Polak, Petr; 2021).

Štaviše, pandemija COVID-19 predstavila je brojne izazove u implementaciji AI u bankarskom sektoru. Iako je interesovanje banaka za AI tehnologije i dalje veliko, smanjeni prihodi doveli su do smanjenja kratkoročnih ulaganja u AI tehnologije – čime se naglašava potreba da bankarske institucije nastave da ulažu u AI tehnologije kako bi ublažile buduće rizike i poboljšale integraciju između online i offline kanala. Iz perspektive kupca, COVID-19 je podstakao povećano usvajanje usluga vođenih AI tehnologijom kao što su četbotovi, E-KIC (Know Your Client) i robo-savetnici. (Belanche. D; Kazalo. L; Flavijan. C; 2019); (Guo, Haochen; Polak, Petr; 2021)

Budući pravci istraživanja

RK 3: Koje su trenutne praznine u istraživanju i budući pravci istraživanja u ovoj oblasti?

Što se tiče strategije, uz kontinuiranu ekspanziju AI u bankarskom sektoru, finansijske institucije moraju istražiti kako interne zainteresovane strane doživljavaju vrednost usvajanja AI, ulogu liderstva i razne druge varijable koje utiču na usvajanje veštačke inteligencije u organizaciji. Stoga, predlažemo da se buduća istraživanja upuste u različite faktore (npr. leadersku ulogu) koji utiču na organizaciono usvajanje AI tehnologija. Štaviše, kako sve više organizacija prihvata AI, javljaju se interni izazovi, stoga preporučujemo istraživanje različitih organizacionih izazova (npr. organizacione kulture) povezanih sa usvajanjem AI. (Castelli. M; Manzoni. L; Popović. A; 2016)

Što se tiče procesa, uticaj AI na izdavanje kredita je intenzivno proučavan od 2005. godine. Predlažemo širenje izvan trenutnih modela i osporavanje osnovnih pretpostavki istraživanjem novih aspekata rizika koje uvode AI tehnologije. Pored toga, zalažemo se za upotrebu praktičnijih studija slučaja za potvrđivanje novih i postojećih modela. Štaviše, širenje AI je podstaklo dalje istraživanje o tome kako se unutrašnji procesi mogu poboljšati. Na primer, predlažemo ispitivanje modela vođenih veštačkom inteligencijom sa drugim finansijskim proizvodima / rešenjima (npr. investicije, depozitni računi itd.). (Giudici. P; 2018).

U domenu klijenata, dominantne teorije pomenute u istraživačkim radovima, kao što su Model prihvatanja tehnologije (TAM) i teorija difuzije inovacija (Mahfuzur. R, Ming.T, Baigh.T, Sarker.M, (2023) su opsežno istražene. Međutim, kako se klijenti više navikavaju na AI, može biti od ključnog značaja da se razviju teorije koje prevazilaze puko prihvatanje i usvajanje. Stoga predlažemo istraživanje različitih varijabli (npr. društveni uticaj i trendovi korisnika) i metodologije (npr. međukulturne studije) koje utiču na odnos kupaca sa AI. Postepeni pomak ka korišćenju veštačke inteligencije usmerene na kupca podstakao je istraživanje novih dimenzija AI koje utiču na korisničko iskustvo. Uбудućе, imperativ je shvatiti uticaj veštačke inteligencije na klijente i naći način da se ona može iskoristiti za poboljšanje korisničkog iskustva.

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EVOLUTION OF ARTIFICIAL INTELLIGENCE IN THE BANKING SECTOR: A SYSTEMATIC LITERATURE REVIEW

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Abstract: *The integration of Artificial Intelligence (AI) in the banking sector has revolutionized how financial institutions operate, interact with customers, and manage risks. This systematic literature review explores the evolution of AI applications in banking, highlighting technological advancements, implementation challenges, and future directions. By analyzing research from the past decade, this review provides insights into how AI technologies have transformed banking operations, customer service, and financial products. The banking sector has witnessed significant transformations due to AI, with innovations aimed at enhancing efficiency, customer experience, and security. The introduction of AI in banking is not just a recent phenomenon but a continuous evolution that has accelerated in the past decade, influenced by advancements in machine learning, natural language processing, and data analytics technologies. The evolution of AI in the banking sector is a testament to the transformative potential of technology in finance. While challenges remain, the ongoing advancements in AI promise a future where banking is more efficient, secure, and customer centric. The continued research and development in AI technologies will be crucial in shaping the next generation of banking services.*

Keywords: artificial intelligence in banking, AI in financial services, machine learning in banking.

JEL classification: G17, G21, B26, D10

Introduction

In today's dynamic banking environment, digital advancements have shifted from being optional to imperative for financial institutions. To remain competitive and meet evolving customer demands, banks must embrace these innovations (Pramanik 2019).

Artificial intelligence (AI) has emerged as a pivotal driving force behind numerous digital technologies in the contemporary banking landscape (Dwivedi. Y 2021). It catalyzes innovative transformations across banking channels, services, and solutions, including automated teller machines, online banking, mobile banking, check imaging, voice recognition, chatbots, AI investment advisors, and AI credit selectors (Azevedo N. 2023). The integration of AI in banking spans various sectors, encompassing front-office, middle-office, and back-office operations. (Ramakant. V 2022)

Nearly 80% of banks in the USA acknowledge the potential benefits associated with AI, which has brought forth a plethora of opportunities along with challenges AI utilization within the banking sphere has facilitated smoother sales processes, informed the development of robust customer relationship management systems, and expanded capabilities to encompass internal systems and processes (Bueno. L 2024).

The term "AI" was coined by John McCarthy in 1956, describing systems capable of rational human-like actions and thinking (Samoili. S 2020). Following the dot-com bubble burst in 2000, AI's trajectory transitioned towards the Web 2.0 era by 2005, spurred by the surge in data growth and increased accessibility of information (Dwivedi. Y 2022).

Technological progress has paved the way for AI to play a pivotal role in facilitating enterprise cognitive computing, enhancing information analysis speed, achieving precise data outputs, and empowering employees to engage in high-level tasks (Zhang. J; Dacheng. T, 2021). However, many corporate leaders still grapple with understanding how to strategically harness AI within their organizations, leading to a lack of strategic plans for AI implementation (Jarrahi. M, Kenyon. S, Brown. A, Donahue. C, Wicher. C 2023)

In this study, we systematically analyze both historical and contemporary literature on the utilization of AI within the banking sector. Our aim is to gain insights into its past applications and outline potential avenues for future research. While previous systematic literature reviews have explored AI within the management discipline, there remains a gap in the literature concerning the depth of research scope or industry focus. Therefore, our study stands out by specifically concentrating on the banking sector and conducting a more comprehensive analysis utilizing multiple modes of examination.

Considering this, our study endeavors to tackle the following research inquiries:

What overarching themes and sub-themes arise from previous literature concerning the integration of AI in the banking sector?

How does the utilization of AI influence the customer journey process within the banking industry, spanning from customer acquisition to service delivery?

What are the existing gaps in research, and what future trajectories should be explored in this domain?

Methodology

Selection of articles

We initiated our Systematic Literature Review (SLR) following established guidelines (Xiao. Y, Watson. M, 2019) beginning with database selection and keyword identification via a comprehensive literature review. Research papers were sourced from Web of Science (WoS) and Scopus due to their complementary nature and access to scholarly articles (Abrizah. A , Zainab. A, Kiran. K, Raj. R, 2013). This selection process aims to ensure the inclusion of high-quality articles. (Kotter. Th, Blozik. E & Scherer. M, 2012) Our search query included terms like "Artificial intelligence," "machine learning," "deep learning," "neural networks," and "Intelligent systems," paired with "Bank," "consumer," "customer," or "user." Keyword selection was guided by prior literature reviews, focusing on various business functions within the banking sector. Initially, we retrieved 5,000 papers, which were subsequently refined by language (English), publication type (article only), and subject area filter ("Management, Business Finance, accounting and Business"), resulting in 500 papers. (Azarian. M, Hao. Y, Shiferaw.A Stevik.K 2023).

To maintain a systematic approach and ensure transparent data flow across different stages of the SLR, we adhered to the preferred reporting method, PRISMA (Azarian. M, Hao. Y, Shiferaw.A Stevik.K (2023). Each of the 500 papers was assigned a unique ID number to facilitate differentiation throughout the analysis. The data were organized into columns including "ID number," "database source," "Author," "title," "Abstract," "keywords," "Year," Australian Business Deans Council (ABDC) Journals, and keyword validation columns.

Systematic exclusion of papers followed a structured procedure: a) elimination of duplicate papers b) removal of papers not published in ABDC journals to maintain quality standards consistent with recent SLRs (Kraus. S, Breier. M, Lim. W, Dabić. M, Kumar. S 2022) c) exclusion of non-consumer-related papers by searching for relevant terms in the title, abstract, and keywords; d) manual relevance check for the remaining papers to ensure alignment with our research objectives, leading to the removal of papers focusing solely on the technical computational process of AI. This meticulous process culminated in the selection of 39 articles for subsequent analyses.

For thematic analysis, we employed both deductive and inductive approaches. Initially, articles were classified into predefined themes, followed by the identification of sub-themes and context for the primary themes. This process involved reviewing previous systematic literature reviews, identifying keywords, and establishing codes (themes) from selected papers. Subsequently, titles, abstracts, and full papers were scrutinized to allocate appropriately within these themes, resulting in the emergence of three primary themes: Strategy, Processes, and Customers.

Findings

RQ 1: What are the themes and sub-themes that emerge from prior literature regarding the utilization of AI in the banking industry?

Strategy

Within the Strategy theme, early research highlights the potential uses and adoption of AI from an organizational perspective (Borges.A, et al 2021), Data mining, an integral aspect of AI, has been em-

ployed for predicting bankruptcy (Sung.T, Chang.N, Lee. G 2015), and optimizing risk models (Kotsian-tis.S, Koumanakos. E, Tzelepis. D, Tampakas. V, 2006). The increasing utilization of AI-driven tools for enhancing organizational effectiveness presents greater opportunities for efficiency in financial institutions compared to traditional strategizing and risk model development methods. The sub-theme Organizational use of AI encompasses various activities wherein banks leverage AI to drive organizational value, including the implementation of AI-driven models for predicting outsourcing success (Olan. F 2022). While AI tools demonstrate effectiveness in driving efficient organizational strategies, challenges persist in implementing AI technologies, such as human resources constraints and organizational culture barriers (Krishnan. N et al., 2022). Recent literature also discusses challenges associated with AI implementation in banking institutions (Hentzen.J et al. 2022; Sheth. J et al. 2022), highlighting the need for sustainable human-machine interactions for successful AI implementation in banking. The sub-theme Challenges with AI addresses a range of challenges organizations face, including the integration of AI into their operations. (Akter.Sh et Al 2023), delineates key challenges related to human-machine interactions crucial for sustainable AI implementation in banking. While current research mainly focuses on technology aspects, future opportunities lie in adoption and integration. The sub-theme AI and adoption in financial institutions (six papers) delves into motivation and barriers to the adoption of AI technology from an organizational perspective, (Saurabh. K at Al 2022) conceptualizing barriers to organizational adoption, including employee apprehension, organizational culture, and budget constraints. Overall, within the Strategy theme, organizational use of AI appears most prominent, emphasizing continued emphasis on technology development over implementation. However, literature discussions related to organizational challenges associated with AI implementation remain limited.

Processes

In the Processes theme, following the dot-com bubble burst and the emergence of Web 2.0, research on AI in the banking sector began to surface, possibly spurred by suggestions to employ AI for predicting stock market movements and stock selection. During this phase, AI in the banking literature primarily focused on credit and loan analysis. In the nascent stages of AI implementation, the development of fast and reliable AI infrastructure is deemed essential, together with a neural network approach to improve loan default and early repayment predictions (Kataria. M, 2021). utilized data mining techniques to analyze credit scores, finding AI-driven data mining to be more effective than traditional methods. Similarly, (Sadok.H, et al 2022) observed machine learning-driven models to be effective in consumer credit risk analysis. The sub-theme, AI and credit, explores the use of AI technologies, such as machine learning and data mining, to enhance credit scoring, analysis, and granting processes. For example, (Donepudi, Praveen Kumar; 2017) investigated the development of a customer credit scoring model using data mining neural network techniques. Post-2013, research expanded to examine how AI improves processes beyond credit analysis. The sub-theme AI and services encompasses the use of AI for process improvement and enhancement, including institutional applications to optimize internal service processes. For instance, (González. I; Jiménez-Márquez. J; López-Cuadrado. J; Ruiz-Mezcua. B; 2019) studied the use of machine learning to optimize appointment scheduling and reduce service time. Overall, regarding the process theme, our findings underscore the utility of AI in enhancing banking processes, yet there remains a gap in practical research on the applied integration of technology in the banking sector. Additionally, while there is ample research on credit risk, exploration of other financial products remains limited.

Customers

In the Customer theme we observed the growing use of AI as a methodological tool to better comprehend customer adoption of digital banking services. The sub-theme AI and Customer adoption investigates AI's role as a methodological tool in examining customers' adoption of digital banking technologies, including both barriers and motivational factors. For example, (Leo.M; Sharma. S; Maddulety. K; 2019) utilized a neural network approach to investigate barriers to internet banking adoption by customers. (Beutel. J; List. S; Schweinitz.G; 2019) explored factors related to AI-driven technology adoption in the banking sector. (Petropoulos. A; Siakoulis.V; Stavroulakis.E; Vlachogiannakis.N, 2020) examined drivers of AI-enabled mobile banking service usage. Furthermore, bank marketers leverage AI to better segment, target, and position banking products and services. The sub-theme, AI and marketing explores AI's role in various marketing activities, including customer segmentation, marketing model development, and delivery of more effective marketing campaigns. For example, (González.I et al. 2019) proposed a machine learning technique for banking customer segmentation and utilized AI-based methods to allocate resources in targeted advertisements. In recent years, there has been a noticeable trend in exploring how AI shapes customer experience. The sub-theme of AI and customer experience investigates AI's role in enhancing banking experience and services for customers. For instance, (Okuda.T; Shoda.S; 2018) examined the impact of chatbots in banking on customer experience.

From 2013 onward, an increase in the inter-relation between all three areas of Strategy, Processes, and Customers is evident. Since 2016, there has been a surge in research linking the themes of Processes and Customers. Moreover, since 2017, papers combining Customers with Strategy have become more frequent.

RQ 2: How does AI impact the banking customer's journey?

One of the crucial areas of research, AI in banking, revolves around credit applications and decision-making processes, directly affecting customer accessibility and acquisition.

We extracted future research directions from the articles included in this study. This section outlines the steps for applying for credit solutions online and demonstrates the integration and utilization of AI in the process, with examples from the literature.

Acquire a customer

We commence with the initial step of customer acquisition, progressing to credit decision-making and post-decision phases. During the acquisition phase, customers are targeted with the aim of directing them to the website and converting them into active customers. The frontstage encompasses targeted advertisements tailored to individual customers. For instance, (Satheesh. M; Nagaraj. S; 2021) employed a multi-armed bandit approach for a large retail bank to enhance customer acquisition, proposing a method that enables bank marketers to balance learning from advertisement data with optimizing advertisement investment. At this stage, support processes focus on integrating AI as a methodological tool to better understand customers' banking adoption behaviors, coupled with leveraging machine learning to assess and update segmentation activities. A fundamental aspect at this stage is comprehending the factors influencing online adoption. (Manser . P et al. 2021) utilized a neural network approach to examine factors influencing mobile banking adoption and digital natives'

comfort levels and attitudes toward AI-enabled mobile banking activities. Sadok.H et al. 2022 employed machine learning to categorize bank customers based on their responses to advertisements.

Visit bank's website & apply for a credit solution

During this stage, banking institutions aim to convert website traffic into credit solution applicants. The integration of robo-advisors aids customers in selecting credit solutions for which they qualify, and which suit their banking needs best. Robo-advisors enhance service offerings by assisting customers with selecting appropriate solutions after gathering basic personal financial data and promptly validating it with credit reporting agencies. (Belanche. D; Casalo. L; Flavián. C; 2019) found that information, system, and service quality are pivotal in ensuring a seamless customer experience with chatbots, with personalization moderating these constructs. Robo-advisors possess task-oriented features (e.g., checking bank accounts) alongside problem-solving features (e.g., processing credit applications). Subsequently, data collected undergo continuous examination through machine learning to refine offerings and improve customer experiences. Giudici. P; 2018 employed machine learning to optimize data collected through various channels, aiding in generating appropriate and inclusive credit recommendations. It is imperative to note that while the proposed process offers significant value to customers and banking institutions, many customers remain reluctant to share their information; thus, trust in the banking institution is paramount for enhancing customer experience.

Receive a decision

Once data are collected through online channels, data mining and machine learning facilitate analysis and provide optimal credit decisions. At this stage, customers receive credit decisions through robo-advisors. Traditional credit decision approaches typically take up to two weeks, involving submission to the advisory network, underwriting, and communication back to the customer. However, with AI integration, customers can receive instant credit decisions, saving time and feeling more empowered and in control. Decision-making processes should strike a balance between managing organizational risk, maximizing profit, and promoting financial inclusion. For instance, Sadok.H et al 2022 utilized machine learning techniques to develop a model predicting customers' credit risk. He also proposed a data mining model to instill greater confidence in credit scoring systems. From an organizational risk perspective, they employed a neural network approach to analyze defaulting customer behavior, aiming to minimize credit risk and boost profitability for credit-providing institutions.

Customer contact the call center

At this juncture, we explored the interaction between humans and AI, and found that customers prefer humans for high-complexity tasks, underscoring the importance of integrating human employees for cases requiring manual review, as AI may misjudge one of the Cs of credit. While AI offers numerous benefits for customers and organizations Jakšič, M. ; Matej. M; 2019 underscores that relationship banking still plays a crucial role in providing a competitive advantage for financial institutions. Integrating AI at this stage can be achieved by optimizing banking channels. For example, banking institutions can enhance service by optimizing appointment scheduling and reducing service time through machine learning.

General discussion

Researchers acknowledge the practical use of AI in providing enhanced customer service. Facilities like robo-advisors can aid in product selection, application for banking solutions, and timesaving in low-complexity tasks. As AI proves effective in automating banking processes, enhancing customer satisfaction, and increasing profitability, the field has evolved to address strategic insights. Recent research has focused on examining AI's role in driving business strategies. For instance, researchers have explored using AI to simplify internal audit reports and evaluate strategic initiatives. Recent studies also highlight challenges associated with AI, be it from an implementation, cultural, or organizational resistance perspective. As AI technologies continue to advance in the banking sector, the privacy-personalization paradox has emerged as a crucial research area requiring exploration. (Guo, Haochen; Polak, Petr; 2021)

Furthermore, the COVID-19 pandemic has presented numerous challenges in implementing AI in the banking sector. While banks' interest in AI technologies remains high, reduced revenue has led to a decrease in short-term investment in AI technologies emphasize the need for banking institutions to continue investing in AI technologies to mitigate future risks and enhance integration between on-line and offline channels. From a customer perspective, COVID-19 has spurred increased adoption of AI-driven services like chatbots, E-KYC (Know Your Client), and robo-advisors. (Belanche. D; Casalo. L; Flavián. C; 2019); (Guo, Haochen; Polak, Petr; 2021)

FUTURE RESEARCH DIRECTIONS

RQ 3: What are the current research gaps and future research directions in this field?

In terms of strategy, with the continuous expansion of AI in the banking sector, financial institutions need to explore how internal stakeholders perceive the value of adopting AI, the role of leadership, and various other variables impacting organizational AI adoption. Hence, we suggest that future research delve into the different factors (e.g., leadership role) influencing the organizational adoption of AI technologies. Moreover, as more organizations embrace AI, internal challenges arise. Therefore, we recommend investigating the various organizational challenges (e.g., organizational culture) associated with AI adoption. (Castelli. M; Manzoni. L; Popovič. A; 2016)

Regarding processes, AI's impact on credit has been extensively studied since 2005. We propose expanding beyond current models and challenging underlying assumptions by exploring new risk aspects introduced by AI technologies. Additionally, we advocate for the use of more practical case studies to validate new and existing models. Furthermore, the proliferation of AI has spurred further exploration of how internal processes can be enhanced. For example, we suggest examining AI-driven models with other financial products/solutions (e.g., investments, deposit accounts, etc.). (Giudici. P; 2018).

In the realm of customers, the predominant theories mentioned in the research papers, such as the Technology Acceptance Model (TAM) and diffusion of innovation theories (Mahfuzur. R, Ming.T, Baigh.T, Sarker.M, (2023), have been extensively explored. However, as customers become more accustomed to AI, it may be crucial to develop theories that transcend mere acceptance and adoption. Hence, we propose investigating different variables (e.g., social influence and user trends) and

methodologies (e.g., cross-cultural studies) that influence customers' relationship with AI. The gradual shift toward customer-centric utilization of AI has prompted exploration of new dimensions of AI that impact customer experience. Moving forward, it is imperative to comprehend the impact of AI on customers and how it can be leveraged to enhance customer experience.

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ODRŽIVO POSLOVANJE BANAKA: PRIMER BANCA INTESA A.D. BEOGRAD

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Rezime: Održivo poslovanje poslednjih decenija postaje globalni fenomen. Sve veći broj banka i finansijskih institucija u svoje poslovanje implementira koncept društvene odgovornosti. Banke na domaćem bankarskom tržištu kasne u odnosu na međunarodne bankarske institucije u primeni koncepta održivosti i realizaciji ekonomskih, ekoloških i socijalnih ciljeva. U skladu sa tim, ovaj rad bavi se analizom koncepta održivog poslovanja u bankarskom sektoru sa posebnim osvrtom na praksu Banke Intese a.d. Beograd. Cilj je utvrditi u kojoj meri realizacija ekoloških i socijalnih ciljeva kroz društveno odgovorno, održivo poslovanje doprinosi realizaciji ekonomskih ciljeva. Prikazane su aktivnosti Banke Intesa u oblasti zaštite životne sredine, društvene odgovornosti i upravljanja, kao i efekti tih aktivnosti na reputaciju i konkurentnost banke. Istraživanje je bazirano na analizi osnovnih indikatora održivosti u odnosu na ekonomsku vrednost koju je banka realizovala za posmatrani period. Poseban akcenat je na zelenim finansijskim proizvodima, kreditnoj politici i društvenoj uključenosti. Rad zaključuje da je održivo poslovanje ne samo etika već i strategija dugoročne konkurentnosti.

Ključne reči: održivo poslovanje, ESG, CSR, Banca Intesa, zelene finansije

JEL klasifikacija: G21, G50, B26, E44

Uvod

Klimatske promene, globalno zagrevanje, ekološki i društveni izazovi i siromaštvo glavni su pokretači brojnih rasprava regulatora širom sveta i definisanja društvenih prioriteta poslednje dve decenije. Izveštavanje o održivosti obaveza je i glavni indikator odgovornosti kompanija koje posluju širom sveta, ali i domaćih i međunarodnih banaka. U skladu sa tim termini društveno odgovorno poslovanje, održivi razvoj, zaštita životne sredine, zeleno finansiranje, zeleno bankarstvo postali su svakodnevnica. Održivo poslovanje postaje ključan strateški pravac za kompanije koje teže dugoročnom razvoju, očuvanju resursa i stvaranju dodatne vrednosti za sve zainteresovane strane. U bankarskom sektoru, održivost podrazumeva odgovorno upravljanje rizicima, podršku projektima koji doprinose zaštiti životne sredine i unapređenje društvene uključenosti.

Opšteprihvaćenu definiciju održivog razvoja dala je Svetska komisija za životnu sredinu i razvoj (engl. *World Commission on Environment and Development WCED*) koja navodi da je održivi razvoj „razvoj koji zadovoljava potrebe u sadašnjosti bez ugrožavanja mogućnosti budućih generacija da zadovolje svoje potrebe” (WCED, 1987). Koncept održivog razvoja odnosi se na zajedničko delovanje na ekonomski rast (podizanje ekonomske efikasnosti i produktivnosti, modernizaciju tehnologije), društveni progres (društveno odgovorno poslovanje uz smanjenje stope siromaštva, unapređenje zdravstvene zaštite) i životnu sredinu (smanjenje zagađenja i toplotnog zagrevanja, očuvanje biodiverziteta), odnosno u sinergiji ovih oblasti (Stanojević, Mitić, & Rakić, 2013 u Petrović-Randelović et al., 2022).

Da bi koncept održivosti mogao da se uspešno implementira u cilju sprečavanja neodgovornog ponašanje pojedinca, kompanija i regulatornih tela neophodna je adekvatna podrška i potpora javnosti u procesu odlučivanja. U skladu sa tim banke kao intermedijarne finansijske institucije imaju značajnu ulogu u realizaciji ovog procesa, koju ostvaruju kroz brojne kampanje i projekte usmerene na očuvanje životne sredine. Istorijski posmatrano, održivo poslovanje banaka kao koncept razvija se na kraju 20. i početkom 21. veka i odnosi se na društveno odgovorno poslovanje koje ima za cilj zaštitu životne sredine. Društveno odgovorno poslovanje banaka integralni je deo koncepta korporativne društvene odgovornosti (engl. *Corporate Social Responsibility-CSR*), koje se odnosi na koncept koji podrazumeva „angažovanost profitno orijentisanih privrednih subjekata u društvenim pitanjima koja mogu, ali nužno i ne moraju, biti posledica njihovih aktivnosti” (Sovilj, 2020, str. 266); a na osnovu (Jovićević & Žugić, 2018, str. 374)

Kako se poslednjih godina koncept održivog razvoja nameće kao neophodnost i obaveza, brojne banke da bi očuvale svoju konkurentsku poziciju morale su da se prilagode zahtevima tržišta. Koncept održivog razvoja u međunarodnim bankama je daleko prisutniji u poslovanju nego u bankama u Republici Srbiji. Među bankama koje posluju u Republici Srbiji, kao jedna od vodećih, koja poštuje i implementira principe zaštite životne sredine ističe se Banca Intesa. U skladu sa tom činjenicom, fokus rada je na analizi koncepta održivog razvoja banaka u Srbiji sa posebnom pažnjom na održivo poslovanje banke Banca Intesa.

Cilj rada je da prikaže koncept održivog poslovanja banaka, uz poseban osvrt na aktivnosti koje sprovodi Banca Intesa a.d. Beograd. Istraživanje se zasniva na javno dostupnim podacima, izveštajima banke i regulatornih institucija, kao i relevantnoj, stručnoj literaturi. U metodološkom smislu, rad se oslanja na kvalitativnu i kvantitativnu analizu dostupnih sekundarnih podataka. Korišćeni su zvanični izveštaji Narodne banke Srbije, finansijski izveštaji Banca Intesa a.d. Beograd, kao i relevantna naučna i stručna literatura. Analiza obuhvata ključne pokazatelje društveno odgovornog poslovanja banke u periodu od 2019. do 2023. godine, sa ciljem da se oceni nivo održivosti njenog poslovanja i

identifikuju faktori koji doprinose njenoj sistemskoj važnosti u okviru domaćeg bankarskog sektora.

S tim u vezi prvi deo rada analizira opšte karakteristike društveno odgovornog poslovanja u bankama. Drugi deo rada pažnju posvećuje banci kroz analizu ključnih indikatora održivosti. Treći deo rada predstavlja zaključna razmatranja.

Društveno odgovorno poslovanje banaka

Koncept održivog poslovanja banaka temelji se na teorijskim osnovama održivog razvoja, društveno odgovornog poslovanja (CSR) i ESG pristupa (Environmental, Social, Governance). Osnovu za razumevanje održivosti postavlja izveštaj WCED (1987) „Naša zajednička budućnost“ (engl. *Our Common Future*), koji definiše održivi razvoj kao razvoj koji zadovoljava potrebe sadašnjih generacija bez ugrožavanja budućih čime su postavljeni temelji za razvoj i sprovođenje politike održivog razvoja. U okviru bankarskog sektora, literaturu o održivom finansiranju i zelenom bankarstvu obogaćuju radovi autora poput Jeucken i Bouma (1999), Bouma, Jeucken i Klinkers (2001), koji razmatraju promene u ekološkoj svesti finansijskih institucija i razvoj zelenih finansijskih proizvoda.

Na domaćem i regionalnom planu, radovi Sovilj (2020), Rakić, Mitić i Raspopović (2012), kao i Petrović-Randelović i saradnici (2022) pružaju uvid u stepen implementacije održivih praksi u bankarskom sektoru Srbije i šireg regiona. Takođe, brojne međunarodne organizacije poput UNEP FI (2021), ECB (2023) i EBRD (2022) daju smernice i standarde za integraciju ESG faktora u poslovne strategije i upravljanje rizicima u bankarstvu.

Posebnu vrednost za ovaj rad predstavljaju izveštaji o održivosti i godišnji finansijski izveštaji Banca Intesa a.d. Beograd i Intesa Sanpaolo grupe, koji omogućavaju empirijsku analizu konkretnih indikatora održivog poslovanja. Kroz korišćenje relevantne domaće i strane literature, rad povezuje teorijske pristupe sa praktičnim aspektima implementacije održivih praksi u bankarskom sektoru.

Društveno odgovorno bankarstvo najznačajniji je deo društveno odgovornih, održivih finansija. Održivo, zeleno, društveno odgovorno, etičko bankarstvo predstavlja odluku banaka da obezbede proizvode i usluge samo klijentima koji uzimaju u obzir posledice svog delovanja, kako sa društvenog aspekta, tako i sa aspekta uticaja na životnu sredinu (Bouma, Jeucken, & Klinkers, 2001).

Svetski poslovni savet za održivi razvoj (engl. *World Business Council for Sustainable Development WBCSD*) definiše društvenu odgovornost banaka kao njihovu opredeljenost u doprinošenju održivom ekonomskom razvoju, uzajamno sarađujući sa zaposlenima, njihovim porodicama, lokalnom zajednicom, te društvom u celini, a sve u cilju unapređenja njihovog životnog standarda (Saraiva & Serrasqueiro, 2007). Generalno posmatrano, bankarski sektor i nije neposredni zagađivač životne sredine, u smislu da direktno doprinosi povećanoj emisiji izduvnih gasova. Ali, ukoliko finansiraju klijente čija poslovna delatnost ima negativne efekte na životnu sredinu, mogu biti posredno odgovorne. S druge strane, postoje slučajevi u kojima su banke bile direktno odgovorne za štetni uticaj na životnu sredinu izazvane aktivnostima svojih klijenata. Najčešće navođen slučaj u literaturi je „The US versus Fleet Factors Corporation“ iz 1991. godine, u kojem je banka, koja je finansirala Korporaciju smatrana odgovornom, i bila je dužna da pokrije troškove dekontaminacije zemljišta korporacije (Sovilj, 2020). Budući da je banka imala učešće u finansijskom menadžmentu korporacije, sud je zauzeo stanovište da je banka imala mogućnosti da utiče na odluke korporacije koje su, u krajnjoj instanci, i doprinele zagađenju, iako banka zvanično nije imala nikakav uticaj na preduzete aktivnosti korporacije (Jeucken, 2001).

Tako se poslednjih godina nametnuo proces ozelenjavanja u bankarstvu, kao rezultat potrebe banaka da, pored maksimiziranja profita kao primarnog cilja, doprinesu i očuvanju životne sredine i stvore atmosferu društveno odgovornog poslovanja. Zelene finansije i bankarstvo se, dakle, odnose na istovremenu realizaciju primarnog cilja banaka i finansijskih institucija kroz ostvarenje profita, ali i orijentaciju ka ciljevima koji inkorporiraju zaštitu životne sredine, društveno odgovorno poslovanje i održivi razvoj (Rakić, Mitić, & Raspopović, 2012).

Društveno odgovorne banke orijentisane su na aktivnosti koje su od koristi za društvenu zajednicu i to kroz odobravanje povoljnih stambenih kredita, finansiranjem tradicionalnih manifestacija, lokalnim stipendiranjem i slično. Banke mogu promovisati održivi razvoj podsticanjem kompanija da posluju u skladu sa principima održivosti, ali i kroz sankcionisanje onih koje ne posluju u skladu sa usvojenim principima. Banke i finansijske institucije imaju dvostruku ulogu u očuvanju životne sredine. Prvo, banke su dužne da etički i društveno odgovorno postupaju kako prema klijentima, tako i prema zaposlenima i ostalim stejkholderima. Druga, ali ne i manje važna uloga banaka je da kroz poslovanje, obavljajući funkciju pružaoca usluga, obezbedi da preduzeća kao njihovi klijenti svoje prakse prilagode očuvanju životne sredine. Na taj način podstaknute su da nude sredstva pod povoljnijim uslovima, a za usvajanje zelenih tehnologija, realizaciju projekata koji će imati dugoročno blagotvoran uticaj na životnu sredinu i društveno blagostanje, kao i da same usvajaju zelenu praksu inoviranjem proizvoda, upotrebom sofisticiranih zelenih tehnoloških rešenja, negovanjem korporativne kulture zastupanja pravih vrednosti (D'Monte, 2010).

U skladu sa tim, održivo poslovanje u bankarstvu uključuje tri dimenzije poznate kao ESG model: ekološka (engl. *Environmental*), društvena (engl. *Social*) i upravljačka (engl. *Governance*). Banke kroz ESG strategije finansiraju projekte koji podstiču energetska efikasnost i obnovljive izvore energije, vode računa o uticaju poslovanja na lokalnu zajednicu, unapređuju interne politike upravljanja rizicima, etike i transparentnosti. Smatra se da banke koje sprovode ESG politiku imaju dugoročnu stabilnost i reputacionu prednost (UNEP FI, 2021). Da bi se banka mogla okarakterisati kao društveno odgovorna, odnosno „zelena“ neophodno je da integriše aspekt životne sredine u upravljanje bankarskim rizicima, da zaposli kadrove osposobljene da vrše poslove zelenog investiranja, podstiče održavanje okruženja u kom svi učesnici poštuju ista pravila i imaju jednake mogućnosti, pridržava se regulativa, podiže svest društva naspram zelenih projekata, ostvari potpunu koordinaciju među interesnim grupama zelenog bankarstva (Setijawan, 2011). Koristeći trofazni model razvoja zelenog bankarstva Jeucken-a i modifikaciju istog datu od strane Boum-a, u *tabeli 1* prikazani su osnovni tipovi zelenih banaka. (Jeucken & Bouma, 1999, str. 30).

Tabela 1 - Trofazni model razvoja društveno odgovornih banaka

Banke koje sprovode društveno odgovorne aktivnosti	Banke koje implementiraju sisteme za upravljanje društvom i životnom sredinom	Društveno odgovorne banke
- Aktivnosti bez velikog uticaja na životnu sredinu, primena brojnih pristupa koji opredeljuje da se bude zelena ali ne i preduzimanje konkretnih aktivnosti - Društveno odgovorni projekti i projekti zaštite životne sredine - Primena informacionih tehnologija, ATM bankomata, briga o zaposlenima	- Diferenciranje usluga koje će pružiti klijentima, sposobno nadgledanja ponašanja i poslovanja svojih klijenata, pružanje pomoći i podrške svojim klijentima - Sistema treba da obezbedi da održivost igra centralnu ulogu na svim nivoima odlučivanja - Standardizovani pristup kroz opredeljenje za društveno odgovorno poslovanje - Usvajanje Ekvatorskih principa, Standarda IFC-a, ISO 9000, ISO 14000, ISO 14001, TQM	- Obezbeđivanje zaštite životne sredine (plasiranje sredstava u energetske efikasne projekte) - Društveno odgovorne banke (inkorporiraju oba aspekta, održive banke) - Obezbeđivanje zaštite društvene sredine (specijalizovane banke za pružanje pomoći ugroženim slojevima stanovništva kroz samozapošljavanje, humanitarne organizacije i slično)

Izvor: autor, na osnovu (Jeucken & Bouma, 1999, str. 30)

Da bi postigle ciljeve održivosti i ostvarile konkurentne prednosti banke usvajaju proaktivne strategije i teže ostvarenju dugoročne profitabilnosti putem eksternog finansiranja ekološki prihvatljivih proizvoda i usluga. Ove aktivnosti dovode do realizacije zelenih bankarskih poslova. *Zeleni bankarski poslovi* su uobičajeni bankarski poslovi poboljšani i modifikovani, kako bi se ispunili zahtevi savremene ekonomije i održivog poslovanja (Sovilj, 2020). Sprovedenjem zelenih bankarskih poslova banke su u mogućnosti da poboljšaju svoje tržišno učešće, ostvare konkurentsku prednost, povećaju profit, poboljšaju zadovoljstvo zaposlenih, ojačaju odnose sa stejkholderima (Noh, 2018). Noh (2018) je zelene bankarske poslove podelila na sledeći način:

Poslovi sa stanovništvom (Zeleni hipotekarni krediti za kupovinu nekretnina; Zeleni sekundarni hipotekarni krediti; Kupovina i izgradnja zelenih stanova; Zeleni krediti za kupovinu automobila i kreditne kartice);

Poslovi sa privredom (Zeleno projektno finansiranje; Zelena sekjuritizacija; Privatni kapital i zelena preduzetnička ulaganja; Finansije bazirane na emisiji štetnih gasova; tehnološki lizing);

Poslovi osiguranja (Auto osiguranje; Osiguranje bazirano na emisiji štetnih gasova; Zeleno osiguranje; Osiguranje od elementarnih nepogoda), i

Poslovi upravljanja imovinom (Fiskalni fond; Eco fond, Carbon fond; CAT obveznice, fond za elementarne nepogode; ECO ETF).

Banke koje sprovode zelene bankarske poslove imaju mogućnost da privuku veći broj klijenata i da na taj način povećaju svoj profit, istovremeno doprinoseći održivom razvoju (Sovilj, 2020). Pored banaka i dru-

ge finansijske institucije, kao što su osiguravajuća društva, zatim investicioni fondovi nastoje da kreiraju i sprovedu zelenu strategiju u svojim poslovnim aktivnostima.

Održivi razvoj i društveno odgovorno poslovanje banaka i drugih institucija u Republici Srbiji regulisano je i određeno na neki način Nacionalnom strategijom održivog razvoja, usvojenom 2008. godine. Nacionalna strategija održivog razvoja održivi razvoj definiše kao „ciljno-orjentisan, dugoročan (kontinuiran), sveobuhvatan i sinergijski proces koji utiče na sve aspekte (ekonomski, socijalni, ekološki i institucionalni) na svim nivoima“ (Nacionalna strategija održivog razvoja Republike Srbije, 2005, str. 5). To bi značilo, kako navode Stanojević, Mitić, & Rakić, (2013) da se koncept održivog razvoja odnosi na istovremeno postizanje ekonomskog rasta, društvenog progressa i zaštite životne sredine. Neophodno je istaći da Nacionalna strategija održivog razvoja ne prepoznaje banke kao važne institucije u sprovođenju osnovnih principa održivosti, osim u segmentu koji se odnosi na podsticanje razvoja elektronskog bankarstva (Nacionalna strategija održivog razvoja, 2008, s.39).

Iako bankarski sektor Republike Srbije po svim ocenama kasni sa implementacijom ovog koncepta u odnosu na razvijene ekonomije širom sveta, pojedine banke učinile su značajan iskorak u sprovođenju principa održivosti. Najveći broj aktivnosti sprovele su Banca Intesa, Erste banka, ProCredit banka i Unicredit banka. U *tabeli 2* prikazane su aktivnosti ovih banaka dok će Banca Intesa u domenu održivog poslovanja biti analizirana u posebnom poglavlju kroz sagledavanje indikatora održivosti.

Tabela 2 - Pregled najznačajnijih aktivnosti održivog poslovanja odabranih banaka u Republici Srbiji

Naziv banke	Nivo realizacije principa održivog poslovanja
Banca Intesa	Primena Deset principa Globalnog dogovora UN, Etički kodeks, Principi ljudskih prava, Politika nefinansiranja naoružanja, Politika zaštite životne sredine i unapređenja energetske efikasnosti, Politika odnosa sa političkim strankama, Smernice za sprečavanje pranja novca i finansiranja terorizma i odnose sa zemljama pod sankcijama; Dobra praksa Održivosti matične grupe Intesa Sanpaolo; Nagrade - Specijalna nagrada VIRTUS za volontiranje koju dodeljuje Trag fondacija, Nagrada za doprinos lokalnoj zajednici koju dodeljuje udruženje Moja Srbija, Nagrada Forum za odgovorno poslovanje i Smart kolektiva za najbolji program korporativnog volonterstva u Srbiji u 2015.godini za „Intesa od srca“; Briga o zaposlenima; E-bankarstvo.
UniCredit banka	Podrška neprofitnih organizacija, kulturnog stvaralaštva, sportskih aktivnosti, socijalno ugroženih grupa; Potrošački krediti za energetske efikasnost. Primena Ekoloških principa;
ProCredit banka	ISO 14001:2015 Primena 3 stuba-Interni sistem upravljanja zaštitom životne sredine (podizanje svesti među zaposlenima, saradnja sa „zelenim“ dobavljačima, ulaganje u bolju izolaciju, poboljšanje upravljanja otpadom, osnivanje Službe za energetske efikasnost), Upravljanje ekološkim i socijalnim rizicima u kreditiranju (odbijanje zahteva za kredit preduzeća koja su uključena u ekološki rizične aktivnosti); Kredit za energetske efikasnost, obnovljive izvore energije i ostale mere zaštite životne sredine za preduzeća, gazdinstva i stanovništvo);

<i>Erste banka</i>	Net i mBanking aplikacije, mToken; Zeleno projektno finansiranje; Keš kredit za penzionere; Omladinski tekući račun; Program Korak po korak-razvoj socijalnog bankarstva; Erste Energetska Efikasnost Kredit iz EBRD linije.
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Izvor: autor, na osnovu (Petrović-Randelović, Colić, & Stojanović-Randelović, 2022)

Za finansiranje obnovljivih izvora energije i podsticanje energetske efikasnosti banke najčešće sprovode finansiranje putem kreditnih linija. Fokus je na upotrebi obnovljivih izvora energije, sprovođenjem određenih projekata obnovljivih izvora energije finansiranih iz evropskih i međunarodnih fondova (Petrović-Randelović, Colić, & Stojanović-Randelović, 2022)

Održivo poslovanje Banca Intesa a.d. Beograd

Banca Intesa a.d. Beograd članica je vodeće evropske bankarske grupacije Intesa Sanpaolo sa sedištem u Italiji. Ova bankarska grupa lider je u svetu i u okviru poslovanja sa stanovništvom, i u poslovanju sa privredom. Takođe, uvrštena je među 20 najodrživijih banaka širom sveta, što potvrđuje njenu sposobnost da strateški upravlja rizicima i mogućnostima u oblasti zaštite životne sredine, društvenog razvoja i rukovođenja. Intesa Sanpaolo uključena je na vodeće liste pokazatelja održivosti, kao što su „Dow Jones“ indeks, „A-lista CDP“ i „FTSE4Good“ (Intesa San Paolo, 2024).

Kao deo matične banke i kao vodeća na domaćem bankarskom finansijskom tržištu, Banca Intesa a.d. Beograd ima značajnu ulogu u privredi uz istovremeni uticaj na prirodno i društveno okruženje. Obezbeđenje održivosti uz kreiranje vrednosti postiže se realizacijom ekonomskih, ekoloških, socijalnih ciljeva. Realizacija osnovnih principa održivosti postiže se kroz poštovanje: 1. Deset principa Globalnog dogovora Ujedinjenih nacija; 2. Etički kodeks; 3. Principa ljudskih prava; 4. Politike nefinansiranja naoružanja; 5. Politike zaštite životne sredine i unapređenja energetske efikasnosti; 6. Politika odnosa sa političkim strankama; 7. Smernice za sprečavanje pranja novca i finansiranja terorizma i odnose sa zemljama pod sankcijama; 8. Dobrim praksama Održivosti matične grupe Intesa Sanpaolo. Karakteriše je stabilno poslovanje, snažan fokus na inovacije i visok nivo društvene odgovornosti. Prema podacima iz godišnjeg izveštaja za 2023. godinu, ukupna aktiva banke iznosi preko 8 milijardi evra, sa pokazateljima profitabilnosti ROE od 11,5% i ROA od 1,2% (Banca Intesa, 2024). Pokazatelji finansijskog položaja banke ukazuju na stabilan rast ukupne aktive, neto dobiti i profitabilnosti tokom perioda 2019–2023. Konstantno povećanje ROE i ROA vrednosti sugerise efikasno upravljanje resursima i uspešnu poslovnu strategiju. Visok nivo kapitalne adekvatnosti iznad regulatornog minimuma iznosi 20,8% (Banca Intesa, 2024), dodatno potvrđuje otpornost banke na tržišne i sistemske rizike, uključujući one povezane sa klimatskim promenama i ESG faktorima.

Strategija rasta koju Banca Intesa fokusira se na održive rezultate i stvaranje odnosa zasnovanog na poverenju i zadovoljstvu klijenata, osećanju pripadnosti kod zaposlenih i potreba zajednice (Intesa SanPaolo, 2024). Cilj je stvaranju stabilnih i održivih vrednosti sa ekonomske, finansijske, društvene i ekološke tačke gledišta, koje banka gradi na osnovnim korporativnim vrednostima sa svim zainteresovanim stranama.

Banca Intesa finansira projekte energetske efikasnosti, zeleni transport i obnovljive izvore energije. Kroz program „Zeleni krediti“ omogućava povoljnije uslove za fizička i pravna lica koja investiraju u solarne panele, toplotne pumpe i sl. (Banca Intesa, 2023). Podržava obrazovne programe, inicijative za

finansijsku pismenost, kao i zdravstvene i humanitarne projekte. Kroz program „Inicijativa za zajednicu“ ulaže u lokalne zajednice i neprofitni sektor (Banca Intesa, 2023). Interno sprovodi politike rodne ravnopravnosti, etike poslovanja i odgovornog upravljanja rizicima. Izveštaji o održivosti su u skladu sa GRI standardima i redovno se objavljuju (GRI, 2021). Za procenu realizacije društveno odgovornog poslovanja analizirani su glavni indikatori održivosti za period 2019-2023.god. Imajući u vidu da je ovo period krize izazvanje pandemijom COVID-19, cilj je da se utvrdi da li je pandemija uticala na sprovođenje osnovnih CSR aktivnosti u banci i kako je to uticalo na stvaranje ekonomske vrednosti. U tabeli 3 prikazani su osnovni indikatori.

Tabela 3 - Pregled osnovnih indikatora održivosti i ostvarene ekonomske vrednosti Banca Intesa za period 2019-2023.god.

	2019	2020	2021	2022	2023
<i>Ukupan broj zaposlenih</i>	3.073	3.061	3.029	3.061	3.079
<i>Ukupan broj časova obuke za zaposlene</i>	140.976	186.508	209.815	339.525	348.760
<i>Ukupna potrošnja energije (kWh)</i>	16.048.691	10.084.951	10.159.451	9.557.198	8.209.829
<i>Ukupna potrošnja vode (m³)</i>	113.178	43.377	35.130	41.233	33.950
<i>Ukupna nabavka papira (t)</i>	347	213	207	223	221
<i>Ukupan generisani otpad (kg)</i>	92	40	39	30	29
<i>% obnovljive energije u ukupnoj potrošnji energije</i>	27,0	27,0	29,0	86,0	86
<i>Realizovana ekonomska vrednost</i>	28.069.774	26.478.244	30.182.035	33.907.250	45.270.576

Izvor: autor na osnovu Izveštaja o održivosti i Godišnjih finansijskih izveštaja za 2019, 2020, 2021, 2022. i 2023. god.

Banca Intesa je pristupanjem Alijansi banka koje teže nultoj emisiji (engl. *Net-Zero Banking Alliance*) počela da sprovodi aktivnosti usmerene na „nultu emisiju“ do 2050. god, kako u okviru kreditnih i investicionih aktivnosti tako i kroz upravljanje sredstvima (UNEP FI, 2021). Osnovni cilj banke je „nulta emisija“ do 2030. god. uz istovremenu zaštitu i obnovu prirodnog kapitala. U posmatranom periodu banka je težila efikasnoj realizaciji svih aktivnosti koje se tiču zaštite životne sredine i objedinjuju aktivnosti odgovornog upravljanja resursima i odgovornog finansiranja. Pored ovih aktivnosti banka je usmerena i na brigu o zaposlenima. Na osnovu podataka iz tabele možemo zaključiti da je većim delom banka realizovala svoje ciljeve društveno odgovornog poslovanja, kroz smanjenje potrošnje energije, racionalnu potrošnju voda, smanjenje upotrebe papira i prelazak na elektronske načine poslovanja i povećanja udela obnovljive energije u ukupnoj potrošnji. S tim u vezi, ostvarenje osnovnih ciljeva održivosti doprinosi i povećanju realizovane ekonomske vrednosti izražene kroz ukupne prihode poslovanja. Ekološka dimenzija Banca Intesa finansira projekte energetske efikasnosti, zeleni transport i obnovljive izvore energije. Kroz program „Zeleni krediti“ omogućava povoljnije uslove za fizička i pravna lica koja investiraju u solarne panele, toplotne pumpe i sl. (Banca Intesa, 2023).

Banka podržava obrazovne programe, inicijative za finansijsku pismenost, kao i zdravstvene i humanitarne projekte. Kroz program „Inicijativa za zajednicu“ ulaže u lokalne zajednice i neprofitni sektor (Banca Intesa, 2023). Takođe, efekti ESG pristupa ogledaju se u povećanju poverenja korisnika, partnera i regulatora. Održivo poslovanje doprinosi smanjenju operativnih i reputacionih rizika. Evropska centralna banka insistira na identifikaciji klimatskih i ekoloških rizika u portfoliju banaka (ECB, 2023). U tabeli 4. prikazani su osnovni ESG projekti banke.

Tabela 4 - Prikaz ključnih ESG projekata i iznos investicija Banca Intesa

Naziv projekta	Kategorija	Godina	Iznos investicija (u evrima)
<i>Zeleni krediti za fizička lica (GEFF)</i>	Ekološki	2022-2023.	3.000.000
<i>Energetska efikasnost za MSP</i>	Ekološki	2022.	2.500.000
<i>Inicijativa za zajednicu</i>	Društveni	2023.	500.000
<i>Program finansijske pismenosti</i>	Društveni	2021-2023.	100.000
<i>Politike rodne ravnopravnosti</i>	Upravljački	2022.	50.000
<i>Usklađivanje sa GRI standardima</i>	Upravljački	2023.	70.000

Izvor: autor, na osnovu EBRD (2022); Banca Intesa a.d. Beograd (2023); Intesa Sanpaolo Group (2023); GRI (2021).

Banca Intesa najveći iznos sredstava usmerava ka ekološkim inicijativama, poput zelenih kredita i energetske efikasnosti za mala i srednja preduzeća, što potvrđuje strateški fokus banke na zelenu tranziciju. Istovremeno, nisu zapostavljene ni društvene i upravljačke dimenzije održivosti, što ukazuje na holistički pristup ESG integraciji. U celini, analizirani podaci pokazuju da Banca Intesa ne samo da ostvaruje solidne finansijske rezultate, već i aktivno investira u dugoročno održive projekte koji doprinose razvoju zajednice i očuvanju životne sredine. Takva sinergija finansijske stabilnosti i ESG performansi čini ovu banku jednim od vodećih primera održivog poslovanja u regionu.

Činjenica da je globalna kriza izazvana pandemijom COVID-19 praktično zaustavila svet i dovela do kolapsa opravdava i smanjenje ključnih indikatora u godinama krize. Veći deo aktivnosti preusmeren je na elektronske načine komunikacije i poslovanja. Međutim, sprovedene aktivnosti idu u prilog realizaciji ciljeva društveno odgovornog poslovanja banke. Svoju leadersku poziciju na tržištu banka opravdava visoko razvijenom ekološkom svešću i inovatorskom pozicijom u finansiranju cirkularne ekonomije. Tokom 2022. god. obavila je 21 transakciju u vrednosti od 32 miliona evra realizovanih u oblasti privrede i malih i srednjih preduzeća. Transakcije cirkularne ekonomije odnose se na finansiranje pametnih, zelenih zgrada, solarne elektrane i postrojenja za preradu otpada (Banca Intesa, 2023). Što se tiče kreditnih aktivnosti osnovni cilj je sprovođenje politike kreditiranja održivosti. S tim u vezi banka kreditiranje kvalifikuje kao održivo, poštujući pored ekonomskih i ekološke, socijalne i upravljačke kriterijume.

Zaključak

Društveno odgovorno, održivo poslovanje sastavni je deo aktivnosti svih entiteta jedne privrede. Poslednjih godina velika pažnja posvećena je održivom, zelenom bankarstvu i finansijama. Realizacija koncepta održivosti sprovodi se i na međunarodnom i na lokalnom nivou. Banke kao intermedijarne finansijske institucije imaju ključnu ulogu u realizaciji ovog koncepta, iako nisu neposredni zagađivači

životne sredine. Svoju ulogu realizuju finansiranjem aktivnosti svojih klijenata koje su usmerene na zaštitu životne sredine, na odgovorno i održivo poslovanje.

Iako bankarski sektor Republike Srbije kasni u odnosu na međunarodne bankarske sisteme u implementaciji osnovnih principa održivosti, svakako pojedine banke koje posluju u domaćem bankarskom sektoru su učinile iskorak u realizaciji principa društveno odgovornog poslovanja. Među najodrživijim bankama spadaju Banca Intesa, Erste banka, Procredit Banka, AiK banka, UniCredit banka, Credit Agricole banka. Ove banke kroz svoje poslovanje teže da istovremeno realizuju ekonomske, ekološke i socijalne ciljeve preduzimanjem brojnih aktivnosti poštujući Etički kodeks i brojne međunarodne principe. Krajnji cilj jeste da banke, a posredstvom njih, i ceo finansijski sektor implementira društveno odgovorno poslovanje kao sastavni deo svog redovnog poslovanja.

Ovaj rad analizirao je osnovne indikatore društveno odgovornog poslovanja Banca Intesa za period 2019-2023. god. Banca Intesa kategorisana je kao vodeća na domaćem tržištu u poslovanju i realizaciji ekonomskih i ekoloških ciljeva. Takođe, reprezentativni je primer banke u kojoj realizacija ekoloških i socijalnih ciljeva doprinosi realizaciji ekonomskog učinka, što su pokazali i rezultati istraživanja. Uprkos relativno stabilnom broju zaposlenih, banka je značajno povećala broj realizovanih sati obuke, sa 140.976 časova u 2019. godini na gotovo 349.000 časova u 2023. godini, što ukazuje na snažan fokus na razvoj i edukaciju zaposlenih. Paralelno s tim, potrošnja energije je smanjena za gotovo 50% u istom periodu, dok je udeo obnovljive energije u ukupnoj potrošnji povećan sa 27% na 86%, što svedoči o jasnoj strategiji energetske tranzicije. Smanjenje potrošnje vode i papira, kao i kontinuirani pad količine generisanog otpada, potvrđuju posvećenost banci unapređenju internih procesa u skladu sa principima održivosti. Dodatno, rast realizovane ekonomske vrednosti, koja je porasla sa 28 miliona evra u 2019. godini na preko 45 miliona u 2023, ukazuje da održive prakse ne samo da ne narušavaju poslovne rezultate, već mogu doprineti njihovom poboljšanju. Analiza pokazuje da implementacija ESG principa može biti efikasno integrisana u operativno i strateško upravljanje, bez negativnog uticaja na ključne finansijske pokazatelje, pa čak i uz dodatnu vrednost u pogledu stabilnosti i reputacije.

Period analize poklapa se sa pojavom zdravstvene krize izazvane pandemijom COVID-19. Međutim, ova kriza nije u velikoj meri uticala na realizaciju ekoloških i socijalnih ciljeva. Naprotiv, brojne banke tokom pandemije uvele su programe finansiranja zdravstvene pomoći svojim zaposlenima. U godini nakon pandemije podržani su projekti socijalne zaštite naročito oni koji su bili usmereni na decu - kao što je UNICEF projekat za rano detinjstvo koji za cilj ima podršku optimalnom razvoju i inkluziji dece u Srbiji. U skladu sa tim, može se zaključiti da će dalje ulaganje u ljudske resurse i životnu sredinu biti od velikog značaja za poboljšanje ekonomskih performansi banke.

Takođe, banka je prepoznala značaj finansiranja energetske tranzicije, podsticanja društvene uključenosti i primene principa dobrog korporativnog upravljanja. Kroz projekte kao što su zeleni krediti, inicijative za zajednicu, programi finansijske pismenosti i harmonizacija izveštavanja sa GRI standardima, potvrđuje se strateška opredeljenost ka održivom razvoju. Banca Intesa a.d. Beograd je primer dobre prakse za ostale učesnike finansijskog sistema u Republici Srbiji i regionu, u kontekstu izgradnje konkurentnog, otpornog i društveno odgovornog bankarskog sektora, i zaključujemo da održive inicijative ne narušavaju profitabilnost, već doprinose stabilnosti, reputaciji i konkurentskoj prednosti banke.

Iako ovaj rad pruža sveobuhvatan uvid u održivo poslovanje Banca Intesa a.d. Beograd, dalja istraživanja bi trebalo da obuhvate širu komparativnu analizu održivih praksi više banaka koje posluju na domaćem i regionalnom tržištu. Na taj način moguće je identifikovati obrasce, razlike i sličnosti u pristupima održivosti, ali i utvrditi faktore koji doprinose većoj otpornosti i konkurentnosti banaka u

uslovima ekonomske i regulatorne neizvesnosti. U kontekstu sve veće važnosti održivog bankarstva, buduća istraživanja mogu se usmeriti ka nekoliko važnih pravaca. Pre svega, korisno bi bilo sprovesti komparativnu analizu održivih praksi banaka u regionu Zapadnog Balkana, kako bi se identifikovale razlike u nivou integracije ESG principa i regulatornih podsticaja. Dodatno, empirijska istraživanja mogu se fokusirati na kvantifikaciju uticaja ESG performansi na profitabilnost i finansijsku stabilnost banaka, korišćenjem ekonomskih i statističkih modela. Značajan doprinos dala bi i istraživanja percepcije klijenata i investitora o značaju održivog poslovanja, kao i analiza spremnosti bankarskog sektora da odgovori na klimatske i regulatorne rizike. Posebnu pažnju zaslužuju i zelene finansije – istraživanje uspešnosti i tržišnog potencijala zelenih kredita, fondova i obveznica, kao i interni aspekti organizacione kulture banaka, uključujući način na koji se ESG vrednosti inkorporiraju u poslovne strategije i svakodnevno odlučivanje. Ovi pravci istraživanja doprineli bi boljem razumevanju sistemskog značaja održivog poslovanja banaka u savremenim ekonomskim uslovima.

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NAPOMENA: Rad je rezultat istraživanja u okviru Projekta Ministarstva nauke, tehnološkog razvoja i inovacija. Broj Ugovora za realizaciju Projekta u okviru Inovacionog centra Univerziteta u Nišu je: 451-03-136/2025-3/200371.

SUSTAINABLE BANKING BUSINESS: THE EXAMPLE OF BANCA INTESA A.D. BEOGRAD

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Summary: *Sustainable business has become a global phenomenon in recent decades. An increasing number of banks and financial institutions are implementing the concept of social responsibility in their operations. Banks in the domestic banking market lag behind international banking institutions in applying the concept of sustainability and realizing economic, environmental and social goals. Accordingly, this paper deals with analyzing of the concept of sustainable business in the banking sector with special reference to the practice of Banca Intesa a.d. Belgrade. The goal is to determine to what extent the realization of environmental and social goals through socially responsible, sustainable business contributes to the realization of economic goals. The activities of Banca Intesa in the field of environmental protection, social responsibility and management (ESG), as well as the effects of these activities on the bank's reputation and competitiveness, are presented. The research is based on the analysis of basic indicators of sustainability, in regard to the economic value realized by the bank for the observed period. Special emphasis is placed on green financial products, credit policy and social inclusion. The paper concludes that sustainable business is not only ethics but also a long-term competitiveness strategy.*

Keywords: sustainable business, ESG, CSR, Banca Intesa, green finance

JEL classification: G21, G50, B26, E44

Introduction

Climate change, global warming, environmental and social challenges, and poverty are the main drivers of numerous discussions by regulators around the world, and the definition of social priorities in the last two decades. Reporting on the sustainability of obligations is also the main indicator of the responsibility of companies operating around the world, as well as domestic and international banks. Accordingly, the terms socially responsible business, sustainable development, environmental protection, green financing, and green banking have become everyday terms. Sustainable business is becoming a key strategic direction for companies that strive for long-term development, resource conservation and the creation of additional value for all stakeholders. In the banking sector, sustainability means responsible risk management, support for projects that contribute to environmental protection and promotion of social inclusion.

The generally accepted definition of sustainable development was given by the World Commission on Environment and Development (WCED), which states that sustainable development is “development that meets the needs of the present without compromising the ability of future generations to meet their needs” (WCED, 1987). The concept of sustainable development refers to joint action on economic growth (raising economic efficiency and productivity, modernization of technology), social progress (socially responsible business while reducing the poverty rate, improving health care) and the environment (reducing pollution and thermal warming, preserving biodiversity), i.e. in the synergy of these areas (Stanojević, Mitić, & Rakić, 2013 in Petrović-Randelović et al., 2022).

For the concept of sustainability to be successfully implemented to prevent the irresponsible behavior of individuals, companies and regulatory bodies, adequate support and support from the public in the decision-making process is necessary. Accordingly, banks as intermediate financial institutions have a significant role in the realization of this process, which they achieve through numerous campaigns and projects aimed at preserving the environment. From a historical point of view, sustainable banking is a concept developed at the end of the 20th and the beginning of the 21st century and refers to a socially responsible business that aims to protect the environment. The socially responsible business of banks is an integral part of the concept of Corporate Social Responsibility (CSR), which refers to the concept that implies “the engagement of profit-oriented economic entities in social issues that may, but may not necessarily, be a consequence of their activities” (Sovilj, 2020, p. 266); and based on (Jovičević & Žugić, 2018, p. 374).

As the concept of sustainable development has been imposed as a necessity and obligation in recent years, numerous banks had to adapt to market demands in order to maintain their competitive position. The concept of sustainable development in international banks is far more present in business than in banks in the Republic of Serbia. Among the banks that operate in the Republic of Serbia, Banca Intesa stands out as one of the leaders that respects and implements the principles of environmental protection. In accordance with this fact, the focus of the paper is on the analysis of the concept of sustainable development of banks in Serbia, with special attention to the sustainable operations of Banca Intesa.

The aim of the work is to present the concept of sustainable bank operations, with special reference to the activities carried out by Banca Intesa a.d. Beograd. The research is based on publicly available data, reports from banks and regulatory institutions, as well as relevant professional literature. In the methodological sense, the paper relies on qualitative and quantitative analysis of available secondary data. Official reports of the National Bank of Serbia, and financial reports of Banca Intesa a.d. Beograd

were used, as well as relevant scientific and professional literature. The analysis includes key indicators of the bank's socially responsible operations in the period from 2019 to 2023, with the aim of assessing the level of sustainability of its operations and identifying factors that contribute to its systemic importance within the domestic banking sector.

In this regard, the first part of the paper analyzes the general characteristics of socially responsible operations in banks. The second part of the paper pays attention to Banca Intesa through the analysis of key indicators of sustainability. The third part of the paper presents concluding considerations.

Socially Responsible Bank Operations

The concept of sustainable bank operations is based on the theoretical foundations of sustainable development, corporate social responsibility (CSR) and the ESG approach (Environmental, Social, Governance). The basis for understanding sustainability is laid by the WCED report (1987) "Our Common Future", which defines sustainable development as development that meets the needs of current generations without endangering future ones, which laid the foundations for the development and implementation of sustainable development policy. Within the banking sector, the literature on sustainable financing and green banking is enriched by the works of authors such as Jeucken and Bouma (1999), Bouma, Jeucken and Klinkers (2001), who consider changes in the environmental awareness of financial institutions and the development of green financial products.

On the domestic and regional level, the works of Sovilj (2020), Rakić, Mitić and Raspopović (2012), as well as Petrović-Randjelović et al. (2022) provide insight into the degree of implementation of sustainable practices in the banking sector of Serbia and the wider region. Also, numerous international organizations such as UNEP FI (2021), ECB (2023) and EBRD (2022) provide guidelines and standards for the integration of ESG factors into business strategies and risk management in banking.

The sustainability reports and annual financial reports of Banca Intesa a.d. Beograd and Intesa Sanpaolo Group are of special value for this work, which enable empirical analysis of specific indicators of sustainable business. Through the use of relevant domestic and foreign literature, the paper connects theoretical approaches with practical aspects of the implementation of sustainable practices in the banking sector.

Socially responsible banking is the most important part of socially responsible, sustainable finance. Sustainable, green, socially responsible, ethical banking represents the decision of banks to provide products and services only to clients who take into account the consequences of their actions, both from the social aspect and from the aspect of environmental impact (Bouma, Jeucken, & Klinkers, 2001).

The World Business Council for Sustainable Development (WBCSD) defines the social responsibility of banks as their determination to contribute to sustainable economic development, mutually cooperating with employees, their families, the local community, and society as a whole, to improve their standard of living (Saraiva & Serrasqueiro, 2007). Generally speaking, the banking sector is not a direct polluter of the environment, in the sense that it directly contributes to the increased emission of exhaust gases. However, banks can be held indirectly responsible if they finance clients whose business activities have negative implications for the environment. On the other hand, there are cases where banks were directly responsible for the harmful impact on the environment caused by the activities of their clients. The most frequently cited case in the literature is The US versus Fleet Factors Corporation

from 1991, in which the bank that financed the Corporation was held liable and was required to cover the costs of decontamination of the Corporation's land (Sovilj, 2020). Since the bank was involved in the financial management of the corporation, the court took the position that the bank could influence the decisions of the corporation that, in the last instance, contributed to pollution, although the bank officially did not influence on the corporation's activities (Jeucken, 2001).

Thus, the process of greening in banking has been imposed in recent years, as a result of banks' need to, in addition to maximizing profits, as a primary goal, contribute to the preservation of the environment and create an atmosphere of socially responsible business. Green finance and banking, therefore, refer to the simultaneous realization of the primary goal of banks and financial institutions through the realization of profit, but also orientation towards goals that incorporate environmental protection, socially responsible business and sustainable development (Rakić, Mitić, & Raspopović, 2012).

Socially responsible banks are oriented towards activities that are useful for the community, through the approval of affordable housing loans, financing of traditional events, local scholarships and the like. Banks can promote sustainable development by encouraging companies to operate by the principles of sustainability, but also by sanctioning those who do not operate by the adopted principles. Banks and financial institutions have a dual role in environmental protection. First, banks are obliged uphold ethical and social responsibility towards clients, employees and other stakeholders. The second, but no less important, role of banks is to ensure that companies, as their clients, adapt their practices to environmental protection through business, performing the function of service providers. In this way, they are encouraged to offer funds under more favorable conditions, and for the adoption of green technologies, the realization of projects that will have a long-term beneficial impact on the environment and social well-being, as well as to adopt green practices themselves by innovating products, using sophisticated green technological solutions, nurturing a corporate culture of representing true values (D'Monte, 2010).

Accordingly, sustainable banking operations include three dimensions known as the ESG model: environmental, social and governance. Through ESG strategies, banks finance projects that encourage energy efficiency and renewable energy sources, take into account the impact of business on the local community, and improve internal risk management policies, ethics and transparency. Banks that implement ESG policies are considered to have a long-term stability and reputational advantage (UNEP FI, 2021). For a bank to be characterized as socially responsible, i.e. "green", it is necessary to integrate the aspect of the environment into the management of banking risks, to employ staff trained to carry out green investment activities, to encourage the maintenance of an environment in which all participants respect the same rules and have equal opportunities, to comply with regulations, to raise society's awareness of green projects, to achieve complete coordination among green banking interest groups (Setijawan, 2011). Using Jeucken's three-phase green banking development model and Boum's modification of it, *Table 1* shows the basic types of green banks. (Jeucken & Bouma, 1999, p. 30).

Table 1 - Three-Phase Model of Development of Socially Responsible Banks

Banks that carry out socially responsible activities	Banks that implement social and environmental management systems	Socially responsible banks
- Activities without a large impact on the environment, application of numerous approaches that decide to be green but not undertaking concrete activities - Socially responsible projects and environmental protection projects - Application of information technologies, ATMs, care of employees	- Differentiating the services that will be provided to clients, capable of monitoring the behavior and business of their clients, providing assistance and support to their clients - The system should ensure that sustainability plays a central role at all decision-making levels - Standardized approach through commitment to socially responsible business - Adoption of the Equator Principles, IFC Standards, ISO 9000, ISO 14000, ISO 14001, TQM	- Ensuring environmental protection (investing funds in energy-efficient projects) - Socially responsible banks (incorporate both aspects, sustainable banks) - Ensuring the protection of the social environment (specialized banks for assisting vulnerable segments of the population through self-employment, humanitarian organizations and the like)

Source: author, based on (Jeucken & Bouma, 1999, p. 30)

To achieve sustainability goals and achieve competitive advantages, banks adopt proactive strategies and strive for long-term profitability through external financing of environmentally friendly products and services. These activities lead to the realization of green banking operations. Green banking deals are ordinary banking deals improved and modified to meet the requirements of the modern economy and sustainable business (Sovilj, 2020). By implementing green banking operations, banks can improve their market share, gain competitive advantage, increase profits, improve employee satisfaction, and strengthen relationships with stakeholders (Noh, 2018). Noh (2018) divided green banking operations as follows:

Retail transactions (Green mortgage loans for the purchase of real estate; Green secondary mortgage loans; Purchase and construction of green apartments; Green loans for the purchase of cars, and credit cards);

Corporate operations (Green project financing; Green securitization; Private capital and green entrepreneurial investments; Finance based on harmful gas emissions; technological leasing);

Insurance operations (Car insurance; Insurance based on harmful gas emissions; Green insurance; Insurance against natural disasters), and

Asset management (Fiscal fund; Eco fund, Carbon fund; CAT bonds, fund for natural disasters; ECO ETF).

Banks that carry out green banking operations have the opportunity to attract a larger number of clients and thereby increase their profits, while contributing to sustainable development (Sovilj, 2020). In addition to banks and other financial institutions, such as insurance companies, investment funds strive to create and implement a green strategy in their business activities.

Sustainable development and socially responsible business of banks and other institutions in the Republic of Serbia is regulated and determined in a way by the National Strategy for Sustainable Development, adopted in 2008. The National Strategy for Sustainable Development defines sustainable development as “goal-oriented, long-term (continuous), comprehensive and synergistic process that affects all aspects (economic, social, ecological and institutional) at all levels” (National Strategy for Sustainable Development of the Republic of Serbia, 2005, p. 5). This would mean, as stated by Stanojević, Mitić, & Rakić, (2013), that the concept of sustainable development refers to the simultaneous achievement of economic growth, social progress and environmental protection. It is necessary to point out that the National Strategy for Sustainable Development does not recognize banks as important institutions in the implementation of the basic principles of sustainability, except in the segment related to encouraging the development of electronic banking (National Strategy for Sustainable Development, 2008, p. 39).

Although the banking sector of the Republic of Serbia is, by all accounts, late with the implementation of this concept about developed economies around the world, some banks have made significant progress in implementing the principle of sustainability. The largest number of activities were carried out by Banca Intesa, Erste Bank, ProCredit Bank and UniCredit Bank. *Table 2* shows the activities of these banks, while the sustainable operations of Banca Intesa will be analyzed in a separate chapter by looking at sustainability indicators.

Table 2 - Overview of the Most Significant Sustainable Business Activities of Selected Banks in the Republic of Serbia

Name of the bank	The level of realization of the principles of sustainable business
<i>Banca Intesa</i>	Implementation of the Ten Principles of the UN Global Compact, Code of Ethics, Principles of Human Rights, Non-Finance of Weapons Policy, Environmental Protection and Energy Efficiency Improvement Policy, Policy on Relations with Political Parties, Guidelines for Preventing Money Laundering and Financing Terrorism and Relations with Countries Under Sanctions;
<i>UniCredit bank</i>	Support of non-profit organizations, cultural creativity, sports activities, socially vulnerable groups; Consumer loans for energy efficiency. Application of Ecological Principles;
<i>ProCredit bank</i>	ISO 14001:2015 Application of 3 pillars - Internal environmental protection management system (raising awareness among employees, cooperation with “green” suppliers, investment in better insulation, improvement of waste management, establishment of the Energy Efficiency Service), Management of environmental and social risks in lending (rejection of loan requests from companies involved in environmentally risky activities);
<i>Erste bank</i>	Net and mBanking applications, mToken; Green project financing; Cash loan for pensioners; Youth current account; Program Step by Step - Development of Social Banking; Erste Energy Efficiency Credit from the EBRD line.

Source: author, based on (Petrović-Randjelović, Colić, & Stojanović-Randjelović, 2022)

To finance renewable energy sources and encourage energy efficiency, banks most often implement financing through credit lines. The focus is on the use of renewable energy sources, by implementing certain projects of renewable energy sources financed from European and international funds (Petrović-Randjelović, Colić, & Stojanović-Randjelović, 2022).

Sustainable Operations of Banca Intesa a.d. Beograd

Banca Intesa a.d. Belgrade is a member of the leading European banking group Intesa Sanpaolo, headquartered in Italy. This banking group is the leader in the world both within the framework of business with the population, and in business with the economy. It is also listed among the 20 most sustainable banks worldwide, which confirms its ability to strategically manage risks and opportunities in the field of environmental protection, social development and leadership. Intesa Sanpaolo is included in the leading lists of sustainability indicators, such as the "Dow Jones" index, "A-list CDP" and "FTSE4Good" (Intesa SanPaolo, 2024).

As part of the parent bank and as a leader in the domestic banking financial market, Banca Intesa a.d. Belgrade has a significant role in the economy with a simultaneous impact on the natural and social environment. Ensuring sustainability while creating value is achieved by realizing economic, ecological and social goals. Realization of the basic principles of sustainability is achieved through compliance with: 1. Ten principles of the United Nations Global Compact; 2. Code of Ethics; 3. Principles of human rights; 4. Policies of non-financing of weapons; 5. Environmental protection and energy efficiency improvement policies; 6. Policy of relations with political parties; 7. Guidelines for preventing money laundering and terrorist financing and relations with countries under sanctions; 8. Good sustainability practices of the parent group Intesa Sanpaolo. It is characterized by stable operations, a strong focus on innovation and a high level of social responsibility. According to the data from the annual report for 2023, the bank's total assets amount to over 8 billion euros, with ROE profitability indicators of 11.5% and ROA of 1.2% (Banca Intesa, 2024). Indicators of the bank's financial position indicate a stable growth of total assets, net profit and profitability during the period 2019-2023. A constant increase in ROE and ROA values suggests efficient management of resources and a successful business strategy. The high level of capital adequacy above the regulatory minimum is 20.8% (Banca Intesa, 2024), additionally confirms the bank's resistance to market and systemic risks, including those related to climate change and ESG factors.

Banca Intesa's growth strategy focuses on sustainable results and creating relationships based on trust and customer satisfaction, a sense of belonging among employees and the needs of the community (Intesa SanPaolo, 2024). The goal is to create stable and sustainable values from an economic, financial, social and environmental point of view, which the bank builds on core corporate values with all stakeholders.

Banca Intesa finances energy efficiency projects, green transport and renewable energy sources. Through its "Green Loans" program, it provides more favorable conditions for individuals and legal entities that invest in solar panels, heat pumps, etc. (Banca Intesa, 2023). It supports educational programs, financial literacy initiatives, as well as health and humanitarian projects. Through the "Community Initiative" program, it invests in local communities and the non-profit sector (Banca Intesa, 2023). It internally implements the policies of gender equality, business ethics and responsible risk management. Sustainability reports comply with GRI standards and are published regularly (GRI, 2021). To assess the implementation of socially responsible businesses, the main sustainability indicators for the

period 2019-2023 were analyzed. Bearing in mind that this is a period of crisis caused by the COVID-19 pandemic, the goal is to determine whether the pandemic affected the implementation of basic CSR activities in the bank and how it affected the creation of economic value. *Table 3* shows the basic indicators.

Table 3 - Overview of basic indicators of sustainability and realized economic value of Banca Intesa for the period 2019-2023.

	2019	2020	2021	2022	2023
<i>Total number of employees</i>	3,073	3,061	3,029	3,061	3,079
<i>Total number of training hours for employees</i>	140,976	186,508	209,815	339,525	348,760
<i>Total energy consumption (kWh)</i>	16,048,691	10,084,951	10,159,451	9,557,198	8,209,829
<i>Total water consumption (m3)</i>	113,178	43,377	35,130	41,233	33,950
<i>Total paper procurement (t)</i>	347	213	207	223	221
<i>Total waste generated (kg)</i>	92	40	39	30	29
<i>% of renewable energy in total energy consumption</i>	27.0	27.0	29.0	86.0	86
<i>Realized economic value</i>	28,069,774	26,478,244	30,182,035	33,907,250	45,270,576

Source: author based on Sustainability Report and Annual Financial Reports for 2019, 2020, 2021, 2022 and 2023.

By joining the Net-Zero Banking Alliance, Banca Intesa started implementing activities aimed at “zero emissions” by 2050, both within credit and investment activities and through asset management (UNEP FI, 2021). The main goal of the bank is “zero emissions” by 2030, with the simultaneous protection and restoration of natural capital. In the observed period, the bank strove for the efficient implementation of all activities related to environmental protection and unifying the activities of responsible resource management and responsible financing. In addition to these activities, the bank is focused on taking care of its employees. Based on the data from the table, we can conclude that the bank mostly realized its socially responsible business goals, through reducing energy consumption, rational water consumption, reducing the use of paper and switching to electronic ways of doing business and increasing the share of renewable energy in total consumption. In this regard, the achievement of the basic sustainability goals also contributes to the increase of the realized economic value expressed through the total income of the business. In the domain of ecology, Banca Intesa finances energy efficiency projects, green transport and renewable energy sources. Through the “Green Loans” program, it provides more favorable conditions for individuals and legal entities that invest in solar panels, heat pumps, etc. (Banca Intesa, 2023).

The bank supports educational programs, financial literacy initiatives, as well as health and humanitarian projects. Through the “Community Initiative” program, it invests in local communities and the

non-profit sector (Banca Intesa, 2023). Also, the effects of the ESG approach are reflected in the increase in the trust of users, partners and regulators. Sustainable business contributes to the reduction of operational and reputational risks. The European Central Bank insists on the identification of climate and environmental risks in the portfolio of banks (ECB, 2023). *Table 4* shows the main ESG projects of the bank.

Table 4 - Presentation of Key ESG Projects and the Value of Investments of Banca Intesa

Name of the project	Category	Year	Investment value (in euro)
<i>Green loans for individuals (GEFF)</i>	Ecological	2022-2023	3,000,000
<i>Energy efficiency for SMEs</i>	Ecological	2022	2,500,000
<i>Community Initiative</i>	Social	2023	500,000
<i>Financial Literacy Program</i>	Social	2021-2023	100,000
<i>Gender equality policies</i>	Governance	2022	50,000
<i>Compliance with GRI standards</i>	Governance	2023	70,000

Source: author, based on EBRD (2022); Banca Intesa a.d. Belgrade (2023); Intesa Sanpaolo Group (2023); GRI (2021).

Banca Intesa directs the largest amount of funds towards environmental initiatives, such as green loans and energy efficiency for small and medium-sized enterprises, which confirms the bank's strategic focus on the green transition. At the same time, the social and management dimensions of sustainability have not been neglected, which indicates a holistic approach to ESG integration. Overall, the analyzed data show that Banca Intesa not only achieved solid financial results, but also actively invests in long-term sustainable projects that contribute to community development and environmental preservation. Such a synergy of financial stability and ESG performance makes this bank one of the leading examples of sustainable business in the region.

The fact that the global crisis caused by the COVID-19 pandemic practically stopped the world and led to a collapse justifies the reduction of key indicators in the years of the crisis. Most activities were redirected to electronic means of communication and business. However, the implemented activities are in support of the realization of the socially responsible business goals of Banca Intesa. The bank justifies its leadership position on the market with its highly developed environmental awareness and innovative position in the financing of the circular economy. During 2022, it carried out 21 transactions in the value of 32 million euros realized in the field of economy and small and medium-sized enterprises. Circular economy transactions refer to the financing of smart, green buildings, solar power plants and waste processing facilities (Banca Intesa, 2023). As far as lending activities are concerned, the main goal is the implementation of a sustainability lending policy. In this regard, the bank qualifies lending as sustainable, respecting not only economic and environmental, but also social and governance criteria.

Conclusion

Socially responsible, sustainable business is an integral part of the activities of all entities of an economy. In recent years, much attention has been paid to sustainable, green banking and finance. The

implementation of the concept of sustainability is carried out both at the international and local level. Banks as intermediary financial institutions have a key role in the realization of this concept, even though they are not direct polluters of the environment. They realize their role by financing the activities of their clients, which are aimed at environmental protection, responsible and sustainable business.

Although the banking sector of the Republic of Serbia lags behind international banking systems in the implementation of the basic principles of sustainability, certainly some banks operating in the domestic banking sector have made a step forward in realizing the principles of socially responsible business. Among the most sustainable banks are Banca Intesa, Erste Bank, Procredit Bank, Aik Bank, UniCredit Bank, and Credit Agricole Bank. Through their operations, these banks strive to simultaneously realize economic, environmental and social goals by undertaking numerous activities respecting the Code of Ethics and numerous international principles. The ultimate goal is for banks, and subsequently the entire financial sector, to implement socially responsible operations as an integral part of their regular operations.

This paper analyzed the basic indicators of corporate social responsibility of the Banca Intesa for the period 2019-2023. Banca Intesa is categorized as a leader on the domestic market in business and in the realization of economic and environmental goals. Also, it is a representative example of a bank in which the realization of environmental and social goals contributes to the realization of economic performance, as shown by the research results. Despite the relatively stable number of employees, the bank significantly increased the number of training hours, from 140,976 hours in 2019 to almost 349,000 hours in 2023, which indicates a strong focus on employee development and education. At the same time, energy consumption was reduced by almost 50% in the same period, while the share of renewable energy in total consumption increased from 27% to 86%, which testifies to a clear energy transition strategy. The reduction of water and paper consumption, as well as the continuous decrease in the amount of generated waste, confirm the bank's commitment to improving internal processes by the principles of sustainability. In addition, the growth of realized economic value, which increased from 28 million euros in 2019, to over 45 million in 2023, indicates that sustainable practices not only do not impair business results, but can contribute to their improvement. The analysis shows that the implementation of ESG principles can be effectively integrated into operational and strategic management, without negative impact on key financial indicators, and even with added value in terms of stability and reputation.

The period of analysis coincides with the emergence of the health crisis caused by the COVID-19 pandemic. However, this crisis did not greatly affect the realization of environmental and social goals. On the contrary, during the pandemic, numerous banks introduced health care financing programs for their employees. In the year after the pandemic, social protection projects were supported, especially those aimed at children - such as the UNICEF project for early childhood, which aims to support the optimal development and inclusion of children in Serbia. Accordingly, it can be concluded that further investment in human resources and the environment will be of great importance for improving the bank's economic performance.

Also, the bank recognized the importance of financing the energy transition, encouraging social inclusion and applying the principles of good corporate governance. Through projects such as green loans, community initiatives, financial literacy programs and harmonization of reporting with GRI standards, the strategic commitment to sustainable development is confirmed. Banca Intesa a.d. Beograd is an example of good practice for other participants of the financial system in the Republic of Serbia and

the region, in the context of building a competitive, resilient and socially responsible banking sector, and we conclude that sustainable initiatives do not impair its profitability, but contribute to the bank's stability, reputation and competitive advantage.

Although this paper provides a comprehensive insight into the sustainable operations of Banca Intesa a.d. Beograd, further research should include a broader comparative analysis of the sustainable practices of several banks operating in the domestic and regional markets. In this way, it is possible to identify patterns, differences and similarities in approaches to sustainability, but also to determine factors that contribute to greater resilience and competitiveness of banks in conditions of economic and regulatory uncertainty. In the context of the growing importance of sustainable banking, future research can be directed in several important directions. First of all, it would be useful to conduct a comparative analysis of the sustainable practices of banks in the Western Balkans region, in order to identify differences in the level of integration of ESG principles and regulatory incentives. Additionally, empirical research can focus on quantifying the impact of ESG performance on the profitability and financial stability of banks, using economic and statistical models. Research into the perception of clients and investors about the importance of sustainable business, as well as an analysis of the readiness of the banking sector to respond to climate and regulatory risks, would make a significant contribution. Green finance also deserves special attention - research into the success and market potential of green loans, funds and bonds, as well as internal aspects of banks' organizational culture, including how ESG values are incorporated into business strategies and daily decision-making. These lines of research would contribute to a better understanding of the systemic importance of sustainable bank operations in modern economic conditions.

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BEOGRADSKA BERZA
BELGRADE STOCK EXCHANGE

BAROMETAR / BAROMETER

Maj 2025 – Avgust 2025.

1. PROMET / TURNOVER

Mesec/ Month	Listing	Open Market	Regulisano tržište/ Regulated market	MTP/MTF	Ukupno/ Total	Broj transakcija/ Number of transactions
Maj 2025	296.493.794	39.548.582	336.042.376	0	336.042.376	998
Jun 2025	585.894.222	72.358.795	658.253.017	2.402.240	660.655.257	891
Jul 2025	4.430.553.416	138.267.948	4.568.821.364	0	4.568.821.364	984
Avg 2025	1.037.546.684	37.826.842	1.075.373.526	0	1.075.373.526	666
Sept 2025	399.299.646	78.646.605	477.946.251	0	477.946.251	1.069
Okt 2025	5.003.237.553	45.262.387	5.048.499.940	0	5.048.499.940	991
Ukupno/ Total	11.753.025.315	411.911.159	12.164.936.474	2.402.240	12.167.338.714	5.599

*RSD

2. INDEKSI / INDICES

Januar 2025. April 2025		BELEX15	BELEXline
	Poslednja vrednost / Last value	1.241,9	2.857,76
	Promena (abs) / Change (abs)	99,59	300,47
	Promena (%) / Change (%)	8,72%	11,75%
	Najviša vrednost / Maximum value	1.247,63	2.857,76
	Najniža vrednost / Minimum value	1.135,77	2.566,54
	Istorijski max / History maximum value	3.335,2	5007,34
	Istorijski min / History minimum value	347,46	841,99
	Vrednost prometa / Value of turnover	349.760.550	394.086.703

3. TRŽIŠNA KAPITALIZACIJA / MARKET CAPITALISATION

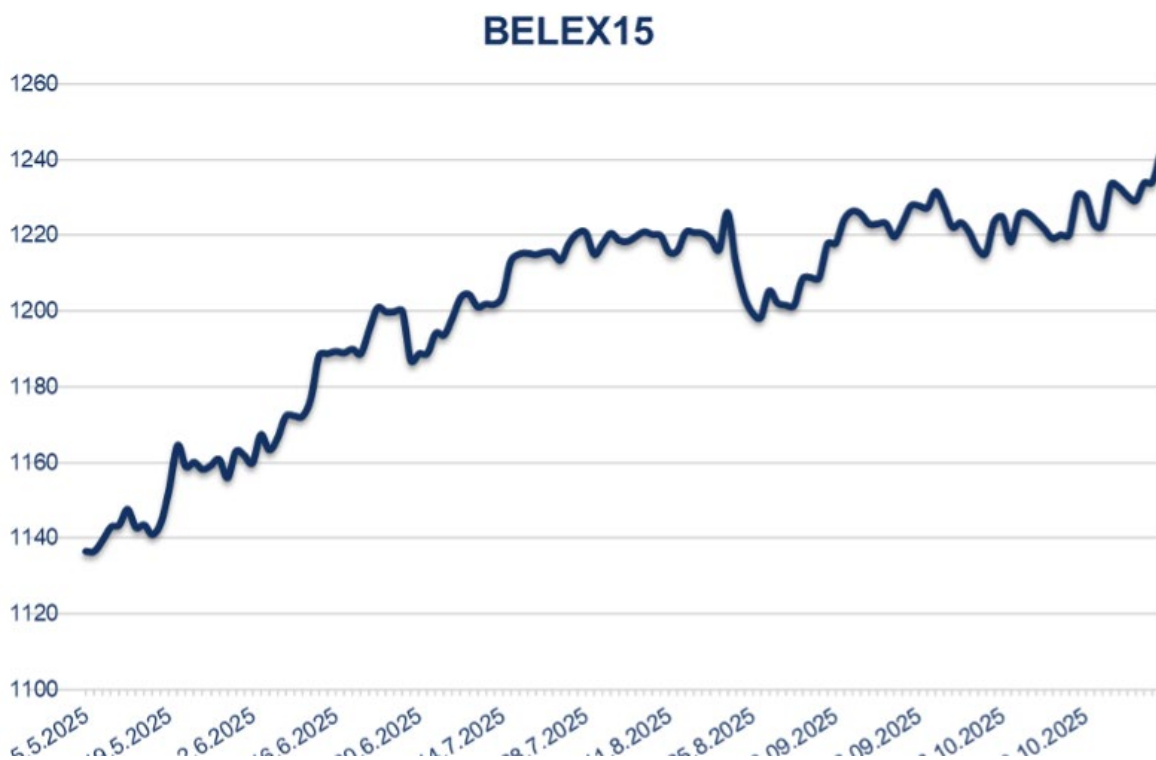
	Maj/May	Jun/June	Jul/July	Avgust/	Septembar/ September	Oktobar/ October
Ukupna tržišna kapitalizacija/ Total market capitalisation	484.533.835.336	487.071.857.807	492.694.054.356	494.008.772.87	496.697.821.541	501.876.246.369
Regulisano tržište/ Regulated Market	476.272.585.381	478.821.685.452	484.456.488.815	485.771.207.329	488.460.256.000	493.710.984.132
Prime Listing – akcije/ Prime Listing – shares	216.179.096.015	216.141.154.700	217.382.087.400	217.447.162.399	217.447.271.944	219.484.057.736
Open Market	260.093.489.366	262.680.530.752	267.074.401.415	268.324.044.930	271.012.984.056	274.226.926.396
MTP/MTF	8.261.249.955	8.250.172.355	8.237.565.541	8.237.565.541	8.237.565.541	8.165.262.237
BELEX15	286.072.169.985	288.322.089.372	293.006.923.807	290.430.995.448	292.631.884.846	296.299.342.530
BELEXline	310.646.466.573	312.841.336.254	317.448.744.891	318.588.866.784	321.598.750.210	324.718.284.751

*u hiljadama RSD / in RSD thousands

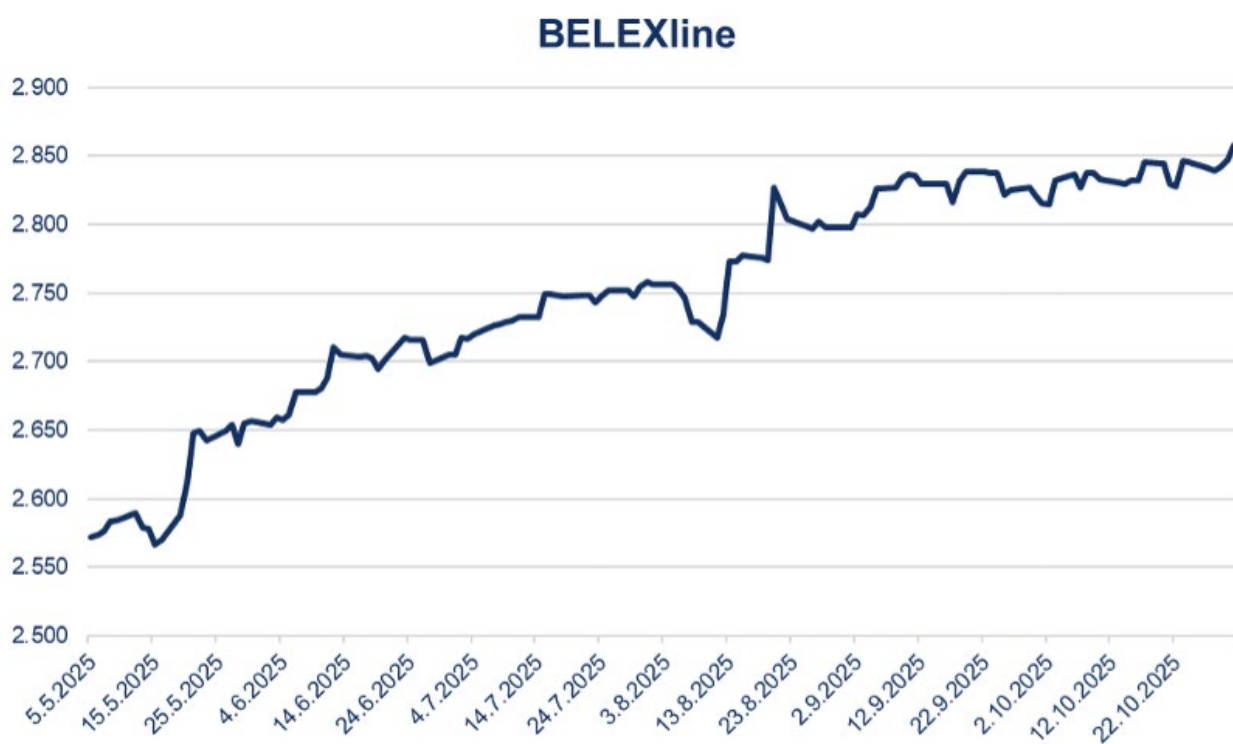
4. UČEŠĆE STRANIH INVESTITORA / FOREIGN INVESTORS PARTICIPATION

Maj 2025 – Okt 2025	Učešće stranih investitora / Foreign Investors Participation		
	FIS	total	3,60%
		b-FIS	3,77%
		s-FIS	3,44%
	FIB		0,38%
	FIT		0,52%

BELEX15 kretanje maj – okt 2025

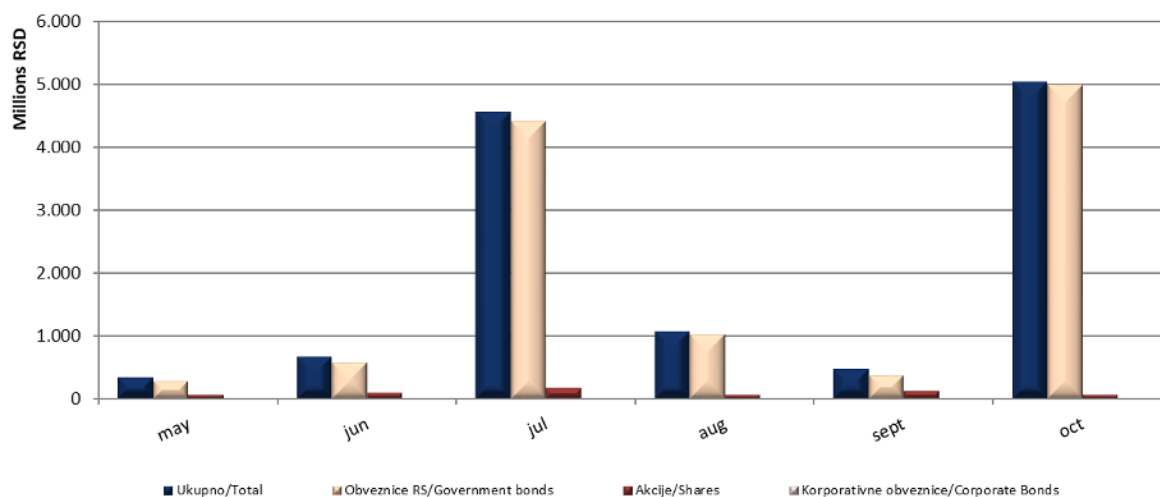


BELEXline kretanje maj – okt 2025



Prometi maj – okt 2025

Ostvareni promet za 2025. godinu/Trading turnover in 2025





UPUTSTVO ZA AUTORE

Radovi za časopis Bankarstvo moraju biti originalni i prethodno neobjavljivani. Autor odgovara za podatke objavljene u tekstu.

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Prva stranica rada treba da sadrži: naslov rada, rezime i ključne reči. Takođe, dati predlog za JEL klasifikaciju (klasifikaciju Journal of Economic Literature) rada.

Postupak testiranja na plagijat obaviće se nakon pozitivnih recenzija rada.

Radovi će biti odbijeni ukoliko se utvrdi plagijat, autoplagijat ili lažno autorstvo.

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- Rad treba da bude u A4 formatu, sve margine 20 mm.
- Dužina rada najviše 10 strana uključujući grafikone, tabele, literaturu i ostale priloge. Ukoliko rad po obimu prevazilazi date propozicije, na uredništvu je odluka da li će ga objaviti ili ne.
- Font i veličina fonta za ceo rad: isključivo Times New Roman, latinica, 10 pt, razmak između redova single.
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- Posle naslova rada napisati rezime/apstrakt dužine do 150 reči.
- Posle rezimea dati do 10 ključnih reči, pogodnih za indeksiranje i pretraživanje.
- Osim glavnog naslova (naslova rada) koristiti u tekstu do dva nivoa naslova, bez numeracije.
- Početak pasusa kucati od početka kolone (bez tabulatora).
- Ukoliko uz tekst idu šeme ili grafikoni, označiti u radu gde treba da budu i napraviti ih isključivo u programu Word, Excel ili PowerPoint.
- Ukoliko rad sadrži fotografije, označiti u radu gde one treba da stoje i priložiti svaku kao poseban fajl u formatu .eps ili .tiff, rezolucija 300 dpi.
- Tabela po širini ne sme da prelazi margine, a po dužini ne sme biti duža od jedne stranice i mora imati naslov i izvor.
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- Ispraviti sve gramatičke i greške u kucanju.
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 - Časopisi: Pantelić S. (2013). Flavije Valerije Konstantin (306-337). Bankarstvo 42 (4), 136-145. (prilikom citiranja iz elektronskih verzija časopisa na kraju dodati: DOI broj citiranog članka, ako ga ima, odgovarajući internet link i datum pristupa).
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The Editorial Board reserves the right to return to the author a text that does not meet the given criteria as unfit for publishing, or to request changes or additions. In other words, no paper will be submitted for review unless all the rules set out in these Instructions are followed.

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No personal information about the author(s) should be included in the text of the article, as papers are sent for anonymous review.

The first page of the paper should include: the title of the paper, a summary, and keywords. Moreover, a proposal for the JEL classification (classification of the Journal of Economic Literature) should be included in the paper.

The plagiarism testing procedure will be carried out following positive reviews of the paper.

Papers will be rejected if plagiarism, self-plagiarism or false authorship is identified.

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- Maximum length of 10 pages, including charts, tables, literature and other appendices. If the volume of the paper exceeds the given propositions, it is up to the editorial board to decide whether to publish it or not.
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- The title of the paper should be short and clear.
- After the title of the paper, write a summary/abstract of up to 150 words.
- After the summary, provide up to 10 keywords, suitable for indexing and searching.
- In addition to the main title, use up to two levels of headings in the text, without numbering.
- The beginning of the paragraph should be typed from the beginning of the column (without the indent).
- If the text is accompanied by diagrams or charts, mark their intended position in the paper, and create them in either Word, Excel, or PowerPoint.
- If the paper contains photographs, mark their intended position in the paper and attach each as a separate file in .eps or .tiff format, resolution 300 dpi.
- The width of the table must not exceed the margins, and the length must not exceed one page, and all tables must have a title and a source.
- In text and tables, do not use text boxes.
- Web addresses should be typed as text, not as a hyperlink.
- Take care to correct all grammatical and typographical errors.
- The names of institutions, when first introduced, should be given in translation, with the original name and abbreviation in parentheses.
- The use of footnotes is not envisioned (references should be provided in the text and must be cited in the literature).

- If the manuscript was prepared using tools based on artificial intelligence (e.g. ChatGPT), it is necessary for the author(s) to describe in the paper itself how and where they used such tools (e.g. to improve the quality of text in English, which is allowed).
- An optional acknowledgment should come after the conclusion and before the references. If the paper was created as a result of the author's engagement in a project, the author's acknowledgment should include the name and number of the project within which the research/subject of the work was conducted.
- References should be given in the text by stating the author's surname and the year of publication in parentheses. Any cited text should be followed by indicating the author's surname, the year of publication and the page number of the quote in parentheses.

If there are two authors, both should be named, with the year of publication, and if there are three or more authors, only the first one should be listed (surname of the first author + and associates with the year of publication). Each reference must also be cited in the literature.

- The literature should be grouped at the end of the paper according to the following principle:
 - Books: Klasens R. (2006). Prevention of money laundering. Belgrade: Association of Serbian Banks
 - Journals: Pantelić S. (2013). Flavius Valerius Constantine (306-337). Bankarstvo 42 (4), 136-145. (when quoting from electronic versions of the journal at the end add: the doi number of the cited article, if any, the appropriate internet link and date of access)
 - Other sources - websites (internet address and date of access), dissertations (surname, first name, title, institution where the doctoral dissertation was defended, year), official publications (name of publication/organisation/institution, title, place of publication, publisher, number, year).

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