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BITKOIN I ZLATO KAO “SAFE HAVEN ASSET” U GODINAMA PANDEMIJE

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Rezime: Pandemija koja je zadesila svet 2020. godine ostavila je za sada nesagledive posledice po celokupnu svetsku ekonomiju. Bitcoin i zlato su valute čije su cene rasle uprkos kriznom periodu. Rezultati istraživanja upotrebom Spirmanovog koeficijenta korelacije, pokazali su statistički značajnu vezu između kretanja cene bitcoina i cene zlata, što može biti osnov za predviđanje kretanja cene zlata u budućnosti na osnovu kretanja cene bitcoina. Utvrđena je signifikantna veza između kretanja cene bitcoina i porasta broja korisnika bitcoin novčanika, što jasno ukazuje na povećanje obima trgovine i široj zastupljenosti ove valute. Teorijsko istraživanje osnova bihevioralne ekonomije ukazalo je na potvrdu hipoteze da kada je finansijski sistem izložen krizi, bitcoin i zlato će imati karakteristike „safe haven asset“, što se može objasniti principima bihevioralne ekonomije.

Ključne reči: bitcoin, zlato, “safe haven asset”, bihevioralna ekonomija

JEL klasifikacija: E71, G41

Uvod

U 2020. godini svet se suočio sa zdravstvenom krizom koja je ostavila za sada nemerljive zdravstvene, socijalne i ekonomske posledice. Pandemija izazvana virusom COVID-19 ozbiljno je promenila svet, ugrozila nacionalne ekonomije i izvršila udar na bezbednost stanovništva.

Poslednjih godina sve više se koriste internet valute. Najznačajnija internet valuta koja funkcioniše u sistemu elektronskog novca je bitcoin. Bitcoin je digitalna valuta, koja se koristi i distribuira elektronski. Zbog svog konstantno promenljivog kursa, bitcoin postaje odlična prilika za investiranje. Bitcoin je relativno nov i prilično složen proces plaćanja. Zato je prirodno što su potrošačke opcije i dalje ograničene, ali svakog dana sve više preduzeća, od malih, lokalnih kafića do industrijskih giganta, prihvata plaćanje u bitcoinu.

Uprkos tome što je nestabilna i ne baš sasvim priznata valuta, vrednost joj je tokom pandemije porasla. S druge strane zlato je od davnina najsigurniji instrument za očuvanje vrednosti novca. Imajući u vidu karakteristike ovih valuta, interesantno je istražiti kretanje njihovih cena tokom pandemije COVID-19.

Predmet rada je komparativna analiza kretanja cene bitcoina i cene zlata, kao i utvrđivanje postojanja veze između kretanja ove dve varijable, sa posebnim osvrtom na uticaj shvatanja bihevioralne ekonomije na kretanje bitcoina u doba pandemije COVID-19.

Naučni cilj se ogleda u deskripciji, kako teorijske, tako i empirijske analize kretanja posmatranih varijabli. U teorijskom smislu naučni cilj se zasniva na analizi savremenih pogleda na bitcoin i zlato kao valute, dok u empirijskom smislu, komparativnom analizom kretanja ovih varijabli, istražuje se i razmatra stepen i uticaj kretanja cene bitcoina na kretanje cene zlata, korelacija između kretanja cene bitcoina i broja korisnika bitcoin novčanika, kao i korišćenje uticaja bihevioralne ekonomije za objašnjenje kretanja cene bitcoina u doba krize izazvane pandemijom COVID-19.

Sa aspekta društvenog cilja, istraživanje treba da prikaže trenutnu poziciju i predvidi kretanje ove dve valute imajući u vidu utvrđenu volatilnost njihovih tržišta, prikaže komparativnu analizu nivoa cena, cenovni uticaj jedne valute na drugu, a kako bi se predvidela buduća kretanja.

Imajući u vidu definisan predmet i cilj istraživanja, u radu će se poći se od sledećih hipoteza:

H1: Postoji visoka korelisanost između kretanja cene bitcoina i broja korisnika bitcoin novčanika u posmatranom periodu.

H2: Postoji visoka korelisanost između kretanja cene bitcoina i kretanja cene zlata u posmatranom periodu.

H3: Ukoliko je finansijski sistem izložen krizi, onda će bitcoin i zlato imati karakteristike „safe haven asset“, što se objašnjava principima bihevioralne ekonomije.

Metodologija i podaci

Za predmetna istraživanja biće uzet vremenski period od 2013. do 2021. godine. Za prikupljanje podataka biće korišćene reprezentativne međunarodne baze podataka (World Gold Council, Yahoo Finance, Bloomberg Business itd.) i sva relevantna domaća i strana literatura. Za testiranje postavljenih hipoteza i dolaska do rezultata istraživanja biće korišćen statistički alat SPSS - The Statistical Package for the Social Sciences i u okviru njega za statistiku zaključivanja korelaciona analiza. Za analizu veze između kretanja cene bitkoina i broja korisnika bitkoin novčanika, kao i za analizu kretanja cene bitkoina i zlata koristiće se Spirmanov koeficijent korelacije. Spirmanov koeficijent predstavlja neparametarski test i može da se primeni kod bilo koje kombinacije varijabli ordinalnog ili višeg nivoa merenja. Spirmanov koeficijent korelacije prikladan je za veličine koje se mogu rangirati i posebno za manje serije podataka (Biljan-August, Pivac, Štambuk, 2007). Koeficijenti korelacije se kreće u opsegu od -1 do 1, pri čemu predznak pokazuje da li je reč o negativnoj ili pozitivnoj korelaciji ili pak imamo odsustvo korelacije (0) (<http://psihologija.ff.uns.ac.rs/viz/koeficijenti-korelacije-za-rangirane-podatke>). Formula za izračunavanje:

$$r_s = 1 - 6 \sum_{i=1}^n \frac{d_i^2}{n(n^2 - 1)}$$

gde je: d razlika vrednosti rangova dve posmatrane varijable, a n broj različitih serija.

Dobijanje odgovora na postavljene hipoteze, zahteva određivanje vremenskog okvira, izbora metoda istraživanja i elemenata koji će biti korišćeni.

Tabela 1 - Elementi korišćeni u analizi

Naziv varijable	Izvor podataka	Period
Cena bitkoina u dolarima	Statista; Coin desk, YahooFinance	2013- 2021. godina
Broj korisnika bitkoin novčanika u milionima	Statista; Coin desk, YahooFinance	2013- 2021. godina
Cena zlata u dolarima	Business insider, World Gold Council, Yahoo Finance,	2013- 2021. godina

Izvor: Autor

Posmatrani period je pogodan za analizu zato što obuhvata dovoljno dug vremenski period za praćenje trenda, a takođe i period svetske pandemije. U istraživanju su korišćeni sekundarni podaci iz baze podataka sajtova o kretanju cena posmatranih valuta na tržištima. U tabeli 2 dati su podaci koji će biti korišćeni kao elementi za ocenu korelacije.

Tabela 2 - Kretanje bitcoina i zlata u periodu 2013- 2021. godina

Godina	Cena bitcoina u dolarima	Broj korisnika bitcoin novčanika u milionima	Cena zlata u dolarima
2013 ¹	744,17	0,89	1.205,90
2014	309,90	2,71	1.225,40
2015	424,96	5,34	1.072,40
2016	952,46	10,69	1.138,85
2017	13.062,15	21,51	1.264,50
2018	3.689,57	31,91	1.267,05
2019	7.251,28	44,51	1.469,50
2020	28.768,84	63,48	1.839,80
2021	47.128,47	73,00	1.814,95

Izvor: <https://www.statista.com/statistics/326707/bitcoin-price-index/>; <https://www.coindesk.com/price/bitcoin/>; <https://www.statista.com/statistics/647374/worldwide-blockchain-wallet-users/>; <https://finance.yahoo.com/topic/crypto/>; <https://markets.businessinsider.com/commodities/gold-price/>; <https://www.gold.org/goldhub>

Cena jednog bitcoina se tokom vremena menjala, u zavisnosti od stanja na tržištu. U prvim godinama se za manje od 1 dolara mogao kupiti 1 bitcoin, da bi se rast cene ove valute beležio od 2009. godine. Sve do kraja 2016. godine za jednu jedinicu bitcoina bilo je potrebno izdvojiti manje od hiljadu dolara. Već krajem 2017. bilo je potrebno izdvojiti preko 13.000 dolara za jednu jedinicu ove decentralizovane kriptovalute (<https://www.coindesk.com/price/>). Tokom 2018. godine zabeležen je pad na 3.689 dolara. Kada je izbila pandemija, bitcoin je mogao da se kupi za oko 7.200 dolara. Danas košta više od 47.000 dolara - zapanjujući rast od preko 500 procenata. Na početku krize sa COVID-19, porast ukupnog broja slučajeva pozitivno je povezan sa tržišnom kapitalizacijom i obimom trgovanja kriptovalutama. Međutim, oko sredine februara, efekat se preokrenuo: porast broja ukupnih slučajeva postao je negativno povezan sa aktivnošću na tržištu kripto valuta (Jabotinsky, Sarel, 2020). Međutim, ovaj uzlazni trend nije nužno očigledan sa teorijskog stanovišta, jer postoji nekoliko sila koje su mogle da pokreću potražnju nagore ili naniže kao odgovor na krizu, zbog čega rast bitcoina postaje dodatno zanimljiv za analizu. Neke kompenzacione snage mogle su da potisnu potražnju. Bitcoin je mogao da postane usko povezan sa tradicionalnim finansijskim tržištem u vreme krize, čak i ako takve korelacije nema u uobičajeno vreme, tako da korist od prelaska na bitcoin postane zanemarljiva. Još gore, kaos izazvan pandemijom mogao je dovesti do najmanje dve opasne aktivnosti koje su mogle prouzrokovati znatne gubitke. Prvo, sofisticirani investitori mogli su manipulirati cenom bitcoina veštačkim povećavanjem potražnje kako bi namamili nesofisticirane investitore, a zatim odustati od svog ulaganja kada cena bude dovoljno visoka. Ovo je moguće kada se ima u vidu da ljudi demonstriraju tzv. pastirsko ponašanje, odnosno kupuju bitcoin samo zato što posmatraju druge. Drugo, čak i pre pandemije, za bitcoin se sumnjalo da omogućava kriminalne aktivnosti. Imajući ovo u vidu, ljudi se mogu plašiti da bi ih upotreba kriptovaluta izlagala krivičnim prijavama za pranje novca, pa stoga izbegavaju trgovanje (<https://clsbluesky.law.columbia.edu/2021/03/26/how-the-covid-19-pandemic-affected-the-cryptocurrency-market/>).

¹Stanje na dan: 31.12.

Neki od racionalnih objašnjenja rasta cena bitkoina u doba pandemije je činjenica da se bitkoinom može trgovati bilo gde u svetu, što donekle ublažava potencijalna ograničenja likvidnosti koja mogu nastati ako države ograniče trgovinske aktivnosti kao deo zaključavanja. Kao rezultat, bitkoin postaje privlačniji u poređenju sa alternativama. Dalje, investitori koji su se plašili da će kriza dovesti do toga da se centralne banke ili politički akteri mešaju na tržište, preferirali su da svoje investicije prebace u decentralizovani bitkoin. Drugim rečima, s obzirom da bitkoinom ne upravlja centralni entitet, već posluju automatski, oni mogu omogućiti investitorima da se zaštite od nekih političkih rizika i da tako postanu privlačniji.

S obzirom da novčanici omogućavaju korisnicima kreiranje neograničenog broja računa, ne može se sa sigurnošću znati koliki je stvarni broj korisnika, ali se može primetiti da je broj novčanika, kao i cena bitkoina, zabeležio početak rasta tek u januaru 2013. godine, dok je bitkoin nastao 2009. godine. U periodu jul 2016 - jul 2017. godine porastao je velikom brzinom. U julu 2016. godine broj registrovanih novčanika je iznosio preko 7,8 miliona, a u julu 2017. godine preko 14,9 miliona. Od početka pandemije, od januara 2020. do juna 2021. godine broj korisnika bitkoin novčanika narastao je sa 45,45 na 73 miliona. Ako se analizira kretanje cene zlata nakon 2013. godine uočava se stabilan trend sa rasponom vrednosti između 1.072 i 1.267 dolara. Osetniji rast beleži se u 2019. godini. Finansijska javnost fokusirala se na zlato kao sigurno utočište u vremenima stresa, posebno pre i tokom ranih dana krize COVID-19. Rast cena beleži se tokom celokupnog trajanja pandemije sa izuzetkom marta 2020. godine, i zaustavljanjem trenda rasta od februara 2021. godine, koje prati podatke o smirivanju pandemije i početkom vakcinacije.

Pregled literature

U poslednjih nekoliko godina kao sredstvo plaćanja koriste se različite internet valute. Internet valuta predstavlja sredstvo elektronskog plaćanja koje je zasnovano na čuvanju vrednosti na hardverskoj osnovi ili na softverskoj osnovi. Najznačajnija internet valuta koja funkcioniše u sistemu elektronskog novca je bitkoin. Dizajn sistema plaćanja, ali i još neke okolnosti na koje ni sami kreatori nisu mogli da utiču, uslovile su da ovaj sistem elektronskog novca potraje duže od prethodnih, ali i da zavredi više pažnje, kako stručne javnosti, tako i korisnika. Bitkoin je zapravo softverski elektronski novac jer se njime može raspolagati uz instaliranje odgovarajućeg softvera na hard disk računara (Selgin, 2014). Ukupna veličina tržišta kriptovaluta čini bitkoin apsolutno dominantnim. Početkom 2020. godine bitkoin je činio preko 2/3 ukupne kapitalizacije i oko 1/3 ukupnog dnevnog obima trgovine na tržištu kriptovaluta (Tomić, 2020).

Bitkoin adresa je nalik bankovnom računu, preko kojeg korisnik može da prima, šalje i čuva bitkoin. Umesto čuvanja u fizičkom obliku u trezoru, bitkoini su osigurani putem kriptografije javnim ključem. Svaka adresa sadrži javni ključ, koji je dostupan svima, i privatni ključ, koji se mora držati u tajnosti. Bilo ko može poslati bitkoin bilo kom javnom ključu, ali samo osoba sa određenim privatnim ključem ih može potrošiti.

Sistem za procesiranje plaćanja u bitkoin valuti naziva se BitPay. Ovo je privatna mreža, koja nije vlasnički povezana sa menjačkim berzama, niti se bavi održavanjem međuklijentske mreže, već privlači kompanije da otpočnu prihvatanje plaćanja u bitkoin valuti (<https://bitpay.com>).

Korisnici počinju da koriste bitcoin upotrebom programa nazvanog bitcoin novčanik i jedne ili više bitcoin adresa, koje služe za prijem bitcoina, na isti način kao što se imejl adrese koriste za prijem mejlova. Prilikom slanja novca novčanik kreira transakciju koja sadrži adresu primaoca i iznos koji se šalje, uz potpisivanje transakcije. Bitcoin novčanik omogućava čuvanje raspoloživog iznosa i izvršavanje plaćanja putem interneta. Transakcija se ne može verifikovati sve dok se ne uključi u bitcoin blockchain. Svaka transakcija sadržana u blockchain-u (sajt za trgovanje) se smatra važećom i eliminiše mogućnost dvostrukog trošenja. Blockchain obezbeđuje svakom korisniku uvid u istoriju izvršenih transakcija. Jednom stečeni i pravilno obezbeđeni, bitcoini ne mogu biti oduzeti od njihovih vlasnika, bilo od strane lopova, banke ili vlade. Takođe, nijedan entitet ne može zamrznuti račun, niti sprečiti vlasnika da sprovede (besplatne) transakcije na bitcoin mreži (Đoršević, 2018).

Sistem je dizajniran da bude siguran, ne nužno anonimn. U teoriji je moguće pratiti bilo koju transakciju svakog korisnika. „Rudarenje“ (mining) je osnovna funkcija bitcoina, koji je istovremeno i valuta i način plaćanja. Svaka transakcija je predmet obrade svakog u mreži ko je uključio svoje računare u izračunavanje komplikovanih problema, sa zajedničkim ciljem da obezbede sigurnost transakcija, (kao i njihovu anonimnost i neopozivost) (<http://marketingitd.com/2013/sta-je-bitcoin-i-kako-da-ga-koristite-u-naplati/>). Problem sa ovom idejom je što se sve transakcije stapaju u jedan decentralizovani blockchain koji se distribuira svuda. Ovo ujedno znači da se nigde ništa ne može sakriti (Baxter – Reynolds, 2013). Da bi se osigurala sigurnost plaćanja i onemogućile različite zloupotrebe, koristi se sama mreža kao sistem koji će kontrolisati regularnost transakcija. Bitcoin je zasnovan na R2R mrežama. Peer-to-peer predstavlja mrežu koja nije zasnovana na „klijent - server“ arhitekturi, već su svi računari ravnopravni članovi mreže. Obično se koristi za deljenje informacija na taj način što kada jedan računar „podeli“ neki sadržaj, svi ostali računari u mreži će imati pristup tom fajlu (Dinić, 2014).

Bitcoin nije prvi, a verovatno ni poslednji sistem elektronskog novca. Ranija operativna rešenja nisu uspela da potraju duži vremenski period, najčešće jer nisu garantovala bezbednost svojim korisnicima, niti su uspela da prodru do šireg kruga privatnih korisnika i poslovnih entiteta koji bi ih prihvatili kao sredstvo plaćanja. Imajući u vidu moguće probleme, postavlja se pitanje kako je bitcoin uspeo da preživi kao internet novac? Period trajanja bitcoina još uvek nije dovoljno dug, ali je svakako duži od perioda trajanja drugih eksperimenata ove vrste novca (Miladinović, Smigić, 2018).

Postoji više karakteristika bitcoin sistema koji ga čine različitim od ostalih sistema elektronskog novca. Pre svega, iza bitcoina ne stoji kompanija koja je vlasnica sistema, ne stoji ni jedna banka kao pokretač, niti neka centralna banka kao operator sistema. To dalje implicira da ne postoji poslovni entitet koji namerava da servisiranjem sistema zarađuje na proviziji, tako da je sa te strane bitcoin oslobođen ekonomskog pritiska za opstanak. Kada je tek počela upotreba internet valuta, usled malog broja korisnika i male količine novca u opticaju bilo je lako proveriti istinitost i napraviti izveštaj o svakoj transakciji. Sa porastom broja novčića i broja korisnika postalo je složenije vršiti proveru i potvrđivanje, pa je sada potrebno više vremena. Takođe, obični računari, naročito laptopovi postali su hardverski preslabi da podnesu opterećenje ovog ekstenzivnog rada (Raskin, 2013).

Centralna banka ne kontroliše postojanje i upotrebu ovog oblika novca. Najočigledniji problem nedostatka centralne vlasti je nestabilnost kriptovaluta, među kojima je i bitcoin. Za razliku od nacionalnih valuta, gde centralne banke imaju na raspolaganju čitav niz alata kojima valutu održavaju koliko-toliko stabilnom, kriptovalute su potpuno prepuštene tržištu, to jest, zakonu ponude i potražnje. Kriptovalute, kao globalne i decentralizovane, nisu pod kontrolom nijedne države i samim tim su manje osetljive na politička dešavanja (<https://www.barrons.com/articles/why-bitcoin-is-the-best-investment-opportunity-post-pandemic-heres-what-will-drive-the-price-higher-51607134443>).

Iako je prvobitno bitkoin zamišljen kao eksperimentalni platni sistem, trenutno je široko rasprostranjen i privlači medijsku pažnju u velikoj meri. Pristalice tvrde da se radi o prvoj pravoj globalnoj valuti koja ne diskriminiše svoje korisnike po osnovu državljanstva ili lokacije, uvek je dostupna, jednostavno je osigurati uz vrlo niske troškove korišćenja, nema zaduženja, i sl. Sa druge strane, kritičari tvrde da se široko zloupotrebljava za kupovinu ilegalnih stvari i za „pranje“ velikih suma novca i da je izuzetno lako ukrasti bitkoin u slučaju sajber napada (Ron, Shamir, 2013).

Iako primarno dizajniran za plaćanje usluga i kupovinu dobara, bitkoin još uvek nema široku primenu. Iako je interesantan kao investiciona mogućnost, bitkoin nije postao prihvatljiv na najvećim svetskim prodajnim sajtovima. Amazon i eBay ne primaju ovu valutu, a na društvenim mrežama nije dozvoljeno sredstvo plaćanja. Pored toga, najveći broj kompanija koje prihvataju plaćanja u bitkoinu su firme koje su poslovanjem vezane za pružanje usluga na internetu (hosting kompanije), 3D modelari i digitalni dizajneri, kompanije za masovno slanje SMS-a, firme koje nude smeštajni prostor za dokumenta na internetu, proizvođači softvera i online kladionice. Međutim najveći broj ponuđača proizvoda su novoformirani sajtovi za prodaju i aukciju osnovanih upravo za poslovanje sa bitkoin valutom. Veliki problem kod denominacije cena na prodajnim sajtovima u bitkoinima je velika promenljivost vrednosti ovih novčića (<https://www.marketwatch.com/story/the-pandemic-showed-theres-a-need-for-digital-currencies-especially-bitcoin-11607031312>).

Ipak, u dosadašnjim istraživanjima primećuje se jasan trend rasta cene bitkoina svaki put kada se dogodi neka politička ili finansijska kriza u svetu, pa čak i kada samo postoji naznaka da bi moglo biti krize. Cena je rasla tokom kiparske krize, grčke krize, nakon Bregzit referenduma i predsedničkih izbora u Americi i nakon najnovije pandemije. Dakle, kad god je poverenje u postojeći sistem poljuljano, određeni broj ljudi alternativu vidi u kriptovalutama (<http://www.societegenerale.rs/kako-je-nastao-bitcoin/>). Za bitkoin se vezuje nestabilnost i visoki stepen volatilnosti, pri čemu ovaj instrument nudi slabe osnove očuvanja vrednosti i pre služi kao sredstvo razmene za novac nego kao stvarni medijum razmene. U takvim okolnostima, uključivanje većeg udela bitkoina u strukturu portfolija značajno pojačava rizik portfolija, što investitori imaju u vidu, zbog čega je interesantan rast vrednosti ove valute tokom svetske pandemije (Šoja, Senerathne, 2019).

Poslednjih godina došlo je do velikog interesovanja za kombinacijom psihologije i ekonomije, koja je u relevantnoj literaturi poznata pod nazivom biheviorna ekonomija. Reč je o disciplini koja povećava eksplanatornu snagu ekonomske nauke, kombinujući je sa realističnijim psihološkim postavkama i koristeći socijalne, emocionalne i kognitivne faktore u pokušaju da objasni ekonomske odluke pojedina i institucija. Belsky, Gilovich (2010) definišu biheviornu ekonomiju kao kombinaciju psihologije i ekonomije kako bi objasnio zašto i kako ljudi donose iracionalne ili nelogične odluke kada troše, investiraju, štede i posuđuju novac (Belsky, Gilovich, 2010). U centru ove subdiscipline u okviru ekonomske nauke je ideja da će povećanje realističnosti psiholoških osnova ekonomske analize poboljšati standardni ekonomski model u pogledu generisanja teorijskih saznanja, stvaranja dobrih predviđanja o različitim fenomenima i kreiranja bolje ekonomske politike. Biheviorna ekonomija predstavlja relativno novi i perspektivni pravac istraživanja koji u značajnoj meri utiče na stanje i budućnost ekonomske nauke. Fundamentalna istraživanja iz oblasti biheviorne ekonomije su jasno pokazala da bi psihološke ideje mogle da se formalizuju u alternativni model i iskoriste za formiranje predviđanja koja bi dalje mogla da se upotrebe u realnom ekonomskom okruženju (Krstić, Radivojević, 2019). Biheviorne finansije pretpostavljaju ograničenu racionalnost učesnika na tržištu, dok standardne finansije polaze od koncepta savršene racionalnosti. Biheviorne finansije ukazuju na pojavu i ponavljanje iracionalnosti, dok standardne finansije polaze od principa savršeno racionalnog finansijskog odlučivanja.

Financijska teorija je prošla dug put od opšteprihvaćenosti hipoteze efikasnog tržišta (Efficient Market Hypothesis – EMH) koja se nalazi u osnovi standardne financijske teorije, do pojave bihevioralnih finansija i bihevioralne kritike EMH. Veliki broj tržišnih anomalija je doveo u pitanje validnost EMH i stvorio prostor za razvoj jednog novog pristupa u finansijama u čijem fokusu je izučavanje ponašanja i psihologije ljudi (Leković, 2020). Kako tvrdi Águila (2009), rastuće interesovanje za bihevioralne finansije je rezultat upravo akumulacije empirijskih anomalija, a zadatak bihevioralnih finansija je da integracijom psihologije sa finansijama i ekonomijom obezbedi njihovo bolje razumevanje. U bihevioralnom finansiranju, mikro pristrasnost ponašanja investitora prema Baker, Nofsinger (2002) je grupisana u način na koji investitori razmišljaju (osnovna pravila/heuristika) i kako se osećaju investitori (emocije), dok prema Pompian (2006) i Hirschei, Nofsinger (2008) pristrasnost investitora grupisana je u kognitivnu pristrasnost i emocionalnu pristrasnost. Ova pristrasnost u ponašanju utiče na ljude u donošenju odluka prema Zahera, Bansal (2018). Kognitivna pristrasnost je donošenje odluka korišćenjem osnovnog pravila za informacije ili činjenice. Kognitivna psihologija se odnosi na način razmišljanja ljudi i ima važnu ulogu u bihevioralnim finansijama, jer su brojna istraživanja pokazala da ljudi prave sistemske greške u načinu razmišljanja: previše su samouvereni, pridaju preveliki značaj skorašnjim iskustvima, koriste mentalne prečice, izbegavaju promene (Ritter, 2003). Iracionalnosti prisutne u složenom svetu finansija, bihevioralne finansije nastoje da objasne putem kognitivnih predrasuda kao što su: 1) preterano samopouzdanje, 2) uokviravanje ili formulacija, 3) mentalno računovodstvo, 4) reprezentativnost, tj. dostupnost ili pristrasnost sećanja, 5) konzervatizam, tj. sklonost ka izbegavanju promena ili „usidrenje“, 6) odbojnost prema gubitku, 7) izbegavanje kajanja, 8) ponašanje krda, tj. mentalitet stada ili psihologija mase, 9) potvrđivanje ili samopotvrđivanje, 10) kasno uviđanje, 11) kognitivna disonanca i 12) prokletstvo pobednika. Emocionalna pristrasnost je odlučivanje zasnovano na osećanjima.

Prednost bihevioralnih finansija se, između ostalog, ogleda upravo u objašnjavanju tržišnih anomalija i uzroka tržišne neefikasnosti. Prema standardnoj teoriji cena aktive zavisi od pristiglih informacija, dok prema bihevioralnim finansijama cena aktive zavisi od reakcije tržišnih učesnika na pristigle informacije (Fakhry, 2016).

U polju bihevioralne ekonomije, s obzirom na prirodu predmeta, kvalitativne analize su dominantne. Prostor za kvantitativna istraživanja je uzak. Savremena ekonomija ponašanja naglašava da ljudska iracionalnost često ima važan uticaj na donošenje odluka, što uzrokuje značajne ekonomske posledice. Naučnici pokušavaju da razviju modele rizika u ponašanju i njihovo stvaranje bi uskoro moglo postati stvarnost zahvaljujući velikim podacima, razvoju bihevioralnih i društvenih nauka i upravljanju ljudskim resursima. Kvalitativna istraživanja mogla bi obuhvatiti različite egzogene faktore (politički sistem, propise, običaje, kulturu), kao i endogene faktore koji utiču na proces donošenja odluka u investiranje. Dalji razvoj i kvantitativnih i kvalitativnih istraživanja u kombinaciji sa velikim podacima mogao bi dovesti do razvoja novih modela ponašanja i objašnjenja ekonomskih pojava (Petronijević, 2018).

Cena zlata ima tendenciju rasta uvek kada financijskom sistemu prete ozbiljni problemi, potresi, financijski rizici, krize. Posebno je atraktivno u periodima visoke inflacije, kada se javlja kao aktiva koja čuva vrednost novca od daljeg erodiranja izazvanog inflacijom. Zaraditi na zlatu se može samo ukoliko ga prodamo po višoj ceni čime ostvarujemo tzv. kapitalnu dobit. Periodi u kojima realne kamatne stope padaju ili su negativne, često su povoljni za ulaganje u zlato, jer investitori, u takvim situacijama, „beže“ u sigurnije aktive kako bi se zaštitili od nepovoljnih kretanja na tržištu. Ovakvo kretanje cene zlata daje širok spektar mogućnosti investitorima da se zaštite od rizika nestabilnosti cena, smanjenja prinosa na aktivu, inflacije i sl. Let do zlata tokom ekonomskog stresa rezultirao je uvreženim uverenjem da investitori preusmeravaju ulaganja na zlato kada su zabrinuti zbog pada tržišta; odnosno na zlato se gleda kao na sigurno utočište.

Sarkodie, Ahmed, Owusu (2021) u istraživanjima koje su sproveli u toku pandemije bavili su se vezom između kretanja rasta bitkoina i obolelih od korona virusa. Utvrdili su vezu između ove dve varijable. Zato je interesantno posmatrati kretanje u uslovima pandemije budući da bi se očekivalo da će kriza uticati na smanjenje trgovine ovom valutom. Čini se da se učesnici na tržištu kriptovaluta ponašaju iracionalno. Studija koju su sproveli Keller, Scholz (2019) je imala za cilj da identifikuje tipove investitora, uključujući i bihevioralne principe i njihov uticaj. Identifikovali su šest tipova investitora koji postavljaju ponude i četiri tipa investitora koji potražuju (Keller, Scholz, 2019). Cheung, Roca, & Su (2015) navode da je bitkoin mehur - balon. Shiller (2000) je definisao balon kao situaciju u kojoj vesti o povećanju cena podstiču entuzijazam investitora, koji se širi psihološkom zarazom od osobe do osobe, pojačavajući priče koje bi mogle opravdati rast cena i dovodeći sve veću i veću klasu investitora, uprkos sumnjama u stvarnu vrednost investicije. Prema Baker, Nofsinger (2002), bihevioralne finansije nastoje da izraze iracionalnost investitora uopšte i pokazuju ljudske greške na tržištima kriptovaluta. Na osnovu literature o kognitivnoj i emocionalnoj pristrasnosti koja je uticala na donošenje odluka i koja bi se mogla primeniti u kriptovaluti, uviđa se konceptualni model za razumevanje pristrasnosti u ponašanju koji utiče na investiranje u kriptovalutu. Predrasude su pastirstvo, optimizam, prekomerno samopouzdanje, pristrasnost potvrde, averzija prema gubicima i zabluda kockara. Pastirstvo je tendencija nekoga ko više voli da sledi druge ili imitira grupno ponašanje u donošenju odluka, a ne samostalno da odlučuje. Pristrasnost optimizma je težnja nekoga da preceni mogućnost da se dogode pozitivne stvari i potceni potencijal za neprijatne događaje. Prekomerno samopouzdanje je verovanje nekoga ko misli da zna i da ima bolje informacije. Predrasuda ili podudarnost u potvrdi mogu se desiti u fazi kada cene padnu, ali privremeno ponovo porastu. Averzija prema gubitku je pristrasnost koja se može objasniti teorijom prospekta. Teorija prospekta koristi se za opisivanje načina na koji ljudi donose odluke između različitih izbora ili izgleda, posebno u uslovima neizvesnosti. Zabluda kockara je verovanje da će se korekcija dogoditi u poštenoj kocki (Hidajat, 2019). Rezultati Almansour (2020) pokazuju da bihevioralna ekonomija ima značajan uticaj na ponašanje investitora na tržištu kriptovaluta, a to sa druge strane značajno pogađa kretanje cena ovih valuta.

Inverzni odnos između zlata i zaliha mnogi navode u popularnoj literaturi. Međutim, neki su primetili da se odnos promenio 2020. god. Na primer, Mark DeCambre je primetio u MarketWatch-u u avgustu 2020. da je „zlato u istorijskom nagibu“. Pozitivna korelacija između zlata i zaliha primećena je rano u periodu COVID -19. Na primer, Zhang (2020) tvrdi da „kada zlato i akcije postanu pozitivno povezani, to obično signalizira tržišni režim vođen likvidnošću i promenom stvarnih prinosa“. Choudhri (2015) napominje da zlato nije bilo sigurno utočište tokom finansijske krize 2007–2009. god. zbog jednosmernog odnosa između prinosa zlata i prinosa na tržištu (vraćanje zlata na deonice), ali ne i dvosmernog. Takođe, primećuje da postoji nelinearna uzročnost, tvrdeći da se zlato možda koristilo kao zaštitna ograda pre finansijske krize, ali ne i tokom kriznog perioda. Al Ameer (2018) uočava različitu korelaciju za periode pre, tokom i nakon finansijske krize 2007–2008. godine. Svrha studije koju je Drake sprovela 2020. god. je da istraži odnos zlata i berze, s obzirom na nedavnu recesiju usled COVID-19 i ulogu kamatnih stopa. Rezultati ukazuju da inverzni odnos primećen u prošlosti nije podržan u dve najnovije recesije i da na taj odnos utiču stvarne kamatne stope i volatilitnost berze. Kada su realne kamatne stope negativne, postoji pozitivna veza između zlata i prinosa na tržištu (Drake, 2020).

Poslednjih godina tržište bitkoina prilično je promenljivo, te postoji potreba da se analiziraju načini predviđanja kretanja cena bitkoina. Budući da je poslednjih godina tržište zlata takođe bilo pod znatnim interesovanjem, pre svega zbog svoje kolebljivosti i odražavanja globalnih ekonomskih trendova, ne samo onih koji se odnose na ekonomske i finansijske tokove, već i širih, društveno-političkih, vrlo je zanimljivo razmotriti mogućnost korišćenja podataka o kretanju cene bitkoina na globalnom tržištu u kontekstu mogućnosti predviđanja kretanja cene zlata.

Ovo je posebno važno s obzirom na to da je tržište zlata odraz globalnih ekonomskih kretanja, s jedne strane, i činjenice da bitcoin postaje sve važniji kao imovina, tj. investicijska alternativa, s druge strane. U studiji, koju je sproveo Dončić (2020) cilj je bio da se odgovori na pitanje da postoji kauzalna veza između kretanja cene bitkoina i cene zlata na globalnom finansijskom tržištu kako bi se odgovorilo na pitanje da li je moguće predvideti kretanje cene bitkoina na osnovu kretanja cene zlata na svetskom tržištu, ali i obratno. Istraživanje je sprovedeno u periodu od 1. januara 2019. godine do 1. decembra 2019. godine. Rezultati istraživanja pokazuju da istorijski podaci o kretanju cene zlata na svetskom tržištu ne mogu da se koriste za predviđanje promena u vrednosti i ceni bitkoina. Sa druge strane, rezultati istraživanja ukazuju da je moguća pouzdana primena istorijskih podataka o kretanju vrednosti i cene bitkoina za predviđanje cene zlata (Dončić, 2020). Upravo zbog toga u ovom radu između ostalog ispiti-vaće se i korelacija između kretanja cene bitkoina i zlata.

Rezultati istraživanja

Varijable koje se posmatraju u definisanom vremenskom intervalu su u skladu sa istraživačkim pitanjima. Analiza modela počinje pregledom rezultata deskriptivne statističke analize (minimum, maksimum, aritmetička sredina i standardna devijacija).

Tabela 3 - Deskriptivna statistika analiziranih varijabli

Naziv varijable	Minimum	Maksimum	Aritmetička sredina	Standardna devijacija
Cena bitkoina u dolarima	309,90	58.734,48	17.618,2136	17.181,31588
Broj korisnika bitcoin novčanika u milionima	0,89	73,00	46,7064	22,43624
Cena zlata u dolarima	1.072,40	1.956,05	1.634,5140	284,82795

Izvor: Autor

Raspon promenljive „cena bitkoina u dolarima“ se kreće od 309,90 do 58.734,48 dolara. Srednja vrednost iznosi 17.618,2136 dolara, dok je standardno odstupanje od te srednje vrednosti 17.181,31588. Raspon promenljive „broj korisnika bitcoin novčanika u milionima“ se kreće od 0,89 do 73,00 miliona. Srednja vrednost iznosi 46,7064 miliona, dok je standardno odstupanje od te srednje vrednosti 22,43624 miliona. Raspon promenljive „cena zlata u dolarima“ se kreće od 1.072,40 do 1.956,05 dolara. Srednja vrednost iznosi 1.634,5140, dok je standardno odstupanje od te srednje vrednosti 284,82795 dolara.

Imajući u vidu dati pregled varijabli, interesantno je i uporediti vezu između kretanja cene bitkoina i kretanja broja korisnika novčanika, kao i kretanje cene bitkoina i cene zlata, za to će se koristiti korelaciona analiza. Cilj korelacione analize je da utvrdi da li postoji korelacija i u kojoj meri između posmatranih varijabli.

Zbog veličine uzorka posmatranih promenljivih za analizu je korišćen Spirmanov koeficijent korelacije. Rezultati analize prikazani su u tabeli 4. Koeficijent korelacije od 0,939 podrazumeva jaku pozitivnu korelaciju između kretanja cene bitcoina i broja korisnika bitcoin novčanika uz pretpostavku da se vrednost broja korisnika bitcoin novčanika nalazila na istom nivou 17. juna 2021. god. kao krajem maja 2021. godine. Koeficijent korelacije od 0,684 podrazumeva jaku pozitivnu korelaciju između kretanja cene bitcoina i kretanja cene zlata. Utvrđena je statistički signifikantna pozitivna korelacija između analiziranih varijabli (sig. < 0,05). To znači da su zaključci o uticaju kretanja cene bitcoina na broj korisnika novčanika, odnosno na kretanje cene zlata, relevantni.

Tabela 4 - Korelaciona analiza

	Spirmanov koeficijent korelacije	Sig. (2-tailed)
Korelacija između kretanja cene bitcoina i broja korisnika bitcoin novčanika	0,983	0,000
Korelacija između kretanja cene bitcoina i kretanja cene zlata	0,684	0,000

Izvor: Autor

Na osnovu rezultata korelacione analize utvrđen je statistički značajan pozitivan uticaj kretanja cene bitcoina na broj korisnika bitcoin novčanika i cene zlata, čime su prihvaćene prve dve istraživačke hipoteze. U slučaju pozitivne korelacije između cene bitcoina i broja korisnika bitcoin novčanika, imajući u vidu mehanizam funkcionisanja trgovanja bitcoinom, to se može objasniti činjenicom da veća vrednost valute, privlači veći broj investitora, odnosno povećava tražnju. Kada se posmatra pozitivna korelacija između kretanja cene bitcoina i cene zlata, naročito u uslovima pandemije, ovo je u skladu sa istraživanjem Dončić (2020), koji posmatrajući iste varijable zaključuje da rezultati istraživanja ukazuju da je moguća pouzdana primena istorijskih podataka o kretanju vrednosti i cene bitcoina za predviđanje cene zlata. Pozitivan trend kretanja cene bitcoina i cene zlata uočen tokom pandemije u suprotnosti je sa tendencijom koje je zlato iskazalo tokom globalne ekonomske krize i sa većinom ekonomske literature koja je ukazivala na pad vrednosti valuta na tržištima u kriznim periodima.

Kad se u kretanje cene bitcoina poslednjih godina uključe principi i istraživanja u oblasti bihevioralne ekonomije, čini se da su se investitori kada se pojavila ova kriza preusmerili sa tradicionalnih tržišta na alternativna, poput tržišta bitcoina, bar u ranim fazama krize upravo zbog značaja informacija.

Zlato je bogatstvo na koje mnogi misle kada je u pitanju održavanje vrednosti, ali bitcoin sada zaista postaje izazov za zlato u ovom pogledu. Razlika sa bitcoinom je u tome što je postao mnogo privlačnija investicija nego ikada ranije. Bitcoin brzo postaje ono što je poznato kao „safe haven assets“ – imovina sigurnog utočišta, koja dobro funkcionise čak i na nestabilnim tržištima i u nestabilnim vremenima poput pandemije. Zlato je klasičan primer imovine tzv. sigurnog utočišta, jer zadržava vrednost čak i kada tržišta imaju loš učinak. Svaki investitor zna da će njegov novac biti siguran uložen u zlato bez obzira na fluktuacije na tržištu. Bitcoin je dugo nastojao da dostigne status ovakve imovine. Bilo je potrebno da bitcoin dobije poverenje potrošača.

Tokom globalne pandemije, zemlje su uvele mere suzbijanja da bi ublažile širenje virusa COVID-19, uključujući ograničenja putovanja, socijalno distanciranje i politike zaključavanja (Sarkodie, Owusu, 2020). Preduzete mere suzbijanja značajno su uticale na ionako krhku globalnu ekonomiju, koja je već prevazišla finansijsku krizu iz 2008. godine, a sada se procenjuje da će dostići najdublju recesiju od Drugog svetskog rata. Tokom pandemije COVID -19, bitcoin je porastao za preko 500% u 2020. i 2021. godini, delimično usled špekulacija na finansijskom tržištu da investitori gomilaju digitalnu valutu zbog niske kamatne stope na tržištu (World Bank, 2020). U uslovima pandemije status bitcoina kao špekulativne investicije izgleda manje rizičan nego što bi bio u stabilnijim vremenima. Iako ne postoji centralizovani menadžment, marketing bitcoin je pozicioniran kao zaštita od eventualne inflacije - slično zlatu, ali digitalnom. Sposobnost bitcoina da deluje kao zaštita od inflacije ili kao alternativna valuta kao američki dolar nije uspostavljena, ali je određen broj fondova dodao mali ulog rizika (uglavnom manji od 5%) u bitcoin i druge kripto valute upravo u tu svrhu (<https://fintechmagazine.com/digital-payments/year-lockdown-how-has-bitcoin-navigated-pandemi>).

Iako je na početku pandemije bitcoin zabeležio pad vrednosti, od tada se bitcoin oporavio i zabeležio rast cene. Pandemija COVID-19 dovela je do povećanja broja ljudi koji žele lako da investiraju od kuće. Bitcoin je uvek imao prednost što je u potpunosti digitalna valuta. Kupiti bitcoin je lakše nego ikad, delom zahvaljujući pandemiji. Po prvi put, mnogi ljudi vide prednost ulaganja u bitcoin i bitcoin tržište raste kako bi odgovorilo izazovu rastuće tražnje. Pandemija koronavirusa izazvala je veliki pomak ka digitalnom svetu u svim oblastima našeg života - od rada od kuće do naručivanja namirnica putem Interneta. To je već bio trend u porastu pre pandemije, ali COVID-19 je ubrzao ovaj trend. Daljinske finansijske usluge su popularnije nego ikad, a bitcoin postaje sve popularnije kako se ljudi prilagođavaju digitalnom svetu. Objašnjenje zasnovano na bihevioralnoj ekonomiji da ljudi kupuju kriptovalute jer to i drugi čine izgleda uverljivo. Štaviše, efekat može zabeležiti početak strategije „pump and dump“ informisanih investitora, koji počinju da povećavaju ulaganja na tržište u nadi da će namamiti neinformisane investitore na tržište, a zatim sniziti cenu odsecanjem potražnje. Pored toga pastirsko ponašanje ili ponašanje stada je izuzetno prisutno u kriznim vremenima, što je još jedan od bihevioralnih aspekata objašnjenja kretanja cene bitcoina u uslovima pandemije. Sa racionalne strane, investitori koji veruju da je likvidnost od suštinske važnosti možda više vole da drže kriptovalute, jer su one lako dostupne bilo gde u svetu. Tada, investitori znaju da uvek mogu pristupiti svom novcu, bez potrebe da se oslanjaju na bilo koju centralnu vlast. Investitori koji izgube poverenje u banke i vlade više vole kripto opciju, jer zaobilazi strah od intervencije ovih entiteta. Sve što je potrebno je internetska veza za kupovinu i prodaju bitcoina, što ga čini savršenim valutom za preduzeća i pojedince koji žele da izvrše brze i jednostavne međunarodne transakcije. Pored toga inženjeri neprekidno smišljaju zelena, održiva rešenja za rudarstvo bitcoina tokom poslednje dve godine. To uključuje rudarstvo bitcoina na solarnu energiju i hidroelektriku. U svetu u kojem su klimatske promene postale jedno od najkritičnijih pitanja za većinu preduzeća i pojedinaca, bitcoin koji je često napadan sada razvija tehnologiju zasnovanu na obnovljivoj energiji (<https://www.cultureliverpool.co.uk/news/how-bitcoin-is-handling-the-challenges-of-the-covid-19-pandemic/>). Sve navedeno potvrđuje istraživačku hipotezu o sticanju statusa bitcoina kao imovine sigurnog utočišta u doba krize.

Zaključak

Godine 2009. kad je bitkoin plasiran, nije bilo sasvim jasno kako i gde se može trošiti. Sada velike kompanije kao što su Microsoft i Dell primaju uplate u bitkoinu za niz svojih proizvoda i digitalnog sadržaja. Može se leteti sa aviokompanijama, kupiti karte za pozorište, uzeti nekoliko boca zanatskog piva, itd. Ostale opcije uključuju plaćanje hotela i kupovinu imovine, namirivanje računa u različitim barovima i restoranima, priključivanje sajtovim za upoznavanje, kupovinu poklon vaučera, kladenje u online kazinu i dobrotvorne donacije. Postoji takođe niz različitih online tržišta koji trguju sa svim, od ilegalnih supstanci do vrhunskih, luksuznih predmeta. Narodna banka Srbije, ne priznaje bitkoin kao zakonsko sredstvo plaćanja i upozorava građane da koriste ovu valutu na sopstvenu odgovornost u slučaju prevare ili gubitka ulaganja. Bitkoin će zaživeti u Srbiji paralelno sa rastom popularnosti u svetu, jer je Internet kao globalna mreža pokazao da se trendovi brzo šire. Ipak, da bi se to desilo, mora da se ispuni još puno uslova.

Predmet ovog istraživanja bila je komparativna analiza kretanja cene bitkoina i cene zlata, kao i utvrđivanje postojanja veze između kretanja ove dve varijable, sa posebnim osvrtom na uticaj shvatanja bihevioralne ekonomije na objašnjenje kretanja bitkoina u doba pandemije COVID-19.

Testiranje početnih hipoteza utvrdilo je statistički značajnu vezu između kretanja cene bitkoina i cene zlata, što može biti osnov za predviđanje kretanja cene zlata u budućnosti na osnovu kretanja cene bitkoina. Utvrđena je signifikantna veza između kretanja cene bitkoina i porasta broja korisnika bitkoin novčanika, što jasno ukazuje na povećanje obima trgovine i široj zastupljenosti ove valute. Teorijsko istraživanje u ovom radu pokazuje da je bitkoin bio jedan od glavnih dobitnika pandemije koronavirusa. To može da implicira da kada se ekonomski oporavak nakon COVID-19 bude približio kraju, mogao bi se očekivati pad cene bitkoina kako potrošači ponovo budu počinjali da troše, a institucije nastave da ulažu u stvarne ekonomske aktivnosti. Uprkos tome, čini se da se bitkoin pokazao kao legitimno sredstvo za investiranje, zahvaljujući pandemiji, i iako bi eventualni ekonomski oporavak doveo do pada, verovatno će ostati privlačan za investitore u doglednoj budućnosti.

Bitkoin i kriptovalute su profiteri od ekonomskog haosa pandemije i nacionalnih računa koji se gomilaju i koji će se plaćati u budućnosti. Iako je bitkoin poznatija valuta nego što je bio pre pet godina, to je i dalje špekulativna investicija i pojedinačni investitori mu pristupaju s oprezom. Činjenica da je porasla vrednost ove valute kao da je poslužila kao utočište nekim investitorima tokom ekonomske krize pokazuje takođe koliko je kriza duboka. Da li će to i dalje činiti, ostaje da se vidi u narednom periodu. Nestabilna priroda tržišta kripto valuta otežava predviđanja koliko će dugo trajati rast vrednosti bitkoin. Ono što je sigurno jeste da se ponašanje potrošača značajno promenilo zbog pandemije. Sa prelaskom u digitalni svet koji se samo ubrzava, verovatno je da će bitkoin nastaviti da postaje sve više valuta kojoj teži veliki broj investitora. Zlato je i dalje sredstvo za upravljanje velikim fondovima za diverzifikaciju u alternativna sigurna utočišta. To ne znači da bitkoin neće pobediti performanse cena zlata, ali prerano je reći da li bitkoin može u potpunosti zameniti zlato kao sredstvo „safe haven asset“.

Pored svega ovog opšteg entuzijazma, makroekonomske nestabilnosti koje je doneo COVID-19 doveo je do ogromnih podsticajnih paketa vlada širom sveta i mnogih centralnih banaka koje su štampale više novca. To bi moglo povećati inflaciju, što zauzvrat smanjuje kupovnu moć ljudi. Zato ne čudi da čak i centralne banke polako prihvataju kriptovalute. Rusija, Kina, Kanada, Evropska unija i mnogi drugi ili već rade na digitalnim valutama centralne banke za svoje zemlje ili objavljuju beleške sa detaljima o svojoj nameri da to učine.

Ovo je očigledan znak da sile koje su u starom finansijskom svetu kripto valute vide kao budućnost. U međuvremenu, američki savezni regulator najavio je da banke na malo mogu vršiti plaćanja stabilnim kovanicama, koje su kripto valute vezale za tradicionalne valute. Jedan fudbalski klub najavio je upotrebu bitcoina za plaćanje. Bitcoin jeste budućnost sistema plaćanja preko interneta. Međutim, i dalje će postojati tendencija da ga najviše koriste ljudi koji u bitcoin investiraju i vreme i novac koje sebi mogu da dopuste da izgube. Dakle, više će se i dalje koristiti kako bi se zaradilo na vrednosti novčića, a manje za plaćanja roba i usluga.

Ne postoji razlog koji bi sprečio da bitcoin toliko naraste da postane poput velikih nacionalnih valuta. Naravno neophodno je zakonski regulisati njegovo korišćenje kako bi se sve moguće zloupotrebe u smislu krađa, podvala i nezakonitih radnji svele na minimum. Ne postoji tehnički razlog koji bi to sprečio i nijedan teoretski zašto to ne bi moglo. Na svetu postoje male države čije nacionalne ekonomije su slabije od bitcoina, što je zaista fascinirajuće i govori dosta o potencijalima ovog sistema. Smatra se zlatom ovog veka, ali ima dug put do osvajanja poverenja krajnjih korisnika koje je zlato već učinilo.

Ostaje nejasno, kakva je budućnost bitcoina? Mnoga pitanja ostaju obavijena velom tajne: ko stoji iza fenomena bitcoina, ko profitira od ove šeme i da li će doći do kolapsa ili uspeha. Ovde niko ne može da kaže poslednju reč, iako mnoge stvari zavise od državnih vlasti i finansijskih institucija, kao i od krajnjih korisnika koji će odlučivati o sudbini bitcoina. Velika efikasnost elektronskog novca dovodi do povećanja rizika monetarne nestabilnosti. Zbog očekivanja naglog porasta upotrebe internet valuta, sa porastom stepena sigurnosti, ekonomičnosti i spremnosti prihvatanja u budućnosti, postavlja se pitanje njihovog uticaja na vođenje monetarne politike. Javlja se potreba za kontrolom i nadgledanjem njihove upotrebe, usled mogućeg negativnog uticaja na efikasnost instrumenata monetarne politike i na validnost tumačenja postojećih monetarnih indikatora. U narednom periodu će, za centralnu banku i nacionalne regulatorne organe, jedan od izazova svakako biti praćenje efekata korišćenja ovakvih valuta i njihova regulacija. Od regulacije bitcoina i drugih kripto valuta, kao i njihove stabilnosti i sigurnosti, zavisice i budućnost ovakvih valuta.

Komparacija kretanja posmatranih valuta bez stavljanja u kontekst sa dostignutim stupnjem ekonomskog razvoja nosi sa sobom određena ograničenja i ne daje realnu sliku, budući da tržišta nisu institucije koje ne zavise od privrednih kretanja. Imajući u vidu volatilitet tržišta bitcoina predviđanja kretanja cene zlata na osnovu samo cene bitcoina ne bi dalo sasvim pouzdane rezultate. Nemogućnost kvantitativnog ispitivanja uticaja bihevioralne ekonomije na kretanje cene bitcoina u uslovima pandemije, ograničava izvođenje relevantnih zaključaka o kreiranju slike kao „safe haven asset“ bitcoina kod investitora u doba finansijskih kriza.

Prave efekte ekonomske krize izazvane pandemijom moguće je sagledati uključivanjem većeg broja valuta. Budući pravci istraživanja mogući su proširivanjem komparativne analize uključivanjem većeg broja valuta, i/ili proširivanjem vremenskog perioda.

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BITCOIN AND GOLD AS A SAFE HAVEN ASSET DURING THE PANDEMIC

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Abstract: The pandemic that hit the world in 2020 has left unforeseeable consequences for the entire world economy. Bitcoin and gold are currencies whose prices have risen despite the crisis period. The results of the research, using Spearman's correlation coefficient, showed a statistically significant relationship between the movement of the price of bitcoin and the price of gold, which can be the basis for predicting the movement of the price of gold in the future, based on the movement of the price of bitcoin. A significant relationship was found between the movement of the bitcoin price and the increase in the number of users of bitcoin wallets, which clearly indicates an increase in the volume of trade in this currency and a wider representation of this currency. Theoretical research of behavioral economics has confirmed the hypothesis that when the financial system is exposed to a crisis, bitcoin and gold will have the characteristics of a „safe haven asset“ which can be explained by the principles of behavioral economics.

Keywords: bitcoin, gold, safe haven asset, behavioral economics

JEL classification: E71, G41

Introduction

The world experienced a health crisis in 2020 that has had far-reaching effects on people's physical, mental, and financial well-being. The COVID-19 virus-caused pandemic has significantly altered the global environment, imperiled national economies, and harmed public safety. In recent years, the use of internet currencies has grown. Bitcoin is the most significant digital currency used in the electronic payment system. Digital currency known as Bitcoin is used and transferred online. The fluctuating exchange rate of bitcoin makes it a fantastic investment opportunity. Bitcoin is a relatively new and intricate form of payment. The fact that customer options are still limited is therefore only reasonable, yet every day more and more companies, from small local coffee shops to enormous industrial conglomerates, are accepting Bitcoin payments. Although it is unreliable and underutilized money, its value has risen during the pandemic. On the other hand, gold has historically been the most reliable means of protecting the value of money. Investigating how these currencies' prices changed during the COVID-19 epidemic is intriguing given the traits of these currencies.

The purpose of this paper is to compare the price movements of bitcoin and gold, as well as to determine whether there is a relationship between the price movements of these two variables. We pay particular attention to how behavioral economics knowledge has affected the price movement of bitcoin during the COVID-19 pandemic. The scientific goal is reflected in the description of both theoretical and empirical analysis of the movement of the observed variables. In a theoretical sense, the scientific goal is based on the analysis of modern views on bitcoin and gold as currencies, while in an empirical sense, through a comparative analysis of the movement of these variables, the degree and impact of the movement of the price of bitcoin on the movement of the price of gold, the correlation between the movement of the price of bitcoin and number of bitcoin wallet users, as well as using the influence of behavioral economics to explain the movement of the price of bitcoin in the era of the crisis caused by the COVID-19 pandemic. From the aspect of the social goal, the research should show the current position and predict the movement of these two currencies, taking into account the established volatility of their markets, show a comparative analysis of price levels, the price impact of one currency on another, and how to predict future movements.

Bearing in mind the defined subject and goal of the research, the paper will start from the following hypotheses:

H1: There is a high correlation between the movement of the bitcoin price and the number of users of bitcoin wallets in the observed period.

H2: There is a high correlation between the movement of the price of Bitcoin and the movement of the price of gold in the observed period.

H3: If the financial system is exposed to a crisis, then bitcoin and gold will have the characteristics of a "safe haven asset", which is explained by the principles of behavioral economics.

Methodology and Data

The time period from 2013 to 2021 will be taken for the subject research. Representative international databases (World Gold Council, Yahoo Finance, Bloomberg Business, etc.) and all relevant domestic and foreign literature will be used for data collection. The statistical tool SPSS - The Statistical Package for the Social Sciences will be used to test the set hypotheses and arrive at the research results, and within it, correlation analysis will be used for statistical inference. Spearman's correlation coefficient will be used to analyze the relationship between the movement of the bitcoin price and the number of bitcoin wallet users, as well as to analyze the movement of the price of bitcoin and gold. Spearman's coefficient is a non-parametric test and can be applied to any combination of ordinal or higher measurement level variables. Spearman's correlation coefficient is suitable for quantities that can be ranked and especially for smaller series of data (Biljan-August, Pivac, Štambuk, 2007). Correlation coefficients range from -1 to 1, where the sign indicates whether it is a negative or positive correlation or whether we have an absence of correlation (0) (<http://psihologija.ff.uns.ac.rs/viz/koeficijenti-korelacije-za-rangirane-podatke>). Calculation formula:

$$r_s = 1 - 6 \sum_{i=1}^n \frac{d_i^2}{n(n^2 - 1)}$$

where: d is the difference in the values of the ranks of the two observed variables, and n is the number of different series.

Obtaining answers to the set hypotheses requires determining the time frame, the choice of research methods and the elements that will be used.

Table 1 - Elements Used in the Analysis

The name of the variable	Data source	Period
Bitcoin price in dollars	Statista; Coin desk, YahooFinance	2013- 2021.
Number of bitcoin wallet users in millions	Statista; Coin desk, YahooFinance	2013- 2021.
The price of gold in dollars	Business insider, World Gold Council, Yahoo Finance,	2013- 2021.

Source: Author

The observed period is suitable for analysis because it includes a long enough period of time to follow the trend, and also the period of the world pandemic. In the research, secondary data from the website database on price movements of observed currencies on the markets were used. Table 2 shows the data that will be used as elements for the correlation assessment.

Table 2 - The Movement of Bitcoin and Gold in the Period 2013 - 2021

Year	Bitcoin price in dollars	Number of bitcoin wallet users in millions	The price of gold in dollars
2013 ¹	744.17	0.89	1,205.90
2014	309.90	2.71	1,225.40
2015	424.96	5.34	1,072.40
2016	952.46	10.69	1,138.85
2017	13,062.15	21.51	1,264.50
2018	3,689.57	31.91	1,267.05
2019	7,251.28	44.51	1,469.50
2020	28,768.84	63.48	1,839.80
2021	47,128.47	73.00	1,814.95

Source: <https://www.statista.com/statistics/326707/bitcoin-price-index/>; <https://www.coindesk.com/price/bitcoin/>; <https://www.statista.com/statistics/647374/worldwide-blockchain-wallet-users/>; <https://finance.yahoo.com/topic/crypto/>; <https://markets.businessinsider.com/commodities/gold-price/>; <https://www.gold.org/goldhub>

The price of one bitcoin has changed over time, depending on the state of the market. In the first years, 1 bitcoin could be bought for less than 1 dollar, and the price of this currency has been increasing since 2009. Until the end of 2016, it was necessary to allocate less than a thousand dollars for one unit of bitcoin. Already at the end of 2017, it was necessary to allocate over 13,000 dollars for one unit of this decentralized cryptocurrency. During 2018, a drop to \$3,689 was recorded. When the pandemic broke out, Bitcoin could be bought for around \$7,200. Today, it costs more than \$47,000 - a staggering over 500 percent increase. At the beginning of the COVID-19 crisis, the increase in the total number of cases was positively related to the market capitalization and trading volume of cryptocurrencies (Jabotinsky, Sarel, 2020). However, this upward trend is not necessarily obvious from a theoretical standpoint, as there are several forces that could have driven demand up or down in response to the crisis, making Bitcoin's growth even more interesting to analyze. Some countervailing forces could suppress demand. Bitcoin could become closely correlated with the traditional financial market in times of crisis, even if there is no such correlation in normal times, so that the benefit of switching to Bitcoin becomes negligible. Even worse, the chaos caused by the pandemic could have led to at least two dangerous activities that could have caused significant losses. First, sophisticated investors could manipulate the price of Bitcoin by artificially increasing demand to lure unsophisticated investors and then abandon their investment when the price is high enough. This is possible when it is taken into account that people demonstrate the so-called herding behavior, i.e., they buy bitcoin just because they are watching others. Second, even before the pandemic, Bitcoin was suspected of enabling criminal activity. With this in mind, people may fear that using cryptocurrencies would expose them to criminal charges for money laundering and therefore avoid trading (<https://clsbluesky.law.columbia.edu/2021/03/26/how-the-covid-19-pandemic-affected-the-cryptocurrency-market/>).

¹Balance as of: 31.12.

The fact that bitcoin may be traded anywhere in the world somewhat mitigates the potential liquidity limitations that may occur if countries restrict trading activity as part of the lockdown, which is one of the rational justifications for the rise in bitcoin values in the pandemic era. As a result, Bitcoin gains appeal in comparison to competing currencies. Additionally, investors who believed that the crisis might result in market manipulation by central banks or political players decided to switch their investments to decentralized bitcoin. In other words, bitcoins can allow investors to insure against some political risks and so become more appealing because they are not managed by a central authority but rather run autonomously.

Since wallets allow users to create an unlimited number of accounts, the actual number of users cannot be known for sure, but it can be noted that the number of wallets, as well as the price of Bitcoin, only started to grow in January 2013, while Bitcoin was created in 2009. In the period July 2016-July 2017, it grew at a high speed. In July 2016, the number of registered wallets was over 7.8 million, and in July 2017, over 14.9 million. Since the beginning of the pandemic, from January 2020 to 2021, the number of Bitcoin wallet users has grown from 45.45 to 73 million.

If the price of gold is examined after 2013, a steady trend with a range of values between \$1,072 and \$1,267 may be seen. In 2019, there was a more notable increase. In times of stress, the financial community has focused on gold as a refuge, particularly prior to and during the early stages of the COVID-19 crisis. With the exception of March 2020 and the cessation of the rising trend in February 2021, which coincides with information about the subsidence of the epidemic and the beginning of vaccination, prices have increased during the whole course of the pandemic.

Literature Review

Various online currencies have been employed as payment methods in recent years. A form of electronic payment known as "internet currency" relies on either hardware- or software-based value storage. Bitcoin is the most significant digital currency used in the electronic payment system. This electronic money system has lasted longer than the previous ones, and as a result, deserves more attention from both the professional public and users. This is due to the design of the payment system as well as certain other conditions that the inventors themselves could not change. Because it may be destroyed by setting up the necessary software on a computer's hard disk, Bitcoin is truly software electronic money (Selgin, 2014). Bitcoin is utterly dominant due to the magnitude of the cryptocurrency market as a whole. Beginning in 2020, Bitcoin represented more than two-thirds of the market's capitalization and around one-third of its daily trade volume (Tomić, 2020). Similar to a bank account, a bitcoin address allows a user to receive, transmit, and store bitcoin. Bitcoins are safeguarded via public key cryptography rather than being physically kept in a vault. Each address contains a private key that needs to be kept hidden in addition to a public key that is accessible to everyone (Đoršević, 2018). A person with a specific private key is the only one who can spend bitcoins, even though anyone can transmit them to any public key.

BitPay refers to the system for handling bitcoin payments. This is a private network that draws businesses to begin accepting payments in bitcoin currency but is not owned by exchanges or maintains a client-to-client network (<https://bitpay.com>). Users can use one or more bitcoin addresses to get started with bitcoins, as they are used to receive bitcoins in the same manner that email addresses are used to receive emails. When sending money, the wallet generates a transaction that includes the recipient's address, the intended recipient's amount, and a signature. Using a Bitcoin wallet, you may store your available funds and execute online transactions. Until a transaction is recorded in the Bitcoin blockchain, it cannot be validated. The blockchain (trading platform) ensures the validity of every transaction and prevents double spending. Each user has access to the transaction history thanks to blockchain. Bitcoins cannot be stolen from their owners by a thief, bank, or government, once they have been acquired and properly safeguarded. No one or anything else has the authority to freeze an account or stop its owner from using the bitcoin network to perform free transactions (Tomić, Todorović, Jakšić, 2016).

The system is not necessarily anonymous, but it is intended to be secure. Theoretically, any user's transaction could be tracked. Bitcoin is both a currency and a payment system, and "mining" is how it works. Every member of the network who has used their computers to calculate challenging issues is required to process each transaction in order to guarantee its security (as well as its anonymity and irrevocability) (<http://marketingitd.com/2013/sta-je-bitcoin- and-how-to-use-it-in-billing/>). The issue with this theory is that all transactions are combined into a single, distributed, decentralized blockchain. Additionally, this implies that nothing can be concealed (Baxter - Reynolds, 2013). The network itself is utilized as a method to control the regularity of transactions in order to maintain the security of payments and avoid various abuses. R2R networks are the foundation of Bitcoin. Peer-to-peer networks have no "client-server" design; instead, all computers are treated equally as network members. When one computer "shares" certain content with the network, all other computers have access to that file, which is how it is typically used to share information (Dinić, 2014).

Bitcoin is not the first electronic payment system and is not likely to be the last. The main reasons why earlier operating solutions didn't succeed for a long time were that they couldn't ensure the security of their users and couldn't reach a large enough group of private users and commercial entities to accept them as a form of payment. How did bitcoin continue to function as an online currency in light of the possible issues? Bitcoin has been around for a while, though not quite long enough compared to past attempts at this kind of money (Miladinović, Smigić, 2018).

The Bitcoin system stands out from other electronic money systems thanks to a number of features. First of all, neither a bank initiating the system nor any central bank operating it, nor is there a firm behind bitcoin that is the system's owner. This further suggests that there are no commercial entities planning to profit from maintaining the system, freeing Bitcoin from the need to live economically. Because there were few users and little money in circulation when Internet currencies were initially used, it was simple to confirm the transaction's validity and create a report on it. It now takes longer to do verification and confirmation because there are more coins and users, which has made the process more difficult. Additionally, the hardware in regular computers, particularly laptops, has gotten too flimsy to support the workload of this substantial job (Raskin, 2013). This sort of money is not under the supervision of the central bank. The instability of cryptocurrencies, including Bitcoin, is the most glaring issue caused by the lack of a centralized authority.

Cryptocurrencies are entirely dependent on the market, that is, on the law of supply and demand, as opposed to national currencies, where central banks have a wide range of tools at their disposal to maintain the currency more or less stable. Since cryptocurrencies are worldwide and decentralized and are not governed by any one state, they are less susceptible to political events (<https://www.barrons.com/articles/why-bitcoin-is-the-best-investment-opportunity-post-pandemic-heres-what-will-drive-the-price-higher-51607134443>).

Despite being designed as an experimental payment mechanism at first, Bitcoin is currently very popular and getting a lot of media attention. The first truly global currency, according to its proponents, is one that does not discriminate against its users based on their nationality or location, is always available, simple to secure, has very low usage costs, is debt-free, etc. However, detractors contend that it is frequently used fraudulently to purchase items and “launder” enormous quantities of money and that it is very simple to steal Bitcoin in the event of a cyber attack (Ron, Shamir, 2013).

Despite being primarily intended for these purposes, bitcoin is still not widely used. The biggest trading platforms in the world do not yet accept Bitcoin, despite the fact that it is an intriguing financial prospect. This currency is not accepted by Amazon or eBay, and social networks do not permit its use as payment. Additionally, the majority of businesses that accept bitcoin payments are those that deal with the delivery of services over the internet (hosting companies), 3D designers and digital artists, bulk SMS providers, providers of online document storage, software developers, and online bookmakers. However, newly developed sales and auction sites created especially for conducting commerce with bitcoin cash are where the majority of product providers are located. The great volatility of the value of this currency is a significant issue with the denomination of pricing on selling websites in bitcoins (<https://www.marketwatch.com/story/the-pandemic-showed-theres-a-need-for-digital-currencies-especially-bitcoin-11607031312>).

But according to earlier studies, the price of bitcoin always increases whenever there is a global political or financial crisis, even if there is merely a hint that one might occur. The cost went up following the Brexit vote, the US presidential election, the newest pandemic, the Cyprus and Greek crises, the Brexit referendum, and the Brexit referendum. So, whenever faith in the current system is questioned, a certain proportion of individuals view cryptocurrency as a potential replacement. Since Bitcoin has weak underpinnings for the preservation of value and only functions as a means of exchanging money rather than a true medium of exchange, it is known to be unstable and highly volatile. Investors are aware that under these conditions adding a bigger proportion of Bitcoin to the portfolio structure greatly raises the risk of the holdings, thus the rise in price of this currency during the global epidemic is fascinating (<http://www.societegenerale.rs/kako-je-nastao-bitcoin/>).

The intersection of psychology and economics, or behavioral economics as it is known in the relevant literature, has attracted a lot of attention in recent years. It is a field of study that enhances the explanatory power of economic research by fusing it with more realistic psychological contexts and utilizing social, emotional, and cognitive elements to try to understand the economic choices made by people and institutions. According to Belsky and Gilovich (2010), behavioral economics combines psychology and economics to explain why and how people make illogical or irrational decisions when they borrow, spend, invest, and save money (Belsky, Gilovich, 2010).

Increasing the realism of the psychological underpinnings of economic analysis will improve the standard economic model in terms of producing theoretical knowledge, making accurate predictions about various phenomena, and developing better economic policy, according to the central tenet of this sub-discipline within economic science. The state and future of economic science are profoundly impacted by the relatively recent and promising field of behavioral economics. Fundamental behavioral economics research has unequivocally demonstrated that psychological concepts may be formalized into a different model and utilized to provide predictions that can then be applied in a real-world economic situation (Krstić, Radivojević, 2019). While traditional finance begins with the idea of perfect reason, behavioral finance considers the bounded rationality of market players. While traditional finance begins with the tenets of completely rational financial decision-making, behavioral finance emphasizes the incidence and repetition of irrationality.

From the widespread acceptance of the efficient market hypothesis (EMH), the cornerstone of conventional financial theory, through the advent of behavioral finance and behavioral criticism of EMH, financial theory has come a long way. A high number of market anomalies led to the EMH's validity being questioned, which opened the door for the development of a new financial strategy with the study of people's behavior and psychology as its main focus (Leković, 2020). As Águila (2009) claims, the growing interest in behavioral finance is the result of the accumulation of empirical anomalies, and the task of behavioral finance is to integrate psychology with finance and economics to ensure their better understanding. In behavioral micro finance, investor behavioral bias according to Baker, Nofsinger (2002) is grouped into how investors think (ground rules/heuristics) and how investors feel (emotions), while according to Pompian (2006) and Hirschei, Nofsinger (2008) investor bias is grouped into cognitive bias and emotional bias (Pompian, 2006). This behavioral bias affects people in their decision making according to Zahera, Bansal (2018). A cognitive bias is making decisions using a ground rule for information or facts. Cognitive psychology refers to people's way of thinking and has an important role in behavioral finance, because numerous studies have shown that people make systemic mistakes in their way of thinking: they are overconfident, they attach too much importance to recent experiences, they use mental shortcuts, they avoid change (Ritter, 2003). Irrationalities present in the complex world of finance, behavioral finance seeks to explain via cognitive biases such as: 1) overconfidence, 2) framing or formulation, 3) mental accounting, 4) representativeness, i.e. availability or memory bias, 5) conservatism, i.e. tendency to avoid changes or "anchoring", 6) aversion to loss, 7) avoidance of regret, 8) herd behavior, i.e. herd mentality or crowd psychology, 9) confirmation or self-confirmation, 10) late insight, 11) cognitive dissonance, and 12) winner's curse. Emotional bias is decision making based on feelings. The advantage of behavioral finance is, among other things, reflected precisely in explaining market anomalies and the causes of market inefficiency. According to the standard theory, the asset price depends on the received information, while according to behavioral finance, the asset price depends on the reaction of market participants to the received information. (Fakhry, 2016).

Given the nature of the area, qualitative analyses predominate in behavioral economics. The field of quantitative research is very limited. Human irrationality frequently has a considerable impact on decision-making, which has important economic repercussions, according to contemporary behavioral economics. Big data, the advancement of behavioral and social sciences, and human resource management may soon make it possible for scientists to realize their goal of creating behavioral risk models.

Numerous external elements (political system, legislation, norms, and culture) as well as endogenous ones that affect investment decision-making may be included in qualitative study. New behavioral models and explanations of economic events may be developed as a result of the development of both quantitative and qualitative research in conjunction with big data (Petronijević, 2018).

Every time there are major issues, such as earthquakes, financial threats, or crises, that threaten the financial system, the price of gold tends to increase. It is particularly appealing during periods of high inflation because it presents itself as an asset that protects the value of money against further inflation-related degradation. Only by selling gold for a higher price—the so-called capital gain—can you profit from it. Real interest rate periods that decline or even negative are frequently advantageous for buying gold because in these circumstances, investors “flee” to safer assets to hedge against volatile market swings. This fluctuation in the price of gold offers investors a variety of ways to hedge against risks such as inflation, falling asset yields, and price volatility. The widespread perception that investors move their capital to gold when they are concerned about falling markets as a result of the flight to safety that occurred amid economic hardship has led to gold being viewed as a safe haven.

Sarkodie, Ahmed, Owusu (2021) in the research they conducted during the pandemic dealt with the connection between the growth of Bitcoin and those suffering from the corona virus. They found a relationship between these two variables. That is why it is interesting to observe the movement in the conditions of the pandemic, since it would be expected that the crisis will affect the reduction of trade in this currency. Cryptocurrency market participants appear to be behaving irrationally. A study conducted by Keller, Scholz (2019) aimed to identify types of investors, including behavioral principles and their influence. They identified six types of investors who place bids and four types of investors who demand (Keller, Scholz, 2019). Cheung, Roca, & Su (2015) state that Bitcoin is a bubble. Shiller (2000) defined a bubble as a situation in which news of price increases fuel investor enthusiasm, which spreads by psychological contagion from person to person, amplifying stories that could justify price increases and bringing in a larger and larger class of investors ... despite doubts into the real value of the investment”. According to Baker, Nofsinger (2002), behavioral finance seeks to express the irrationality of investors in general and show human errors in cryptocurrency markets (Baker, Nofsinger, 2002). Based on the literature on cognitive and emotional biases that have influenced decision-making and that could be applied to cryptocurrency, a conceptual model for understanding the behavioral biases that influence cryptocurrency investing is envisioned. The biases are herding, optimism, overconfidence, confirmation bias, loss aversion, and the gambler’s delusion. Herding is the tendency of someone who prefers to follow others or imitate group behavior in making decisions rather than making decisions independently. Optimism bias is someone’s tendency to overestimate the possibility of positive things happening and underestimate the potential for unpleasant events. Overconfidence is the belief of someone who thinks they know and have better information. Confirmation bias or coincidence can occur in a phase when prices fall but temporarily rise again. Loss aversion is a bias that can be explained by prospect theory. Prospect theory is used to describe how people make decisions between different choices or prospects, especially under conditions of uncertainty. The gambler’s fallacy is the belief that a correction will occur in a fair gamble (Hidayat, 2019). The results of Almansour (2020) show that behavioral economics has a significant impact on the behavior of investors in the cryptocurrency market, and this, on the other hand, significantly affects the price movement of these currencies (Almansour, 2020).

The inverse relationship between gold and stocks is cited by many in popular literature. However, some have noted that the relationship has changed in 2020. For example, Mark DeCambre noted in *Market-Watch* in August 2020 that “gold is at a historic low.” A positive correlation between gold and stocks was observed early in the COVID-19 period. For example, Zhang (2020) argues that “when gold and stocks become positively correlated, it usually signals a market regime driven by liquidity and changing real returns” (Zhang, Chen Hamilton, 2020). Choudhri (2015) notes that gold was not a safe haven during the financial crisis of 2007–2009 due to the unidirectional relationship between gold returns and market returns (returning gold to stocks), but not bidirectional (Choudhry, Hassan, Shabi, 2015). He also notes that there is non-linear causality, arguing that gold may have been used as a hedge before the financial crisis, but not during the crisis period. AlAmeer (2018) observes a different correlation for the periods before, during and after the 2007–2008 financial crisis. (AlAmeer, Hammad, Ismail, Hamdan, 2018). The purpose of Drake’s 2020 study is to explore the relationship between gold and the stock market, given the recent COVID-19 recession and the role of interest rates. The results indicate that the inverse relationship observed in the past is not supported in the two most recent recessions and that this relationship is influenced by real interest rates and stock market volatility. When real interest rates are negative, there is a positive relationship between gold and market returns (Drake, 2020).

In recent years, the Bitcoin market has been quite volatile, and there is a need to analyze ways to predict Bitcoin price movements. Since the gold market has also been under considerable interest in recent years, primarily due to its volatility and reflection of global economic trends, not only those related to economic and financial flows, but also wider socio-political ones, it is very interesting to consider the possibility of using data on the movement of the price of bitcoin on the global market in the context of the possibility of predicting the movement of the price of gold. This is especially important considering that the gold market is a reflection of global economic trends, on the one hand, and the fact that bitcoin is becoming more and more important as an asset, i.e., investment alternative, on the other hand. In a study conducted by Dončić (2020), the aim was to answer the question that there is a causal relationship between the movement of the price of bitcoin and the price of gold in the global financial market in order to answer the question of whether it is possible to predict the movement of the price of bitcoin based on the movement of the price of gold on the world market, but also vice versa. The research was conducted in the period from January 1, 2019 to December 1, 2019. The results of the research show that historical data on the movement of the price of gold in the world market cannot be used to predict changes in the value and price of Bitcoin. On the other hand, research results indicate that it is possible to reliably apply historical data on the movement of the value and price of bitcoins to predict the price of gold (Dončić, 2020). It is for this reason that in this paper, among other things, the correlation between the movement of the price of bitcoin and gold will be examined.

Research Results

The variables that are observed in a defined time interval are in accordance with the research questions. Model analysis begins with a review of descriptive statistical analysis results (minimum, maximum, arithmetic mean and standard deviation).

Table 3 - Descriptive Statistics of the Analyzed Variables

The name of the variable	Minimum	Maximum	Arithmetic mean	S standard deviation
Bitcoin price in dollars	309.90	58,734.48	17,618.2136	17,181.31588
Number of bitcoin wallet users in millions	0.89	73.00	46.7064	22.43624
The price of gold in dollars	1,072.40	1,956.05	1,634.5140	284.82795

Source: Author

The range of the "Bitcoin Price in Dollars" variable ranges from \$309.90 to \$58,734.48. The mean is \$17,618.2136, while the standard deviation from that mean is \$17,181.31588. The range of the variable "number of bitcoin wallet users in millions" ranges from 0.89 to 73.00 million. The mean is 46.7064 million, while the standard deviation from that mean is 22.43624 million. The range of the variable "price of gold in dollars" ranges from \$1,072.40 to \$1,956.05. The mean is 1,634.5140, while the standard deviation from that mean is \$284.82795.

Bearing in mind the given overview of the variables, it is interesting to compare the relationship between the movement of the price of bitcoin and the movement of the number of wallet users, as well as the movement of the price of bitcoin and the price of gold, for this correlation analysis will be used. The goal of correlation analysis is to determine if there is a correlation between the observed variables and to what extent.

Due to the sample size of the observed variables, Spearman's correlation coefficient was used for the analysis. The results of the analysis are shown in table 4. The correlation coefficient of 0.939 implies a strong positive correlation between the movement of the bitcoin price and the number of bitcoin wallet users. A correlation coefficient of 0.684 implies a strong positive correlation between Bitcoin price movements and gold price movements. A statistically significant positive correlation was established between the analyzed variables (sig. < 0.05). This means that the conclusions about the impact of the Bitcoin price movement on the number of wallet users, that is, on the movement of the gold price, are relevant.

Table 4 -Correlation analysis

	Spearman's correlation coefficient	Sig. (2-tailed)
Correlation between bitcoin price movement and the number of bitcoin wallet users	0.983	0.000
Correlation between bitcoin price movement and gold price movement	0.684	0.000

Source: Author

Based on the results of the correlation analysis, a statistically significant positive impact of the movement of the bitcoin price on the number of bitcoin wallet users and the price of gold was determined, thus accepting the first two research hypotheses. In the case of a positive correlation between the price of bitcoin and the number of bitcoin wallet users, bearing in mind the functioning mechanism of bitcoin trading, this can be explained by the fact that a higher value of the currency attracts a larger number of investors, i.e., increases demand. When observing the positive correlation between the movement of the price of bitcoin and the price of gold, especially in the conditions of a pandemic, this is in accordance with the research of Dončić (2020) who, looking at the same variables, concludes that the results of the research indicate that it is possible to reliably apply historical data on the movement of the value and price of bitcoin for predicting the price of gold. The positive trend in the price of Bitcoin and the price of gold observed during the pandemic is in contrast to the trend shown by gold during the global economic crisis and to the majority of the economic literature that indicated a decline in the value of currencies in the markets during periods of crisis.

When the principles and research in the field of behavioral economics are included in the movement of the bitcoin price in recent years, it seems that when this crisis appeared, investors shifted from traditional markets to alternative ones, such as the bitcoin market, at least in the early stages of the crisis precisely because of the importance of information.

Gold is the wealth that many think of when it comes to holding value, but Bitcoin is now really becoming a challenge to gold in this regard. The difference with Bitcoin is that it has become a much more attractive investment than ever before. Bitcoin is quickly becoming what is known as a “safe haven asset” - a safe haven asset that performs well even in volatile markets and volatile times like a pandemic. Gold is a classic example of the so-called safe haven property, because it retains value even when markets underperform. Every investor knows that their money will be safely invested in gold regardless of market fluctuations. Bitcoin has long sought to reach the status of such an asset, to gain the trust of consumers.

During the COVID-19 pandemic, Bitcoin rose over 500% in 2020 and 2021, partly due to financial market speculation that investors were hoarding the digital currency due to low market interest rates (Bloomberg, 2021). In pandemic conditions, Bitcoin's status as a speculative investment seems less risky than it would be in more stable times. Although there is no centralized marketing management, Bitcoin is positioned as a hedge against possible inflation - similar to gold, but digital. Bitcoin's ability to act as a hedge against inflation or as an alternative currency to the US dollar is not established, but a number of funds have added a small risk stake (generally less than 5%) to Bitcoin and other cryptocurrencies for this very purpose (<https://fintechmagazine.com/digital-payments/year-lockdown-how-has-bitcoin-navigated-pandemi>).

Bitcoin saw a decline in value at the start of the pandemic, but it has since recovered and witnessed a surge in price. People who desire to invest effortlessly from home are more numerous now thanks to the COVID-19 pandemic. Being a completely digital currency has always been a benefit of Bitcoin. In part because of the pandemic, purchasing Bitcoin is now simpler than ever. For the first time, a large number of people are realizing the value of investing in Bitcoin, and the market is expanding to keep up with the demand. Everything in our life has undergone a significant change toward the digital world as a result of the coronavirus pandemic, from working from home to placing grocery orders online. Before the pandemic, there was an upward tendency in this, but COVID-19 has exacerbated it. As individuals get used to the digital environment, remote financial services and Bitcoin are becoming more and more popular. It makes sense, according to behavioral economics, that people purchase cryptocurrency because other people are doing so. Additionally, the outcome might herald the start of an informed investor's “pump and dump” approach, in which informed investors first boost their investment in the market in an effort to draw in uninformed investors, then drop the price by stifling demand.

Another behavioral explanation for the movement of the bitcoin price in pandemics is pastoral behavior or herd behavior, which is highly prevalent in times of distress. On the logical side, investors who think having access to liquidity is important could opt to hold bitcoins because they are widely available everywhere. Investors can then access their money whenever they want without having to rely on a centralized authority. Investors who have lost faith in banks and governments choose the cryptocurrency alternative because it eliminates their concern about government meddling. Bitcoin is the ideal money for organizations and people wishing to conduct quick and simple international transactions because all you need is an internet connection to buy and sell it. Additionally, during the past two years, engineers have consistently developed environmentally friendly, sustainable ways for bitcoin mining. These include bitcoin mining and hydroelectricity. These include bitcoin mining and hydroelectricity. The frequently criticized Bitcoin is currently creating technology based on renewable energy in a world where climate change has emerged as one of the most important issues for most businesses and people (<https://www.cultureliverpool.co.uk/news/how-bitcoin-is-handling-the-challenges-of-the-covid-19-pandemic/>). All of the aforementioned evidence supports the research claim that Bitcoin has become a safe-haven asset in times of crisis.

Conclusion

When bitcoin was first introduced in 2009, it was unclear exactly how and where it could be used. Large corporations are now accepting Bitcoin payments for a variety of their products and digital content, including Dell and Microsoft. Airlines, theater tickets, artisan beer, and other things are all available for purchase. Purchasing real estate and lodging, paying bar and restaurant bills, signing up for dating websites, purchasing gift cards, wagering at online casinos, and making charitable contributions are further alternatives. Additionally, there are a variety of internet markets that deal in everything from illegal drugs to expensive, luxury goods. The National Bank of Serbia advises citizens to use Bitcoin at their own risk in case of fraud or loss of investment because it is not accepted as a legitimate form of payment in Serbia. Given that trends propagate swiftly on the Internet, a worldwide network, Bitcoin will take off in Serbia at the same time as it does globally. More requirements must be completed, though, in order for this to occur.

Initial hypothesis testing revealed a statistically strong correlation between changes in Bitcoin price and gold prices, which can be used to forecast future changes in gold price based on changes in Bitcoin price. The fluctuation of the price of Bitcoin and the rise in the number of Bitcoin wallet users were shown to be significantly correlated, which unmistakably points to an expansion of commerce and a wider use of this currency. Theoretical analysis in this work demonstrates that one of the biggest beneficiaries of the coronavirus outbreak has been Bitcoin. This may mean that if institutions continue to invest in actual economic activity and consumers begin to spend again, the price of Bitcoin will decline when the economic rebound following COVID-19 comes to an end. Despite this, the epidemic seems to have established Bitcoin as a reliable investment option, and even while an eventual economic recovery would result in a fall, it is likely to continue to be appealing to investors for the foreseeable future.

The economic havoc caused by the pandemic and the mounting national debt that must eventually be paid are being reaped by Bitcoin and other cryptocurrencies. Even while Bitcoin is more widely used today than it was five years ago, individual investors should still proceed with caution because it is still a speculative investment. How severe the economic crisis is also demonstrated by the fact that the value of this currency rose as if it were a haven for some investors. In the near future, it will be interesting to watch if it keeps doing so.

How long bitcoin's growth will persist is difficult to predict due to the erratic nature of the cryptocurrency industry. It is undeniable that the epidemic has had a huge impact on consumer behavior. Given the speed at which the world is going digital, it seems likely that Bitcoin will continue to gain popularity as a currency among investors. Gold is still used to diversify enormous sums of money into several safe havens. This is not to imply that Bitcoin won't outperform gold in terms of price performance, but it is still too early to predict if Bitcoin will entirely displace gold as a safe haven asset.

In addition to all of this public enthusiasm, the macroeconomic instability brought on by COVID-19 has prompted numerous central banks to increase their money printing and enormous stimulus packages from governments all over the world. This might lead to higher inflation, which would lower people's purchasing power. Therefore, it comes as no surprise that even central banks are beginning to embrace cryptocurrency. Many additional nations, including China, Canada, the European Union, and Russia, either have central banks developing digital currencies for their nations or have made plans public. This is a blatant indication that the established financial elite believes cryptocurrencies will rule the future. In the meantime, the US federal regulator has declared that small- and medium-sized banks can now accept payments in stablecoins, which have connected cryptocurrencies to conventional currencies. A soccer team has declared that it will accept Bitcoin payments. The future of internet payment methods is Bitcoin. There will, though, continue to be a propensity for it to be mostly used by those who are into bitcoin and commit time and money they can afford to lose. Therefore, a greater portion of the coin will still be utilized to earn value while a smaller portion will be used to purchase goods and services.

There is no reason to stop Bitcoin from expanding to the point where it resembles a significant national currency. It goes without saying that legal restrictions must be placed on its use to prevent any abuses—including theft, fraud, and unlawful activity—from occurring. Technically speaking, it cannot be done and theoretically, it cannot be done. It's incredibly amazing and says a lot about the potential of this system that there are tiny nations in the globe with national economies that are weaker than Bitcoin. It is regarded as the gold of this century, but it still has a long way to go before gaining the same level of consumer trust that gold has.

What Bitcoin's future holds is yet unknown. Who is behind the Bitcoin phenomena, who is making money off of this plan, and whether it will succeed or fail are just a few of the many unanswered issues. Although many factors depend on governmental agencies, financial institutions, and end users who will determine the future of Bitcoin, no one can claim to have the final say in this situation. The risk of monetary instability rises as a result of electronic money's high efficiency. The subject of their impact on the conduct of monetary policy is raised due to the assumption of a quick growth in the usage of Internet currencies, with an increase in the level of security, economy, and willingness to accept them in the future. Due to the potential harm to the efficiency of monetary policy instruments and the reliability of the interpretation of current monetary indicators, their usage must be controlled and monitored. Monitoring the effects of the use of such currencies and their regulation will undoubtedly be one of the difficulties in the future for the central bank and national regulatory authorities. The regulation of cryptocurrencies like bitcoin and others, as well as their stability and security, will determine how these currencies develop in the future.

Since markets are not entities that are independent of economic movements, comparing the movements of observed currencies without placing them in the context of the attained degree of economic development has some limitations and does not provide a realistic picture. Given the turbulence in the Bitcoin market, it would be difficult to forecast how the price of gold will change based solely on the price of Bitcoin.

The ability to draw meaningful conclusions about the development of the perception of bitcoin as a “safe haven asset” among investors in the age of financial crises is constrained by the impossibility of a quantitative examination of the impact of behavioral economics on the movement of the price of bitcoin under pandemic conditions.

By incorporating more currencies, the full impact of the pandemic-related economic catastrophe may be shown. By extending the comparison analysis to include more currencies and/or a longer time span, future research possibilities may be possible.

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