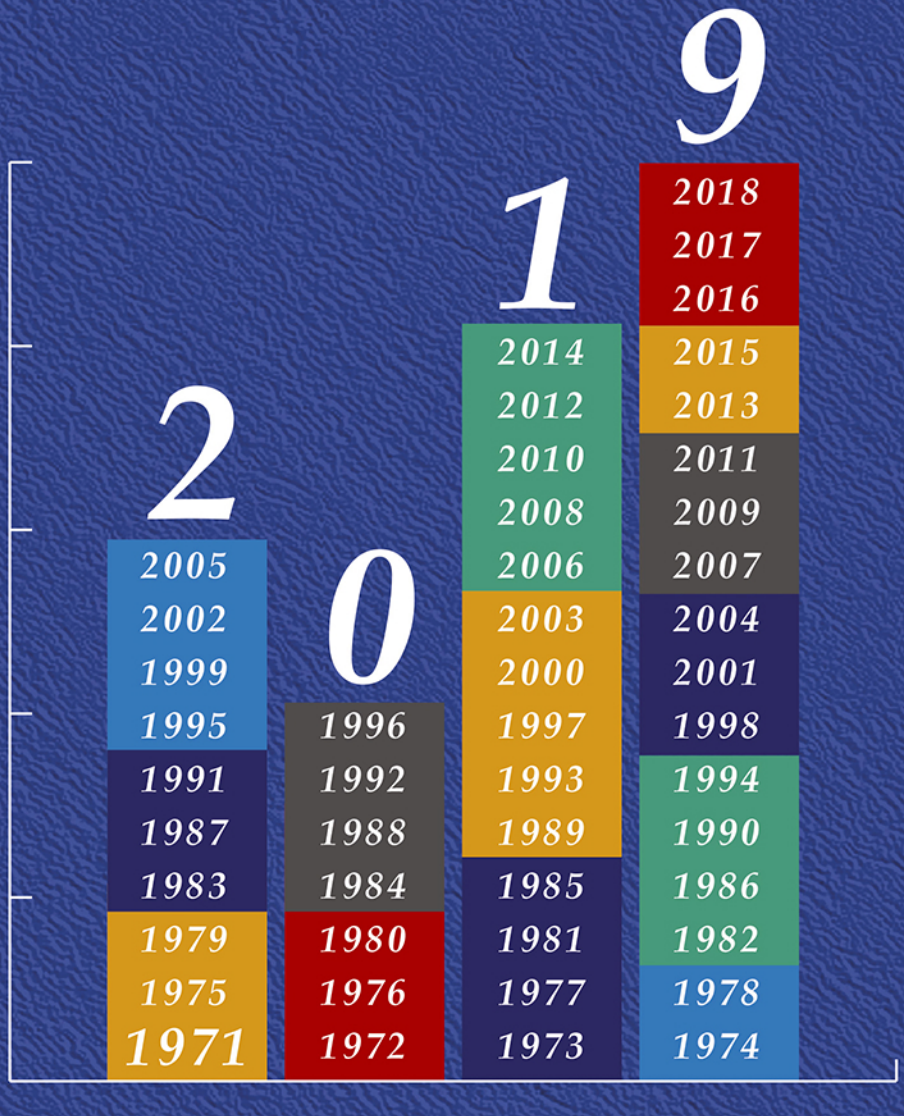
Udruženje banaka Srbije

Bankarstvo



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Nova knjiga u izdanju
Udruženja banaka Srbije:

PROGRES I KONFUZIJA

Stanje makroekonomske politike

Urednici: Olivije Blanšar, Raghuram Radžan, Kenet Rogof i Lorens H. Samers

U dvadeset sedam poglavlja ove knjige obrađeno je sedam tema: „nova normalnost“, finansijska regulativa, makroprudencijalna politika, monetarna politika, fiskalna politika, protok kapitala i upravljanje deviznim kursem, kao i međunarodni monetarni sistem.

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Edited by: Olivier Blanchard, Raghuram Rajan, Kenneth Rogoff, and Lawrence H. Summers

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Bankarstvo

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uvodnik

DIGITALNA TRANSFORMACIJA

Vladimir Vasić

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Uspešna digitalna transformacija zahteva razumevanje kako stvoriti vrednost u digitalnoj ekonomiji u okviru bankarske industrije, prepoznavanje okruženja i snaga koje iniciraju promene i pronalaženje postojećih sredstava koja se mogu koristiti kao osnova za inovacije u poslovnom modelu u banci.

Kako kaže Gartner, digitalizacija će učiniti da većina tradicionalnih finansijskih kompanija ne bude relevantna. Do 2030. godine, 80% tradicionalnih finansijskih firmi će prestati da posluje ili će postojati samo formalno. CEO-ovi kompanija koje pružaju finansijske usluge treba da podstaknu svoje organizacije na koherentniji odgovor na digitalni biznis.

Istovremeno, analize pokazuju da 70-80% digitalnih transformacija ne pomaže kompanijama u postizanju planiranih ciljeva. Veoma je važno razumeti promene u digitalnoj ekonomiji u bankarskoj industriji, ali i u opštem poslovno-privredno-ekonomskom okruženju, te na osnovu toga prilagoditi svoj poslovni model kako biste ostali relevantni vašim klijentima. To podrazumeva da:

- razumete uticaj digitalne ekonomije na banke;
- razumete način stvaranja vrednosti u digitalnoj ekonomiji;
- postanete digitalni lider – spremni za uvođenje inovacija i digitalne transformacije u bankarskoj industriji.

Da li je moguće sprovoditi digitalnu transformaciju u bankarstvu bez sagledavanja celokupnog sistema u kome poslujemo? Koliko je bitna digitalna ekonomija za uspešnu digitalnu transformaciju bankarstva? Kakve i kolike su nam sposobnosti za digitalnu transformaciju?

editorial

DIGITAL TRANSFORMATION

Vladimir Vasić

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Successful digital transformation demands the understanding of how to create value in the digital economy within the banking industry, recognise the environments and strengths which initialise changes, as well as how to identify the existing means which could be used as a basis for innovations in a bank's business model.

As Gartner pointed out, digitalisation will make most traditional financial companies irrelevant. By 2030, 80% of traditional financial companies will have stopped operating, or will only formally exist. CEOs of companies providing financial services should encourage their organisations towards a more coherent response to digital business.

Meanwhile, analyses show that 70-80% of digital transformations do not aid companies in reaching their set goals. It is highly important to understand the changes in digital economy within the banking industry and the general business-economic environment, and to, hence, adapt your business model in order to remain relevant to your clients. This requires the following:

- Understanding the influence of digital economy on banks;
- Understanding the creation of value in the digital economy;
- Becoming a digital leader – prepared to implement innovations and digital transformations in the banking industry.

Is it possible to carry out a digital transformation in banking without considering the overall system in which we operate? How important is the digital economy for a successful digital transformation of banking? What are our digital transformation capabilities?

Budući da će digitalna transformacija izgledati drugačije za svaku kompaniju, teško je odrediti definiciju koja se odnosi na sve. Međutim, generalno gledano, digitalnu transformaciju definišemo kao integraciju digitalne tehnologije u sve oblasti poslovanja, što rezultira temeljnim promenama u poslovanju preduzeća i njihovom pružanju vrednosti kupcima. Pored toga, neizbežan je i aspekt kulturološke promene koja zahteva od organizacija da neprestano izazivaju status quo, često eksperimentišu, pa čak i osete neuspeh. To ponekad podrazumeva udaljavanje od dugogodišnjih poslovnih procesa na kojima su kompanije izgrađene u korist relativno novih praksi koje se još definišu.

Definicija *The Agile Elephant* naglašava sve načine kojima će preduzeća možda morati da prilagode svoje postojeće prakse: „Digitalna transformacija uključuje promenu u vođstvu, drugačijem razmišljanju, podsticanju inovacija i novih poslovnih modela, koji uključuju digitalizaciju imovine i povećanu upotrebu tehnologije za poboljšanje iskustva zaposlenih, kupaca, dobavljača, partnera i zainteresovanih strana vaše organizacije."

Džim Svonson, izvršni potpredsednik grupe Johnson & Johnson, zadužen za digitalnu transformaciju, navodi: „U središtu svega su liderstvo i kultura. Mogli biste imati sve sastojke - kupce, proizvode i usluge, podatke i zaista kul tehnologije - ali ako vam vođstvo i digitalna kultura nisu u srcu, to neće uspeti. Razumevanje šta digitalno znači vašoj kompaniji - bez obzira da li ste finansijska, poljoprivredna, farmaceutska ili maloprodajna ustanova - od ključnog je značaja."

Zašto je digitalna transformacija bitna? Preduzeće može da preduzme digitalnu transformaciju iz više razloga. Ali daleko najverovatniji jeste taj što digitalna transformacija predstavlja pitanje opstanka za mnoge.

Pogledajmo samo S&P 500. Američke korporacije su 1958. godine na tom indeksu ostajale prosečno 61 godinu, prema podacima američke Enterprise fondacije. Do 2011. godine taj pokazatelj se spustio na 18 godina. Danas kompanije zamenjuju jedna drugu na S&P listi otprilike svake dve nedelje. Tehnologija je pokrenula ovaj pomak, a kompanije koje žele da uspeju moraju da razumeju kako spojiti tehnologiju sa strategijom.

Organizacije se nalaze na različitim stupnjevima na putu digitalne transformacije. Ali brzina je postala poslovni imperativ za sve. Poboljšanje korisničkog iskustva postalo je presudni cilj - a time i presudni deo digitalne transformacije. Kako izgleda okvir za digitalnu transformaciju? Iako digitalna transformacija varira u zavisnosti od specifičnih izazova i zahteva organizacije, postoji nekoliko konstanti i uobičajenih tema među postojećim studijama slučaja i objavljenim okvirima koje bi svi rukovodioci preduzeća trebalo da razmotre kada se upuste u digitalnu transformaciju. Primera radi, često se navode ovi elementi digitalne transformacije:

- Iskustvo korisnika
- Operativna agilnost
- Kultura i liderstvo
- Radna snaga
- Integracija digitalne tehnologije.

Digitalna transformacija je ogroman poduhvat, naročito za veće kompanije. Ako se izvrši ispravno, proizvešće posao koji je u većoj meri usklađen sa zahtevima kupaca i otporan u brzoj digitalnoj budućnosti.

Među top tehnologijama koje bi mogle da podstaknu uvođenje inovacija u poslovanje, prema jednom istraživanju učesnici navode: naprednu analitiku (53,7 posto), informacione sisteme u oblaku - cloud (51,2 posto), a velika pažnja posvećena je i digitalnoj sigurnosti (46,3 posto).

Tehnologija otvara brojne mogućnosti, ali i izazove, stvarajući neizvesnost za tradicionalne sektore i veštine. Zbog toga je kvalitetno obrazovanje krucijalno a sticanje novih znanja i veština neophodno za praćenje razvoja tehnologije.

Kako digitalna transformacija postaje sastavni deo današnjeg savremenog poslovanja, koliko je transformacija u preduzeću uspešna vidljivo je po rezultatima koje ostvaruje u svakom trenutku. U ovakvom poslovnom okruženju, koje je neizostavno globalizovano, virtuelno, dinamično i visoko konkurentno, strategijski pristup digitalnoj transformaciji poslovanja predstavlja gotovo jedini način da ovaj proces bude uspešno sproveden u svim organizacijama. Uspešnost donosi pozitivne pomake u poslovanju koji su izraženi kroz

Since digital transformation will appear different for each company, it is difficult to reach a definition that applies to everyone. However, generally speaking, we define digital transformation as the integration of digital technology into all areas of business, resulting in fundamental changes in the company's business and their delivery of value to customers. In addition, an aspect of cultural change is inevitable, requiring organisations to continually challenge the status quo, to experiment frequently, and even to experience failure. This sometimes involves moving away from the long-standing business processes on which companies were built in favour of relatively new practices that are still being defined.

The definition provided by The Agile Elephant highlights all the ways businesses may need to adapt their existing practices: "Digital transformation involves a change in leadership, a different mindset, fostering innovation and new business models, which include digitalising assets and increasing the use of technology to enhance the experience of employees, customers, suppliers, partners and stakeholders of your organisation."

Jim Swanson, EVP of Johnson & Johnson, in charge of digital transformation, states: "In the center of it all is leadership and culture. You could have all those things – the customer view, the products and services, data, and really cool technologies – but if leadership and culture aren't at the heart, it fails. Understanding what digital means to your company – whether you're a financial, agricultural, pharmaceutical, or retail institution – is essential."

Why is digital transformation important? A business can undertake digital transformation for a number of reasons. But by far the most likely answer is that digital transformation is, for many, a matter of survival.

Let us just look at the S&P 500. In 1958, US corporations remained on that index for an average of 61 years, according to the US Enterprise Foundation. By 2011, that indicator had dropped to 18 years. Today, companies replace one another on the S&P list about every two weeks. Technology has driven this shift, and companies that want to succeed must understand how to blend technology with strategy.

Organisations are at different stages on their path of digital transformation. But speed has become a business imperative for everyone. Improving the user experience is now a crucial goal - and thus a crucial part of digital transformation. What does a digital transformation framework look like? Although digital transformation varies depending on the specific challenges and demands of the organisation, there are several constants and common topics among existing case studies and published frameworks that all business executives should consider when embarking on a path to digital transformation. For example, these elements of digital transformation are often cited:

- User experience
- Operational agility
- Culture and leadership
- Work force
- Integration of digital technology.

Digital transformation is a huge undertaking, especially for larger companies. If done correctly, it will generate work that is more aligned with customer requirements and more resilient in the fast-paced digital future.

Among the top technologies that could drive innovation into business, according to one study, participants cited: advanced analytics (53.7 percent), cloud-based information systems (51.2 percent), and much attention was paid to digital security, as well (46.3 percent).

Technology opens up many opportunities but also challenges, creating uncertainty for traditional sectors and skills. Therefore, quality education is crucial and the acquisition of new knowledge and skills is necessary to monitor the development of technology.

As digital transformation is becoming an integral part of today's modern business, the success of a business transformation is evident from the results it produces at any given time. In such a business environment, which is inevitably globalised, virtual, dynamic and highly competitive, a strategic approach to digital business transformation is nearly the only way for this process to be successfully implemented in all organisations. Performance brings about positive business shifts that are expressed through quantitative factors and indicators, which are occasionally difficult to measure. Generally speaking, digital

kvantitativne faktore i indikatore, ponekad teško merljive. Generalno gledano, digitalna transformacija preduzećima, ali i državi, donosi inovacije, sposobnost rasta i razvoja i lakše komunikacije sa partnerima i svetom.

Uspešnost digitalne transformacije bankarske industrije u direktnoj je korelaciji sa digitalnom transformacijom preduzeća, države ali i sposobnosti krajnjih korisnika proizvoda i usluga da je razumeju i koriste.

Na samom kraju, sa napretkom tehnologije postavlja se i pitanje hoće li mašine i virtuelni identiteti zameniti ljude. To se neće dogoditi, jer će tražnja za visokoobrazovanom i kvalifikovanom radnom snagom uvek postojati, čak i porasti. Zbog toga broj zaposlenih ipak neće opadati u većoj meri, a najveći problem biće upravo nedostatak dovoljno stručnog kadra.

Glavni i odgovorni urednik
Vladimir Vasić

transformation brings innovation to businesses and the whole country, as well as the ability to grow, develop and facilitate communication with partners and the world.

The success of the digital transformation of the banking industry is directly correlated with the digital transformation of companies and the state, but also with the ability of end users of products and services to understand and use it.

Finally, with the advancement of technology, the question is often raised whether machines and virtual identities will replace humans. This will not happen, as the demand for a highly educated and skilled workforce will always exist, and will even increase. Therefore, the number of employees will not decrease to a greater extent, and the biggest problem will be the lack of sufficiently professional staff.

Editor-in-Chief
Vladimir Vasić

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PRIMJENA REGRESIONE ANALIZE U PROCJENI UTICAJA DIGITALIZACIJE I TEHNOLOŠKIH INOVACIJA NA TRI MJERE RAZVOJA PRIVREDE I DRUŠTVA

Prevod obezbedili autori

Rezime

Cilj rada je da se ispita korelacija između dostignutog nivoa tehnologije i inovacija i razvoja finansijskog tržišta, indeksa humanog razvoja i bruto domaćeg proizvoda po glavi stanovnika. Istraživačko pitanje glasi: „Da li su, i u kakvoj vezi, nivo tehnologije i inovacija sa indeksom razvijenosti tržišta, indeksom ljudskog razvoja i BDP-om po glavi stanovnika?" Cilj istraživanja je da utvrdimo da li ima osnova za verovanje da je „kopiranjem" određene zemlje po nivou digitalizacije i inovacija moguće dodatno razviti finansijsko tržište, uticati na nivo ljudskog razvoja ili na povećanje BDP-a po glavi stanovnika. Metode korištene u radu su regresiona analiza, odnosno prosta linearna regresija, te analiza i sinteza prethodnih istraživanja i teoretskih nalaza, da bi zaključci bili izvučeni metodom indukcije. Rad predstavlja doprinos autora ekonomskoj teoriji i praksi, te široj javnosti. Rezultati istraživanja još ukazuju i da bi bilo racionalno da finansijski posrednici u zemljama u razvoju razmotre izmjenu svojih poslovnih modela i mogućnosti za njihovo prilagođavanje ubrzanim tehnološkim promjenama.

Ključne reči: digitalizacija, inovacije, finansijska tržišta, FD indeks, HDI, BDP *per capita*

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THE USE OF REGRESSION ANALYSIS IN THE EVALUATION OF THE IMPACT OF DIGITALISATION AND TECHNOLOGICAL INOVATIONS IN THREE MEASURES OF THE DEVELOPMENT OF ECONOMY AND SOCIETY

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Summary

The objective of this paper is to examine the correlation between the achieved level of technology and innovations and the development of the financial market, index of human development and gross domestic product *per capita*. The research question reads: "Is the level of technology and innovations related to the market development index, the human development index and GDP *per capita*, and in what way?" The research objective is to determine whether there is a reason to believe that, by imitating a certain country in relation to the level of digitalisation and innovations, it is possible to further develop the financial market, affect the level of human development or the increase in GDP per capita. Methods used in this paper are regression analysis, i.e. simple linear regression, as well as the analysis and consolidation of preceding research and theoretical findings in order for conclusions to be drawn through an induction method. The paper represents the authors' contribution to the theory and application of economics, as well as to the wider public. The research results also indicate that it would be rational for financial intermediaries in developing countries to consider changing their business models and new possibilities for their adjustment to accelerated technological changes.

Keywords: digitalisation, innovations, financial markets, FD index, HDI, BDP *per capita*

JEL: D53, G15, O15, O16

Uvod

U protekla tri vijeka civilizacija je prošla kroz tri industrijske revolucije, dok je prema mišljenju vodećih svjetskih ekonomista u toku četvrta industrijska revolucija, ili kako se još popularno naziva i 4.0 industrija. Svaku od ovih industrijskih revolucija karakterisale su tehnološke inovacije koje su imale ključni uticaj na razvoj cjelokupnog čovječanstva. Industrija 4.0 već sada na različite načine utiče na sve poslovne aktivnosti, istovremeno razvijajući digitalne i ostale tehnologije, ali utiče i na cjelokupan stil života u svijetu. Nakon procesa globalizacije i povezivanja svijeta u jedno globalno tržište, koje je za posljedicu imalo nesmetano širenje poslovanja, započelo je novo doba koje možemo nazvati dobom digitalne transformacije. Osnovna karakteristika novog, digitalnog doba jeste što iz dana u dan poprima nove dimenzije i nove oblike. Ubrzan tehnološki razvoj, ekspanzija pametnih uređaja, omasovljavanje mobilnih uređaja kao neki od elemenata četvrte industrijske revolucije stavili su pred finansijske institucije izazove na koje su one odgovorile digitalizacijom, stvaranjem novih komunikacijskih kanala ka klijentima, kao i mnoštvom drugih inovativnih servisa (Šehović, 2017, 136).

Iako po svojoj strukturi, obliku poslovanja i ostalim karakteristikama, banke teže prihvataju promjene, ipak su u značajnoj mjeri svoje poslovanje prilagodile promjenama u poslovnom okruženju i samim tim usvojile i primjenile određene procese koje nameće proces digitalizacije. Kontinuirani proces kreiranja novih bankarskih proizvoda i usluga koji su direktno vezani za proces digitalizacije, jasan su znak da je bankarski sektor ozbiljno shvatio nadolazeće promjene. Ove promjene za posljedicu imaju i stvaranje konkurentske prednosti i bolje pozicije na tržištu. Prema shvatanju stručnjaka, tehnološke inovacije i klijenti će postaviti „nova pravila igre" u bankarskom sektoru (Ćukić, 2013), što će značajno uticati na banke, a posebno na one kod kojih je u velikoj mjeri izraženo tradicionalno bankarsko poslovanje (Tornjanski, V., Petrović, D., & Milanović, M., 2016). Da bi banke održale svoju konkurentnost, rast i razvoj, te kontinuirano stvarale vrijednost za korisnike bankarskih usluga i akcionare, menadžment banaka treba da shvati ove trendove, te da redefiniše postojeće strategije poslovanja (Fasnacht, 2009; Huo i Hong, 2013; Tornjanski i saradnici, 2014) i razvije nove modele za prikupljanje znanja, bez odlaganja.

Dosadašnja istraživanja pokazuju da finansijske institucije i stanovništvo imaju značajne prednosti od procesa digitalizacije i inovacija (Laursen i Salter, 2006; Fasnacht, 2009). S druge strane, uprkos tome što digitalizacija predstavlja važan korak za primjenu inovacija, u dosadašnjem naučnoistraživačkom fondu ne postoji dovoljno istraživanja o ovim procesima, odnosno o tome kako digitalizacija, inovacije i informaciono-komunikacione tehnologije doprinose performansama otvorenih inovacija u bankarstvu (Tornjanski et al., 2016). Imajući to u vidu, ovaj rad ima za cilj da produbi i proširi naučni fond o efektima digitalizacije i inovacija na finansijsko tržište i na stanovništvo, te da prikaže značaj ovih procesa.

Prva istraživačka hipoteza glasi: „Tehnologije i inovacije ne utiču na FD indeks."

Druga istraživačka hipoteza glasi: „Tehnologije i inovacije ne utiču na HDI."

Treća istraživačka hipoteza glasi: „Tehnologije i inovacije ne utiču na BDP *per capita*."

Prethodno istraživanje

Industrija 4.0 ili tzv. četvrta industrijska revolucija, odnosno digitalizacija industrije, već nekoliko godina je ključna tema u kojoj se traga za odgovorima kako privrede mogu da budu više konkurentne na globalnim tržištima (Mekinjić, 2019).

Suština industrije 4.0 je u novom pristupu, tj. umrežavanju pametnih digitalnih uređaja sa proizvodima, alatima, robotima i ljudima, dok su njen osnovni cilj pametne fabrike koje su prilagodljive i koje efikasno integrišu klijente i poslovne partnere u jedinstveni proces (Mekinjić, 2019). Na ovaj način bi se povećala produktivnost i efikasnost i time obezbijedila konkurentnost na globalnom tržištu. Jedna od zanimljivosti ove revolucije jeste što je ona zakazana unaprijed, tj. iz nužde usljed krize, recesije i usporavanja privredne aktivnosti, što je navelo vodeće države Evropske unije da traže

Introduction

In the past three centuries, civilization went through three industrial revolutions, while according to the opinion of the world's leading economists, the fourth industrial revolution is ongoing, the one popularly called the Industry 4.0. Each of these industrial revolutions was characterised by technological innovations that had a key impact on the development of the entire mankind. What is characteristic of the Industry 4.0 is that it already affects all business activities, in different ways, while simultaneously developing digital and other technologies, but also affecting the entire global lifestyle. After the process of globalization and intertwining of the world into one global market, which resulted in an unobstructed expansion of business, a new era began, which may be called the age of digital transformation. The basic characteristic of the new, digital age is that it takes on new dimensions and new forms, with each passing day. Accelerated technological development, the expansion of smart devices, and the mass production of mobile devices, as some of the elements of the fourth industrial revolution, have challenged financial institutions, which have responded with digitalisation, the creation of new communicative channels towards clients, as well as with a variety of other innovative services (Šehović, 2017, 136).

Although banks are less likely to accept changes due to their structure, line of business and other characteristic, they have largely adjusted their business to the changes in the business environment and, consequently, adopted and implemented certain processes imposed by the digitalisation process. The continuous process of creating new banking products and services which are directly linked to the digitalisation process, is a clear sign that the banking sector has seriously acknowledged the upcoming changes, which certainly result in the creation of a competitive advantage and a better position in the market. According to experts, technological innovations and clients will "set new rules of the game" in the banking sector (Ćukić, 2013), which will significantly affect banks, especially the ones in which traditional banking is prominent (Tornjanski, V., Petrović, D., & Milanović, M., 2016). In order for banks to retain their competitiveness, growth and development, and to continually create valuable products for banking service users, as well as shareholders, bank management should without any delays acknowledge these trends and redefine existing business strategies (Fasnacht, 2009; Huo & Hong, 2013; Tornjanski et.al., 2014) and develop new models for the expansion of knowledge.

Research so far indicates that financial institutions and the population largely benefit from the process of digitalisation and innovations (Laursen & Salter, 2006; Fasnacht, 2009). On the other hand, despite the digitalisation representing an important step in the application of innovations, there is not enough research on these processes in the existing body of scientific research, i.e. on how digitalisation, innovations and information and communication technologies contribute to the performances of open innovations in banking (Tornjanski et al., 2016). Bearing that in mind, this paper aims at deepening and expanding the body of research on the effects of digitalisation and innovations in the financial market and the population, along with indicating the significance of these processes.

The first research hypothesis reads: "Technology and innovations do not affect the FD index."

The second research hypothesis reads: "Technology and innovations do not affect the HDI."

The third research hypothesis reads: "Technology and innovations do not affect GDP *per capita*."

Previous Research

Industry 4.0 or the so-called fourth industrial revolution, i.e. industry digitalisation, has for a few years been the key topic explored in order to find answers to how economies can be more competitive in global markets (Mekinjić, 2019).

The essence of industry 4.0 is in a new approach, i.e. intertwining smart digital devices and products, tools, robots and people, while its basic objective are smart factories able to adjust and efficiently integrate clients and business partners into a unique process (Mekinjić, 2019).

odgovor kako da njihove ekonomije ojačaju globalnu konkurentnost. Prema istraživanjima koje je provela Evropska bankarska federacija (EBF, 2018) vjeruje se da će jedinstveno digitalno tržište pospješiti razvoj preduzeća koja posluju u ovom sistemu i služiće za dobrobit svih klijenata, daljeg ekonomskog rasta i daljeg zapošljavanja. Dakle, četvrta industrijska revolucija donijela je temeljite i suštinske promjene i rezultirala je potpuno novom ekonomijom - digitalnom ekonomijom (Lazarević, Đuričković 2018, 27).

Postoje tri glavne komponente digitalne ekonomije, i to (Lazarević, Đuričković 2018, 27):

- e-biznis infrastruktura (hardver, softver, telekomunikacione sisteme, mreže, ljudski kapital i sl.);
- e-biznis (fokus na to kako je realizovan/ obavljen posao, tj. bilo koji posao koji organizacija obavlja preko računara posredstvom mreže);
- e-trgovina (transfer robe, npr. kada se knjiga prodaje na mreži).

Istovremeno, OECD pod digitalnom ekonomijom podrazumijeva „zajednički naziv za opis tržišta fokusiranih na digitalnu tehnologiju". Ona uključuje trgovinu informacionim dobrima ili uslugama putem elektronske trgovine. To funkcioniše na slojevitim osnovama sa odvojenim segmentima za transport podataka i aplikacija.

Rezultati dosadašnjih istraživanja ukazuju na potrebu uvođenja koncepta otvorenih inovacija u bankarskom sektoru, odnosno na adekvatno inkorporiranje eksternog znanja u inovacione procese pomoću odgovarajućih tehnologija (Tornjanski, Petrović, & Milanović, 2016). U skladu sa tim, uloga banaka u ovoj tranformaciji jeste da ne budu samo inovativni partneri koji ulažu u inovativne finansijske tehnologije, nego da doprinesu ekonomskom rastu i razvoju na cjelokupnom finansijskom tržištu (Mekinjić, 2019).

Istovremeno, veliki broj autora se bavio procjenom uticaja finansijskog razvoja na ekonomski rast, nejednakost i ekonomsku stabilnost (Levine, 2005, Demirgüç-Kunt i Levine, 2009, i Dabla-Norris i Srivisal, 2013). Naime, finansijski sektori su se razvili širom svijeta i moderni finansijski sistemi su postali isprepleteni višedimenzionalnim procesima. Na primjer, dok su banke i dalje obično najveće i najvažnije na tržištu postoje i investicione banke, osiguravajuća društva, investicioni fondovi, penzioni fondovi, kompanije za ulaganje u rizični kapital i mnoge druge vrste nebankarskih finansijskih institucija koje dobijaju značajnu ulogu na finansijskom tržištu. S tim u vezi, finansijska tržišta su se razvila na načine koji omogućavaju pojedincima i firmama da diversifikuju svoju štednju, a kompanije mogu prikupljati novac putem akcija, obveznica i finansijskih derivata, zaobilazeći tradicionalna bankarska kreditiranja. Konstelacija takvih finansijskih institucija i tržišta olakšava pružanje finansijskih usluga. Osim toga, važna karakteristika finansijskih sistema je njihov pristup i efikasnost. Veliki finansijski sistemi imaju ograničenu upotrebu ako nisu dostupni dovoljno velikom broju stanovništva i firmi. Čak i ako su finansijski sistemi značajni i imaju širok doseg, njihov doprinos ekonomskom razvoju bio bi ograničen ako bi bili rasipni i neefikasni. Ovaj argument su izneli, na primjer, Čihak i dr. (2012) i Aizenman, Jinjarak i Park (2015). Prema tome, raznolikost finansijskih sistema u različitim zemljama podrazumijeva da je potrebno sagledati višestruke pokazatelje za mjerenje finansijskog razvoja. Na primjer, Grujić (2019) je istraživao uticaj strukture penzijskih fondova na razvijenost finansijskih tržišta po zemljama i pokazao da različite strukure penzionih fondova mogu da utiču na razvoj finansijskog tržišta.

Upravo odatle proizilazi cilj ovog istraživanja. Cilj je da se utvrdi da li je „kopiranjem" određene zemlje po nivou digitalizacije i inovacija moguće dodatno razviti finansijsko tržište, uticati na nivo ljudskog razvoja ili na povećanje BDP-a po glavi stanovnika. S tim u vezi, pod terminom „tržište u razvoju" podrazumijevamo zemlje koje odlikuju institucionalne turbulencije, nizak nivo korporativnog upravljanja i ekonomskog razvoja u odnosu na razvijene zemlje. Hoskisson i saradnici kao zemlje u tranziciji izdvajaju sve zemlje Zapadnog Balkana (Hoskisson et al. 2000, 249-267). Ilustracije radi, institucionalno nasljeđe komunizma na tim tržištima ogleda se kroz veliku, nedisciplinovanu i neefikasnu administraciju, birokratizovan pristup institucija i korupciju (Haramija i Njavro,

In this way, productivity and efficiency would increase and secure competitiveness in the global market.One of the interesting aspects of this revolution is that it was scheduled in advance, i.e. out of necessity due to the crisis, recession and slowdown of economic activities, which led leading countries in the European Union to search for a solution to strengthen their economies and global competitiveness. According to research conducted by the European Banking Federation (EBF, 2018), it is believed that a unique digital market will improve the development of companies performing business in this system and that it will be beneficial for all clients, further economic growth and further employment. Therefore, the fourth industrial revolution has brought thorough and essential changes and it has resulted in a completely new economics – digital economics (Lazarević, Đuričković 2018, 27).

There are three main components of digital economics (Lazarević, Đuričković 2018, 27):

- e-business infrastructure (hardware, software, telecoms, networks, human capital, etc.);
- e-business (a focus on how business is realised, i.e. any business performed by the organisation on a computer through a network);
- e-trade (transfer of goods, i.e. a book being sold online).

At the same time, OECD considers digital economics "an umbrella term for the description of markets focused on digital technology". It includes trade in information goods or services through electronic trade. It functions through a layered foundation with separate segments for the transport of data and applications.

The results of existing research indicate the need for introducing the concept of open-ended innovations in the banking sector, i.e. adequate incorporation of external knowledge into innovation processes through suitable technologies (Tornjanski, Petrović, & Milanović, 2016). In accordance with that, the role of banks in this transformation is not only to be innovative partners investing in innovative financial technologies, but also to contribute to the economic growth and development in the overall financial market (Mekinjić, 2019).

At the same time, a large number of authors were concerned with the evaluation of the impact of financial development on economic growth, inequality and economic stability (Levine, 2005, Demirgüç-Kunt & Levine, 2009, Dabla-Norris & Srivisal, 2013). Namely, financial sectors have developed across the world and modern financial systems have become permeated with multidimensional processes. For example, while banks are still usually the biggest and most important in the market, there are also investment banks, insurance companies, investment funds, pension funds, venture capital firms and many other non-bank financial institutions which are gaining an important role in the financial market. As a consequence of that, financial markets have developed in ways which enable individuals and companies to diversify their savings, while companies can collect money through shares, bonds and financial derivatives, circumventing traditional banking credit. The constellation of such financial institutions and markets simplifies the provision of such financial services. Besides that, an important characteristic of financial systems is their accessibility and efficiency. Large financial systems have a limited use if they are not accessible to a large enough number of population and companies. Even if financial systems are significant and have a wide scope, their contribution to economic development would be limited if they were wasteful and inefficient. This argument was presented, for example, in Čihak et al. (2012) and Aizenman, Jijarak & Park (2015). Therefore, the diversity of financial systems in different countries means that it is necessary to look at multiple indicators in order to measure financial development. For example, Grujić (2019) explored the impact of pension fund structure on the development of financial markets across countries and showed that different pension fund structures can affect the development of financial markets.

That is precisely where the objective of this research originates. The goal is to determine whether it is possible to further develop the financial market or influence the level of human development or the increase in GDP *per capita*, by imitating a certain country in the level of digitalisation and innovations. In relation to that, the term "developing market" includes countries

2016). Naime „birokratizovana i restriktivna vlast otvorila je put korupciji i mitu državnih službenika jer se većini građana činilo da je to jedini put do ostvarenja željenog cilja" (Dimitrova-Grajzl i Simon 2010, 206). Već i letimičan pregled zavoda za statistiku zemalja Zapadnog Balkana potvrđuje nastavak takve prakse odnosno rast zaposlenih oblastima koje se finansiraju iz budžeta: u administraciji, javnoj upravi, obrazovanju i umjetnosti. S druge strane, očigledno je smanjenje zaposlenih u prerađivačkoj industriji. Osim toga, relevantna istraživanja potvrđuju i visok nivo korupcije kao posljedicu komunističkog sistema u novim članicama EU u odnosu na „stare" članice (Transparency International 2016). Takođe, kada se posmatraju istraživanja povjerenja u institucije, zemlje u tranziciji su na dnu takvih listi (Bjørnskov 2007). Osim toga, u svim malim i otvorenim ekonomijama, poput država koje čine Zapadni Balkan, sposobnosti monetarne politike su ograničene brojnim faktorima (Benazić i Rami, 2016, 1039). Dakle, kritika tranzicije zasniva se na činjenici značajnog povećanja siromaštva i propadanja, uglavnom, srednjeg sloja (Cifrić 1996, 137).

Posmatrajući tržišta u razvoju zapaža se da, kao i u svim zemljama Zapadnog Balkana, tako i u Bosni i Hercegovini, neekonomski faktori u regiji igraju najvažniju ulogu u determinisanju vrijednosti trgovine između zemalja (Trivić i Klimczak 2015, 57). Ekonomska nestabilnost proizlazi iz „čestih reformi u kojima su potpuno zanemareni ekonomski rast i društveni uticaj promjena, niskih stopa domaćih i stranih ulaganja, spoljnotrgovinskog deficita i niske stope BDP-a" (Duvnjak, 2018, 198). U BiH postoji niz socijalno-ekonomskih pitanja koja još nisu riješena, a čije unapređenje podrazumijeva složena i zahtjevna rješenja (Amidžić et al. 2016, 57).

Indeks humanog razvoja je izabran kao zavisna varijabla jer on predstavlja rezultat traganja za jednom zajedničkom mjerom ekonomskog i socijalnog razvoja. Ovaj indeks je doprinos kvantifikaciji cjelokupnog socioekonomskog aspekta napretka, koji se odnosi na dostignuća zemlje u pogledu temeljnih dimenzija humanog razvoja. Ovaj razvoj uključuje tri temeljne dimenzije humanog razvoja, koje se odnose na mogućnosti koje ljudi očekuju da će postići. To su sljedeće dimenzije:

- očekivani životni vijek je postignut sposobnošću da se živi dug i zdrav život;
- postignuto obrazovanje se ostvaruje kroz sposobnost sticanja znanja;
- postignuti životni standard se ostvaruje kroz sposobnost da se obezbijedi pristojan prihod za život.

Promjene uvedene u HDR 2010. odnose se na izbor pokazatelja dimenzije, transformaciju u izračunu indeksa dimenzije, kao i metoda agregacije; GNI/*per capita* koristi se umjesto BDP/*per capita*.

Indeks humanog razvoja predstavlja kompromis između sveobuhvatnosti i mjerljivosti (Ghislandi, Sanderson, & Scherbov, 2019). Ovaj indeks koristi podatke vodećih svjetskih institucija, a posebna studija je provedena za procjenu prosječnih godina školovanja[1]. Pokazatelji su izračunati

Tabela 1. Sažeti pregled reformi humanog razvoja

Dimenzija	Pokazatelj	Max.	Min.	Pokazatelj	Max.	Min.
		Transformacija			Transformacija	
Dug i zdrav život	Očekivani životni vijek	85	25	Očekivani životni vijek	83,4 (Japan, 2011)	20
Znanje	Stopa pismenosti odraslih	100	0	Očekivane godine školovanja	18 (limitirano na maksimum)	0
	Kombinovani bruto odnos upisa u škole	100	0	Kombinovani bruto odnos upisa u škole	13,1 (Češka, 2005)	0
Pristojan životni standard	BDP/*per capita* (PPP US$)	40000	100	BDP/*per capita* (PPP US$)	107.721 (Katar, 2011)	100
Metodi agregacije	Aritmetička srednja vrijednost			Aritmetička srednja vrijednost		

Izvor: prilagođeno iz HDR 2010; posmatrani maksimum i minimum iz HDR 2011. str 168. i Fetahagić, M. (2013)
Aneks 1: Pokazatelji humanog razvoja za Bosnu i Hercegovinu

characterised by institutional turbulence, low level of corporative management and economic development in comparison with developed countries. Hoskisson and associates consider all the countries in Western Balkans as countries in transition (Hoskisson et al. 2000, 249-267). For illustration purposes, the institutional legacy of communism in those markets is reflected in large, undisciplined and inefficient of monetary policy is limited by numerous factors (Benazić & Rami, 2016, 1039). Hence, the criticism of transition is based on significant increase in poverty and deterioration of mostly middle class (Cifrić 1996, 137).

By observing developing markets it may be noted that, in both countries of the Western Balkans and Bosnia and Herzegovina, non-economic factors in the region play the most

Table 1. A Summarised Overview of Human Development Reforms

Dimension	Indicator	Max.	Min.	Indicator	Max.	Min.
		Transformation			Transformation	
A long and healthy life	Expected lifespan	85	25	Expected lifespan	83.4 (Japan, 2011)	20
Knowledge	Literacy rate in adults	100	0	Expected years of schooling	18 (limited to maximum)	0
	Combined gross ratio of enrolment in schools	100	0	Combined gross ration of enrolment in schools	13.1 (Czech Republic, 2005)	0
Decent standard of living	GDP/*per capita* (PPP US$)	40000	100	GDP/*per capita* (PPP US$)	107,721 (Qatar, 2011)	100
Aggregation methods	Arithmetic mean			Arithmetic mean		

Source: adapted from HDR 2010; observed minimum and maximum from HDR 2011, p. 168, and Fetahagić, M. (2013) Supplement 1: Indicators of Human Development for Bosnia and Herzegovina

administration, bureaucratic approach by institutions, as well as in corruption (Haramija & Njavro, 2016). Namely, "bureaucratic and restrictive governance enabled corruption and bribery of public officials because most citizens saw that as the only way of achieving the desired goal" (Dimitrova-Grajzl & Simon 2010, 206). Even a brief insight by bureaus of statistics in countries in Western Balkans confirms the continuation of such practice, i.e. an increase in the number of employees in budget financed fields: administration, public administration, education and art. On the other hand, it is obvious that there are fewer employees in the processing industry. Besides, relevant research also confirms a high level of corruption, as a consequence of the communist system, in new member states of the EU in comparison with the "old" member states (Transparency International 2016). In addition, when one observes research on the trust in institutions, countries in transition are at the bottom of such lists (Bjørnskov 2007). Besides, in all small and open-ended economies, such as in states constituting the Western Balkans, the capacity important role in determining the amount of trade between countries (Trivić & Klimczak 2015, 57). Economic instability is a consequence of "frequent reforms which completely disregard economic growth and the social impact of changes, low rates of domestic and foreign investments, foreign-trade deficit and low rate of GDP" (Duvnjak, 2018, 198). In BiH there is a number of social and economic issues which have still not been resolved, the improvement of which entails complex and demanding solutions (Amidžić et al. 2016, 57).

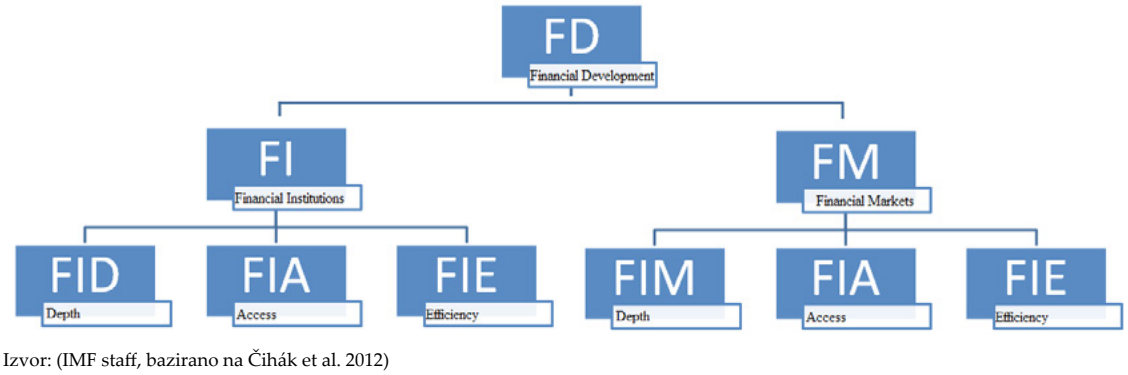
The human development index was chosen as a dependent variable because it represents the result of searching for a single common measure of economic and social development. This index is a contribution to the qualification of the overall socioeconomic aspect of progress, related to a country's accomplishments in relation to core dimensions of human development. This development includes three core dimensions of human development, related to possibilities which people expect to realise. Those are the following dimensions:

- the expected lifespan is achieved through

korištenjem nove metodologije za 2010. godinu, kao i metodologije iz 1980. To je osiguralo poređenje podataka između zemalja, kao i praćenje trendova.

Veliki broj autora se bavio procjenom uticaja finansijskog razvoja na ekonomski rast, nejednakost i ekonomsku stabilnost (Levine, 2005, Demirgüç-Kunt i Levine, 2009, i Dabla-Norris i Srivisal, 2013). Finansijski razvoj uključuje poboljšanja u funkcijama koje obezbjeđuju finansijski sistemi kao: (i) udruživanje štednje; (ii) izdvajanje kapitala za produktivne investicije; (iii) praćenje tih investicija; (iv) diversifikaciju rizika i (v) razmjena dobara i usluga (Levine, 2005). Svaka od ovih finansijskih funkcija može uticati na odluke o štednji i investicijama i na efikasnost raspodjele sredstava. Kao rezultat toga, finansije utiču na akumulaciju kapitala i ukupnu faktorsku produktivnost, tj. na tri faktora koji određuju ekonomski rast. U mjeri u kojoj finansijski razvoj smanjuje asimetrije informacija i finansijska ograničenja i promoviše podjelu rizika, razvoj može povećati sposobnost finansijskih sistema da apsorbuju šokove i smanje pojačavanje ciklusa kroz finansijski akcelerator (Bernanke, Gertler i Gilchrist 1999), smanjujući makroekonomsku volatilnost i nejednakost (Svirydzenka, 2016, 4).

Ilustracija 1. Piramida indeksa finansijskog razvoja (IMF staff, bazirano na Čihák et al. 2012)



Izvor: (IMF staff, bazirano na Čihák et al. 2012)

Većina empirijske literature od sedamdesetih godina prošlog vijeka približava finansijski razvoj dvjema mjerama finansijske dubine - odnosom privatnih kredita prema BDP-u i, u manjoj mjeri, kapitalizacijom tržišta akcija, također u odnosu sa BDP-om. Na primjer, u uticajnoj studiji na industrijskom nivou Rajan i Zingales (1998) koriste obje mjere kako bi pokazali da viši finansijski razvoj olakšava ekonomski rast. Na strani makroekonomske volatilnosti, Dabla-Norris i Srivisal (2013) smatraju da finansijski razvoj, mjeren privatnim kreditima prema BDP-u banaka i drugih finansijskih institucija, igra značajnu ulogu u ublažavanju nestabilnosti proizvodnje, potrošnje i rasta investicija, ali samo do određene tačke. Većina istraživača u ovoj oblasti koristi varijacije ovih mjera da ispita ulogu finansijskog sistema u ekonomskom razvoju.

Da bi se prevazišli nedostaci pojedinih indikatora kao zamjena za finansijski razvoj, kreirano je mnoštvo indeksa koji pokazuju kako su razvijene finansijske institucije i finansijska tržišta u smislu njihove dubine, pristupa i efikasnosti, što kulminira konačnim indeksom finansijskog razvoja (ilustracija 1). Ovaj indeks je prvobitno razvijen u kontekstu napomene MMF-a za diskusiju o osoblju „Preispitivanje finansijskog produbljivanja: stabilnost i rast na tržištima u razvoju“ (Sahay et al., 2015). Podindeksi i konačni ukupni indeks izgrađeni su za 183 zemlje na godišnjoj frekvenciji između 1980. i 2013. godine. Finansijski razvoj se definiše kao kombinacija dubine (veličina i likvidnost tržišta), pristupa (sposobnost pojedinaca i kompanija da pristupe finansijskim uslugama) i efikasnosti (sposobnost institucija da pružaju finansijske usluge uz niske troškove i održive prihode, i nivo aktivnosti tržišta kapitala). Ovaj

1 Izvori podataka: Life expectancy at birth: UNDESA (2009d); Average years of schooling: special study by Barro and Lee (2010) available on: http://www.nber.org/papers/w1590; Expected years of schooling: UNESCO Institute for Statistics (2010a); GNP/*per capita:* World Bank (2010g) i IMF (2010a).

the ability to live a long and healthy life;
- achieved education is realised through the ability to acquire knowledge;
- the achieved standard of living is reached through the ability to obtain a decent income for life.

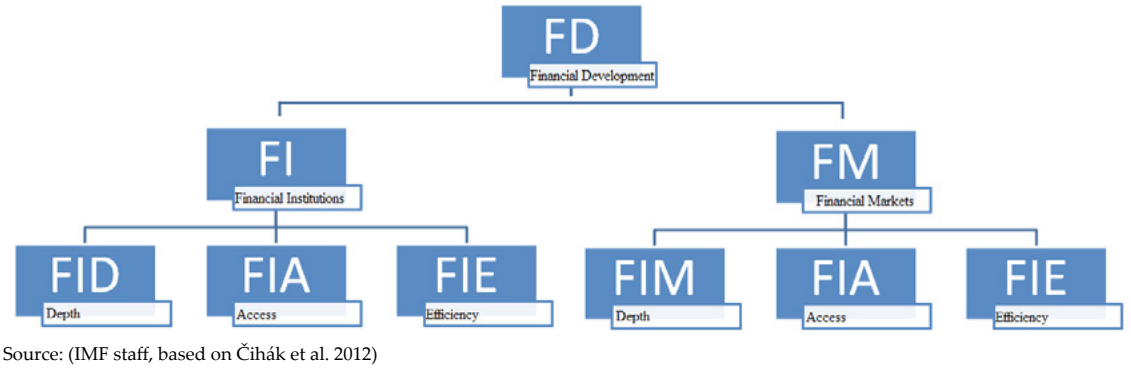
Changes introduced in HDR 2010 are related to the choice of dimension indicators, transformation in the calculation of the dimension index, as well as the aggregation method: GNI/*per capita* is used instead of GDP/*per capita.*

The human development index presents a compromise between inclusion and comparability (Ghislandi, Sanderson & Scherbov, 2019). This index uses data from the world's leading institutions, and a special study was conducted for the evaluation of average number of years of schooling[1]. The indicators were calculated by using new methodology for 2010, as well as methodology from 1980. That enabled the comparison of data between countries, as well as the monitoring of trends.

A large number of authors dealt with the evaluation of the impact of financial development on economic growth, inequality and economic instability (Levine, 2005, Demirgüç-Kunt & Levine, 2009, and Dabla-Norris & Srivisal, 2013). Financial development includes improvements in functions secured by financial systems, such as: (i) pooling of savings; (ii) allocating capital to productive investments; (iii) tracking those investments; (iv) diversification of risk; (v) exchange of goods and services (Levine, 2005). Each of these financial functions can affect decisions on savings and investments and the efficiency of allocation of assets. As a result, finances affect the accumulation of capital and the total factor productivity, i.e. the three factors determining economic growth. To the extent that financial development diminishes the asymmetries of information and financial limitation and promotes the distribution of risk, development may increase the capacity of financial systems to absorb shock and diminish the amplification of cycles through a financial accelerator (Bernanke, Gertler & Gilchrist 1999), while diminishing macroeconomic volatility and inequality (Svirydzenka, 2016, 4).

Most empirical literature from the seventies relates financial development with the two measures of financial depth – ratio of private credit to GDP and, to a lesser extent, the ratio of the capitalisation of the shares market, also to GDP. For instance, in an influential study at an industrial level Rajan & Zingales (1998) use both measures to show that a higher degree of financial development facilitates economic growth. As for macroeconomic volatility, Dabla-Norris & Srivisal (2013) consider that financial development, measured through private credit against GDP of banks and other financial institutions, plays a significant role in mitigating the instability of production, consumption and investment growth, but only to a certain extent. Most researchers in this field use variations of these measures to examine the role of the financial system in economic development.

Illustration 1. Pyramid of Indices of Financial Development (IMF staff, based on Čihák et al. 2012)



Source: (IMF staff, based on Čihák et al. 2012)

1 Sources of data: Life expectancy at birth: UNDESA (2009d); Average years of schooling: special study by Barro and Lee (2010) available on: http://www.nber.org/papers/w1590; Expected years of schooling: UNESCO Institute for Statistics (2010a); GNP/*per capita*: World Bank (2010g) and IMF (2010a).

široki multidimenzionalni pristup definisanju finansijskog razvoja prati matricu karakteristika finansijskog sistema koju je razvio Čihák sa saradnicima. (2012).

Imajući u vidu bogatstvo informacija o svojstvima finansijskog sistema - postoji 105 različitih indikatora u GFDD i 46 indikatora u FinStats - nije moguće pratiti sve ove različite pokazatelje pojedinačno, posebno u empirijskom radu. Čak i da je to bilo moguće, nijedan pojedinačni indikator, kada bi se koristio sam, ne bi pružio sveobuhvatno razumijevanje nivoa finansijskog razvoja. Podindeksi i konačni indeks povezuju ove različite pokazatelje i omogućavaju sveobuhvatnu procjenu pojedinih karakteristika finansijskih sistema i ukupnog nivoa finansijskog razvoja. Kao rezultat toga, indeksi dozvoljavaju da se utvrdi gdje su nedostaci u finansijskom razvoju nedoslijedni ili koji aspekti finansijskog razvoja utiču na makroekonomske rezultate, koji bi zatim mogli biti detaljnije istraženi koristeći raščlanjene podatke od FinStats ili GFDD.

U nastavku rada opisana metodologija je korištena za konstrukciju indeksa, uključujući izvore podataka, tretman nedostajućih vrijednosti, funkcionalnu formu i težine koje se koriste u agregaciji. On pokazuje kako se novi indeksi upoređuju sa tradicionalnim mjerama i ključnim stilizovanim činjenicama o finansijskom razvoju širom svijeta. U diskusiji ćemo se osvrnuti na neka ograničenja i nedostatke indeksa, s ciljem da pokažemo u kojoj mjeri struktura i veličina penzijskih fondova utiču na rezultat indeksa. Cilj je da utvrdimo da li je „kopiranjem" određene zemlje po strukturi i veličini indeksa moguće dodatno razviti finansijsko tržište. S tim u vezi kao termin „tržište u razvoju" podrazumijevamo zemlje koje odlikuju institucionalne turbulencije, nizak nivo korporativnog upravljanja i ekonomskog razvoja u odnosu na razvijene zemlje. Hoskisson i saradnici kao zemlje u tranziciji izvdajaju sve zemlje Zapadnog Balkana (Hoskisson et al. 2000, 249-267). Ilustracije radi, institucionalno nasljeđe komunizma na tim tržištima ogleda se kroz veliku, nedisciplinovanu i neefikasnu administraciju, birokratizovan pristup institucija i korupciju (Haramija i Njavro, 2016). Naime „birokratizovana i restriktivna vlast otvorila je put korupciji i mitu državnih službenika jer se većini građana činilo da je to jedini put do ostvarenja željenog cilja" (Dimitrova-Grajzl i Simon 2010, 206). Već i letimičan pregled zavoda za statistiku zemalja Zapadnog Balkana potvrđuje nastavak takve prakse, odnosno rast zaposlenih u oblastima koje se finansiraju iz budžeta: u administraciji, javnoj upravi, obrazovanju i umjetnosti. S druge strane, očigledno je smanjenje zaposlenih u prerađivačkoj industriji. Osim toga, relevantna istraživanja potvrđuju i visok nivo korupcije kao posljedicu komunističkog sistema u novim članicama EU u odnosu na „stare" članice. Takođe, kada se posmatraju istraživanja povjerenja u institucije, zemlje u tranziciji su na dnu takvih listi (Bjørnskov 2007). Osim toga, u svim malim i otvorenim ekonomijama, poput država koje čine Zapadni Balkan, sposobnosti monetarne politike su ograničene brojnim faktorima (Benazić i Rami, 2016, 1039). Dakle, kritika tranzicije zasniva se na činjenici značajnog povećanja siromaštva i propadanja, uglavnom, srednjeg sloja (Cifrić 1996, 137).

Podaci

Podatke o nivou tehnološkog razvoja i inovacija smo preuzeli iz publikacije *Readiness for the Future of Production Report* 2018, podatke za razvijenost tržišta iskazivali smo uz pomoć FD indeksa, a nivo indeksa humanog razvoja smo koristili iz podataka koje daje *United Nations Development Programme*. Osim toga, u radu smo

Tabela 2. Tabela-matrica međusobne korelacije sve četiri posmatrane promenljive (svaka sa svakom od zemalja OECD-a)

Opis	Skala po tehnologiji i inovacijama	FD Indeks	HD Indeks	BDP *per capita*
Skala po tehnologiji i inovacijama	1,00	0,37	0,72	0,44
FD Indeks	0,37	1,00	0,48	0,50
HD Indeks	0,72	0,48	1,00	0,76
BDP *per capita*	0,44	0,50	0,76	1,00

Izvor: Kalkulacija autora

In order to overcome the shortcomings of specific indicators as a replacement for financial development, a variety of indices have been created which indicate the level of development of financial institutions and markets regarding their depth, accessibility and efficiency, which culminates in the financial development index (illustration 1). This index was initially developed in the context of a remark by the IMF on the staff discussion note "Rethinking Financial Deepening: Stability and Growth in Emerging Markets" (Sahay et al., 2015). Sub-indices and the final total index were constructed for 183 countries at an annual frequency between 1980 and 2013. Financial development is defined as a combination of depth (market size and liquidity), accessibility (the ability of individuals and companies to access financial services) and efficiency (the ability of institutions to provide financial services at a low cost and sustainable income, as well as the level of activity in the capital market). This broad multidimensional approach to defining financial development follows the matrix of the features of financial system developed by Čihák et al. (2012).

Bearing in mind the wealth of information on the features of the financial system – there are 105 different indicators in GFDD and 46 indicators in FinStats – it is not possible to follow all these different indicators individually, especially in empirical work. Even if that were possible, no individual indicator, if used on its own, would provide a thorough understanding of the level of financial development. Sub-indices and the final index connect these different indicators and enable a thorough estimate of specific features of the financial system and the overall level of financial development. As a result, indices enable the determination of aspects in which flaws in financial development are inconsistent or aspects of financial development which affect macroeconomic results, which could in turn be explored in more detail by using the divided data from FinStats or GFDD.

In the remainder of the paper the described methodology is used for the construction of indices, including data sources, the treatment of missing values, functional form and weight used in aggregation. It indicates how the new indices are compared to traditional measures and key stylised facts on the financial development across the world. In the discussion we will look at some limitations and shortcomings of indices with the objective of demonstrating the extent to which the structure and size of pension funds affects the result of indices. The goal is to determine whether it is possible to further develop the financial market by imitating a certain country in terms of the structure and size of indices. Therefore, under the term "developing market" we mean countries characterised by institutional turbulence, low level of corporative management and economic development in relation to developed countries. Hoskisson and associates consider all the countries in Western Balkans as countries in transition (Hoskisson et al. 2000, 249-267). For illustration purposes, the institutional legacy of communism in those markets is reflected in large, undisciplined and inefficient administration, bureaucratic approach of institution, as well as in corruption (Haramija & Njavro, 2016). Namely, "the bureaucratic and restrictive governance enabled corruption and the bribery of public officials because most citizens saw that as the only way of achieving the desired goal" (Dimitrova-Grajzl & Simon 2010, 206). Even a brief insight by bureaus of statistics in countries in Western Balkans confirms the continuation of such practice, i.e. an increase in the number of employees in fields being financed from the budget: administration, public administration, education and art. On

Table 2. Table-Matrix of the Correlation of all Four Observed Variables (each country of OECD with the others)

Description	Scale according to technology and innovations	FD Index	HD Index	GDP *per capita*
Scale according to technology and innovations	1.00	0.37	0.72	0.44
FD Index	0.37	1.00	0.48	0.50
HD Index	0.72	0.48	1.00	0.76
GDP *per capita*	0.44	0.50	0.76	1.00

Source: Authors' calculation

Tabela 3. Tabela-matrica međusobne korelacije sve četiri posmatrane promenljive (svaka sa svakom od zemalja koje nisu iz OECD-a)

Opis	Skala po tehnologiji i inovacijama	FD Indeks	HD Indeks	BDP *per capita*
Skala po tehnologiji i inovacijama	1,00	0,50	0,69	0,67
FD Indeks	0,50	1,00	0,59	0,59
HD Indeks	0,69	0,59	1,00	0,90
BDP *per capita*	0,67	0,59	0,90	1,00

Izvor: Kalkulacija autora

posmatrali podatke koje su dali *The National Bureau of Economic Research* za BDP *per capita*. (2019), Organizacija za ekonomsku saradnju i razvoj za FD Indeks (2019) Svjetski ekonomski forum za podatke o digitalitaciji i inovacijama (*World Economic Forum* 2018) i Međunarodni monetarni fond za BDP *per capita* (2019).

Metodologija

U radu smo posmatrali podatke koje su dali *The National Bureau of Economic Research* (2019), Organizacija za ekonomsku saradnju i razvoj (2019), Svjetski ekonomski forum (*World Economic Forum* 2018), te BDP po glavi stanovnika koji je objavio Međunarodni monetarni fond (2019). Za svaku posmatranu zemlju smo uzeli u obzir nivo digitalizacije i uporedili smo ga sa FD indeksom, HD indeksom i BDP-om po glavi stanovnika u 2018. godini.

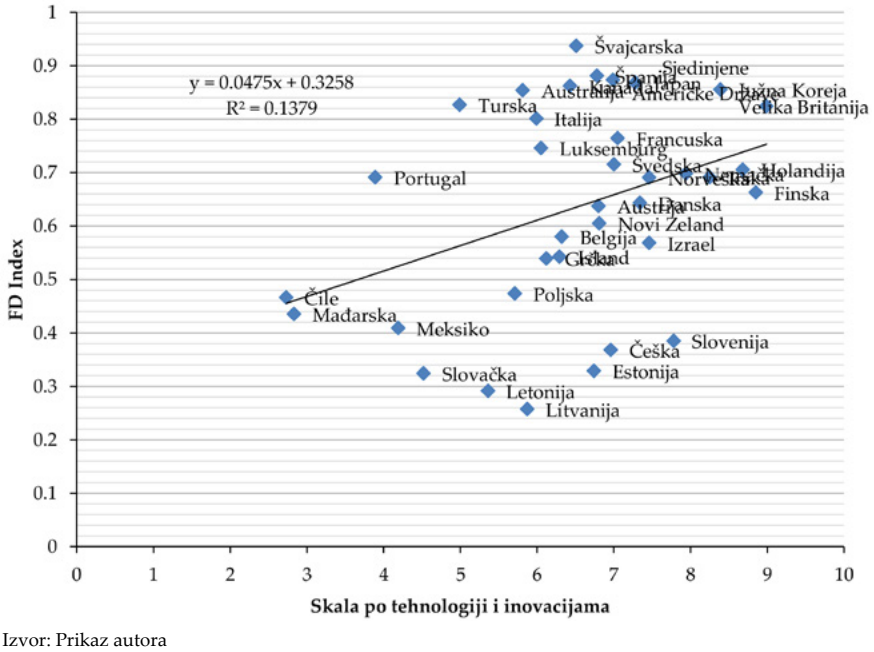
Vezu između ostvarenih stopa neizmirenja i makroekonomskih pokazatelja možemo proveravati na više načina. Linearnu regresiju smo koristili jer smo pretpostavili da postoji linearni odnos između nezavisne varijable (X) i zavisne varijable (Y). Hipoteze smo

Tabela 4. Regresiona analiza podataka za nivo digitalizacije i FD indeksa za zemlje OECD-a

Regression Statistics	
R Square	0,137909875
Adjusted R Square	0,112554283
Standard Error	0,183122067
Observations	36
Regression coefficient	0,047510826
Standard Error	0,020371911
F	5,439031952
Significance F	0,02575015
F crit	2,23977317
Test	ne možemo odbaciti

Izvor: Kalkulacija autora

Ilustracija 2. Prikaz korelacije i determinacije digitalizacije i inovacija i FD indeksa po zemljama OECD-a



Izvor: Prikaz autora

the other hand, it is obvious that there are fewer employees in the processing industry. Besides, relevant research also confirms a high level of corruption as a consequence of the communist system in new member states of the EU in comparison with the "old" member states. In addition, when one observes research on the trust in institutions, countries in transition are at the bottom of such lists (Bjørnskov 2007). Besides, in all small and open-ended economies, such as in states constituting the Western Balkans, the capacity of monetary policy is limited by numerous factors (Benazić & Rami, 2016, 1039). Hence, the criticism of transition is based on significant increase in poverty and deterioration of mostly middle class (Cifrić 1996, 137).

Table 3. Table-Matrix of Correlation of all Four Observed Variables (each country not in OECD with the others)

Description	Scale according to technology and innovations	FD Index	HD Index	GDP *per capita*
Scale according to technology and innovations	1.00	0.50	0.69	0.67
FD Index	0.50	1.00	0.59	0.59
HD Index	0.69	0.59	1.00	0.90
GDP *per capita*	0.67	0.59	0.90	1.00

Source: Authors' calculation

Table 4. Regression Analysis of Data for the Level of Digitalisation and FD Index for Countries of OECD

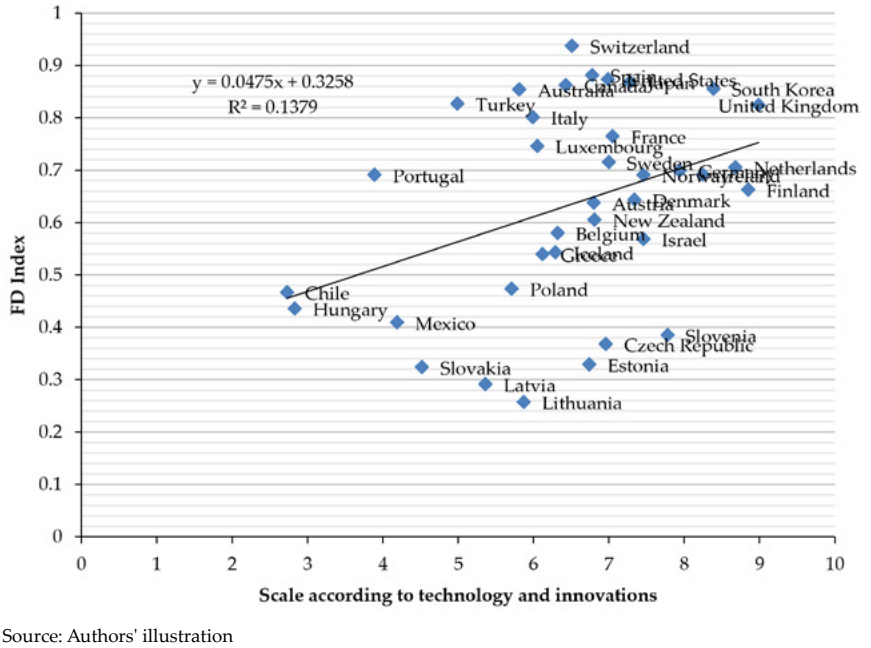
Regression Statistics	
R Square	0.137909875
Adjusted R Square	0.112554283
Standard Error	0.183122067
Observations	36
Regression Coefficient	0.047510826
Standard Error	0.020371911
F	5.439031952
Significance F	0.02575015
F crit	2.23977317
Test	cannot be dismissed

Source: Authors' calculation

Data

Data on the level of technological development and innovations were taken from the publication *Readiness for the Future of Production Report* 2018, data on the market development were expressed through FD index, and the level of human development index was found in data from

Illustration 2. An Overview of Correlation and Determination of Digitalisation and Innovations and FD Index by Countries in OECD



Source: Authors' illustration

postavili kao:
H0 - nul-hipoteza = negacijska
H1 - alternativna = afirmacijska

S tim u vezi, istraživačko pitanje je postavljeno tako da se ispituje da li pojava X utiče na pojavu Y. Prema tome, hipoteze su:
$H0_1$: Tehnologije i inovacije ne utiču na FD indeks.
$H0_2$: Tehnologije i inovacije ne utiču na HDI.
$H0_3$: Tehnologije i inovacije ne utiču na BDP *per capita*.

Rezultati

Analizirajući odnos digitalizacije i inovacija po zemljama OECD-a i FD indeksa dobili smo tabelu 4.

R kvadrat (R^2) jednak je 0,137910. To znači da nezavisna varijabla (varijabla X - nivo digitalizacije i inovacija) objašnjava 13,8% varijable Y - FD indeks. Drugim riječima, digitalizacija i inovacije utiču oko 13,9% na razvijenost finansijskog tržišta. Koeficijent višestruke korelacije (R) jednak je 0,371362188, što znači da postoji slaba direktna veza između nezavisne i zavisne varijable.

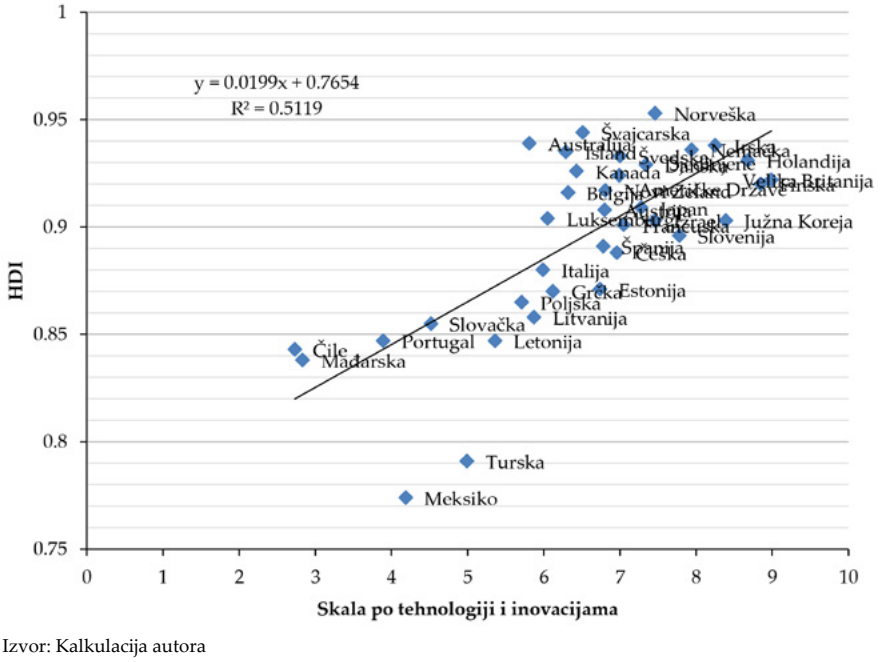
S obzirom na to da je p vrijednost od 0,02575015 veća od 0,01, sa sigurnošću od 99% ne možemo da odbacimo hipotezu da „tehnologije i inovacije ne utiču na FD indeks" i možemo da zaključimo da „nivoi digitalizacije i inovacija ne stoje u statistički značajnoj vezi sa FD indeksom".

Tabela 5. Regresiona analiza podataka za nivo digitalizacije i HD indeksa za zemlje OECD-a

Regression Statistics	
R Square	0,51194416
Adjusted R Square	0,49758958
Standard Error	0,03002224
Observations	36
Regression coefficient	0,019945743
Standard Error	0,003339906
F	35,66415996
Significance F	9,36524E-07
F crit	2,23977317
Test	odbacujemo

Izvor: Kalkulacija autora

Ilustracija 3. Prikaz korelacije i determinacije digitalizacije i inovacija i HD indeksa po zemljama OECD-a



Izvor: Kalkulacija autora

Međutim, kada posmatramo odnos digitalizacije i inovacija po zemljama OECD-a i HD indeks dobijamo tabelu 5.

R kvadrat (R^2) jednak je 0,5119. To znači da nezavisna varijabla (varijabla X – nivo digitalizacije i inovacija) objašnjava 51,2% varijable Y – HD indeks. Drugim riječima,

Table 5. Regression Analysis of Data on the Level of Digitalisation and HD Index for Countries of OECD

Regression Statistics	
R Square	0.51194416
Adjusted R Square	0.49758958
Standard Error	0.03002224
Observations	36
Regression coefficient	0.019945743
Standard Error	0.003339906
F	35.66415996
Significance F	9.37E-07
F crit	2.23977317
Test	dismissed

Source: Authors' calculation

the United Nations Development Programme. Besides, in the paper we have observed data given by the National Bureau of Economic Research for GDP *per capita* (2019), Organisation for Economic Co-operation and Development for FD index (2019), The World Economic Forum for data on digitalisation and innovations (2018) and International Monetary Fund for GDP *per capita* (2019).

(2019), the Organisation for Economic Co-Operation and Development (2019), the World Economic Forum (2018) and the International Monetary Fund for GDP *per capita* (2019). For each country we considered the level of digitalisation and compared it to the FD index, HD index and GDP *per capita* in 2018.

The relationship between the realised rates of non-payment of liabilities and macroeconomic indicators may be checked in several ways. We used linear regression because we supposed that there is a linear relationship between the independent variable (X) and dependent variable (Y).

Hypotheses were constructed in the following manner:

H0 - null-hypothesis 0 = negative

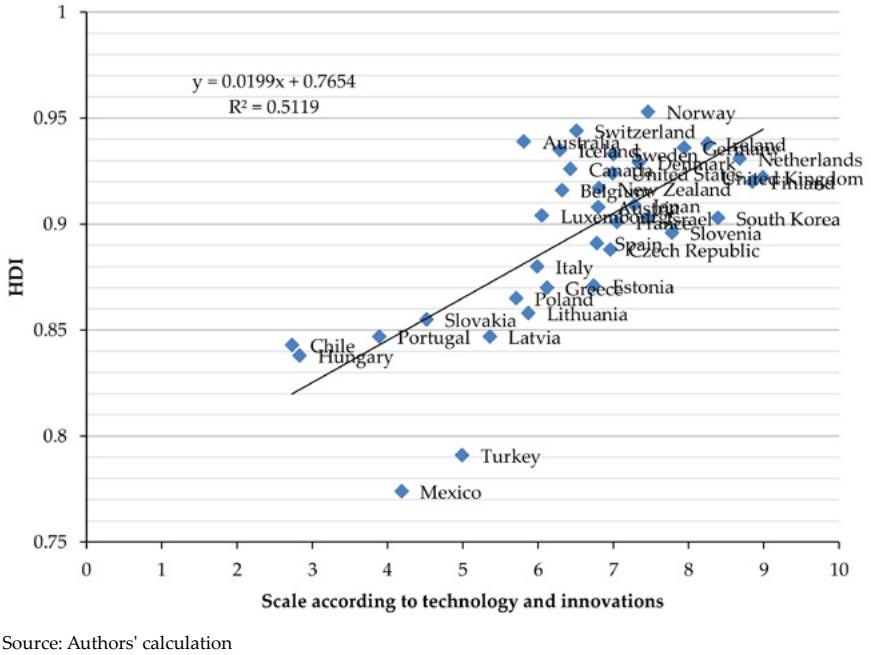
H1 - alternative = affirmative

In relation to that, the research question was formulated so as to ask whether variable X affects the variable Y. Therefore, the hypotheses are:

$H0_1$: Technologies and innovations do not affect the FD index.

$H0_2$: Technologies and innovations do not affect

Illustration 3. An Overview of Correlation and determining Digitalisation and Innovations and HD Index by Countries of OECD



Source: Authors' calculation

Methodology

In the paper we have observed the data given by the National Bureau of Economic Research

the HDI.

$H0_3$: Technologies and innovations do not affect GDP *per capita*.

Tabela 6. Regresiona analiza podataka za nivo tehnoloških inovacija i BDP *per capita*

Regression Statistics	
R Square	0,1950785
Adjusted R Square	0,1714043
Standard Error	21767,555
Observations	36
Regression coefficient	6951,3334
Standard Error	2421,5908
F	8,2401428
Significance F	0,0070014
F crit	2,2397732
Test	odbacujemo

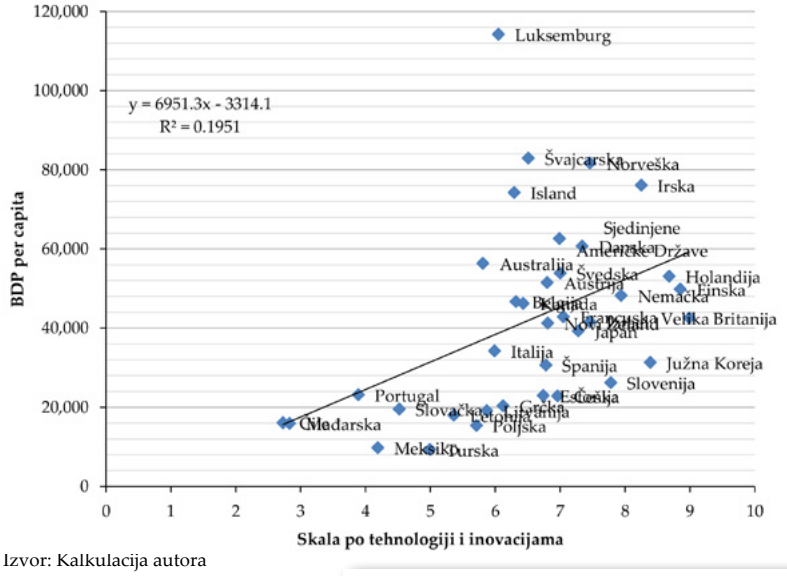
Izvor: Kalkulacija autora

Tabela 7. Regresiona analiza podataka za nivo tehnoloških inovacija i FDI u slučajnom uzorku zemalja van OECD-a

Regression Statistics	
R Square	0,2459
Adjusted R Square	0,212237
Standard Error	0,155548
Observations	24
Regression coefficient	0,06524
Standard Error	0,024319
F	7,19658
Significance F	0,013597
F crit	2,737849
Test	ne možemo odbaciti

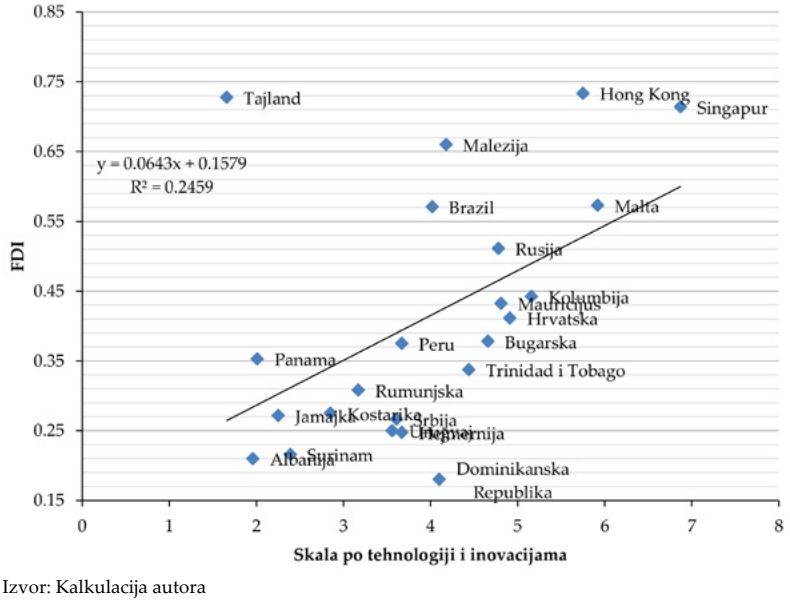
Izvor: Kalkulacija autora

Ilustracija 4. Prikaz korelacije i determinacije digitalizacije i inovacija i BDP *per capita* po zemljama OECD-a



Izvor: Kalkulacija autora

Ilustracija 5. Prikaz korelacije i determinacije digitalizacije i inovacija i FD indeksa u slučajnom uzorku zemalja van OECD-a



Izvor: Kalkulacija autora

Table 6. Regression Analysis of Data for the Level of Technological Innovations and GDP *Per Capita*

Regression Statistics	
R Square	0.1950785
Adjusted R Square	0.1714043
Standard Error	21767.555
Observations	36
Regression coefficient	6951.3334
Standard Error	2421.5908
F	8.2401428
Significance F	0.0070014
F crit	2.2397732
Test	dismissed

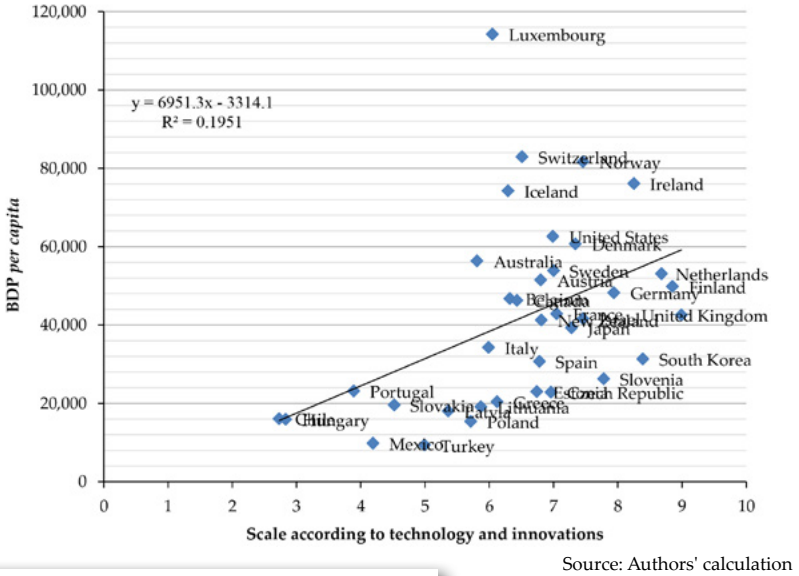
Source: Authors' calculations

Table 7. Regression Analysis of Data on the Level of Technological Innovations and FDI in a Random Sample of Countries Outside OECD

Regression Statistics	
R Square	0.2459
Adjusted R Square	0.212237
Standard Error	0.155548
Observations	24
Regression coefficient	0.06524
Standard Error	0.024319
F	7.19658
Significance F	0.013597
F crit	2.737849
Test	cannot be dismissed

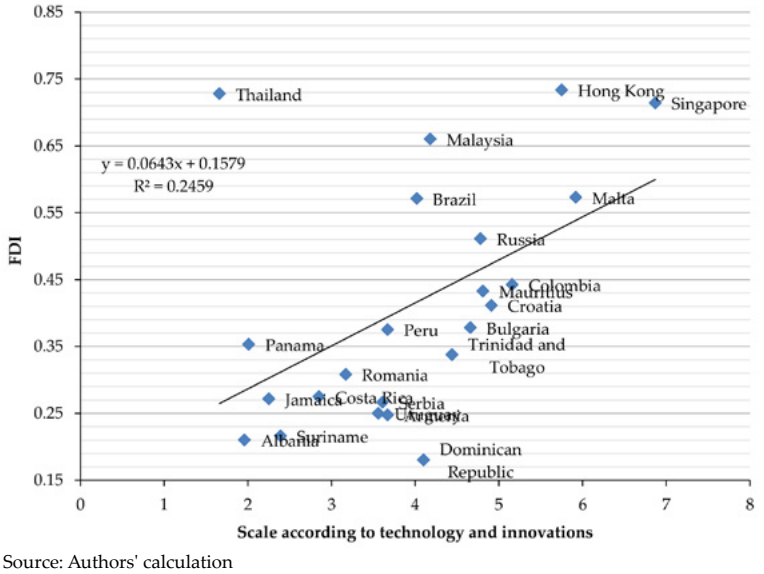
Source: Authors' calculation

Illustration 4. An Overview of Correlation and Determination of Digitalisation and Innovations and GDP Per Capita Across Countries of OECD



Source: Authors' calculation

Illustration 5. An Overview of Correlation and Determining Digitalisation and Innovations and FD Index in a Random Sample of Countries Outside the OECD



Source: Authors' calculation

Tabela 8. Regresiona analiza podataka za nivo tehnoloških inovacija i HDI u slučajnom uzorku zemalja van OECD-a

Regression Statistics	
R Square	0,4739
Adjusted R Square	0,450583
Standard Error	0,040733
Observations	24
Regression coefficient	0,028382
Standard Error	0,006368
F	19,86252
Significance F	0,000198
F crit	2,737849
Test	odbacujemo

Izvor: Kalkulacija autora

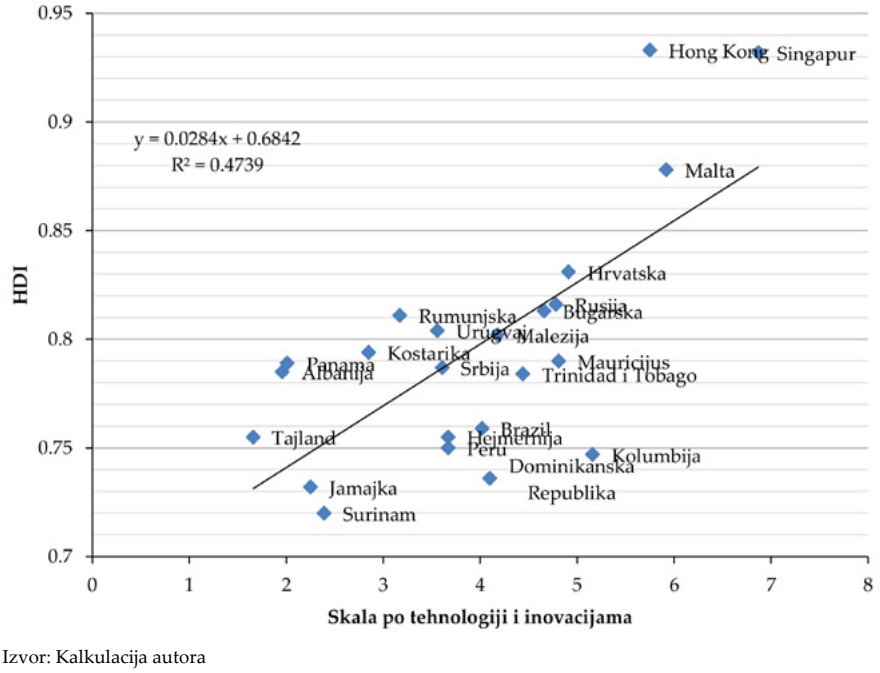
digitalizacija i inovacije utiču oko 52,2% na nivo indeksa humanog razvoja u zemlji. Koeficijent višestruke korelacije (R) jednak je 0,7155027 što znači da postoji jaka direktna veza između nezavisne i zavisne varijable. Na ovom mjestu možemo ponuditi argumente za uzročno-posljedičnu vezu u oba smjera za sve promenljive i digitalizaciju. Na primjer, BDP stvara uslove za razvoj digitalizacije, dok digitalizacija privrede pospešuje rast BDP, što omogućava više izdvajanja za, recimo, školovanje koje podiže indeks ljudskog razvoja, dok školovanje utiče i na BDP i na digitalizaciju. Veza sa finansijskim razvojem je manje očigledna.

S obzirom na to da je p vrijednost 0.0000009365 značajno manja od 0,01 sa sigurnošću od 99% možemo da odbacimo hipotezu da „tehnologije i inovacije ne utiču na HD indeks" i da zaključimo da nivo digitalizacije i inovacija stoje u vezi sa FD indeksom pod pretpostavkom nepromjenjenih ostali varijabli.

Dalje, kada posmatramo odnos digitalizacije i inovacija po zemljama OECD-a i BDP *per capita* dobijamo podatke iz tabele 6.

Nakon ponavljanja provjere hipoteze navedenih testova dolazimo do istovjetnih zaključaka: ne možemo odbaciti prvu hipotezu, a odbacujemo drugu i treću hipotezu sa sigurnošću od 99%. Prema tome, tehnologije i inovacije ne utiču na FD indeks, ali utiču na HDI i na BDP *per capita*. Pokazali smo da postoji slaba veza odnosno slaba korelacija (0,49%) između nivoa digitalizacije i inovacija i FD indeksa, a postoji determinacija od oko 24,65%. Međutim, pokazali smo da postoji snažna korelacija između nivoa digitalizacije i inovacija i HD indeksa (korelacija od oko 68,88% i determinacija od oko 47,45%), te

Ilustracija 6. Regresiona analiza podataka za nivo tehnoloških inovacija i HDI indeksa u slučajnom uzorku zemalja van OECD



Izvor: Kalkulacija autora

Results

By analysing the relation between digitalisation and innovations across countries of OECD and FD index, we have obtained the table 4.

R squared (R^2) equals 0.137910. That means that the independent variable (variable X – the level of digitalisation and innovations) explains 13.8% of variable Y – FD index. In other words, digitalisation and innovations affect around 13.9% of the financial market development. The multiple correlation coefficient (R) equals 0.371362188 which means that there is a weak direct relation between the independent and dependent variable.

Considering that the p value of 0.02575015 is higher than 0.01, with a 99% certainty we cannot dismiss the hypothesis that "technology and innovations do not affect the FD index" and we can conclude that the "levels of digitalisation and innovations is not in a statistically significant relation with the FD index".

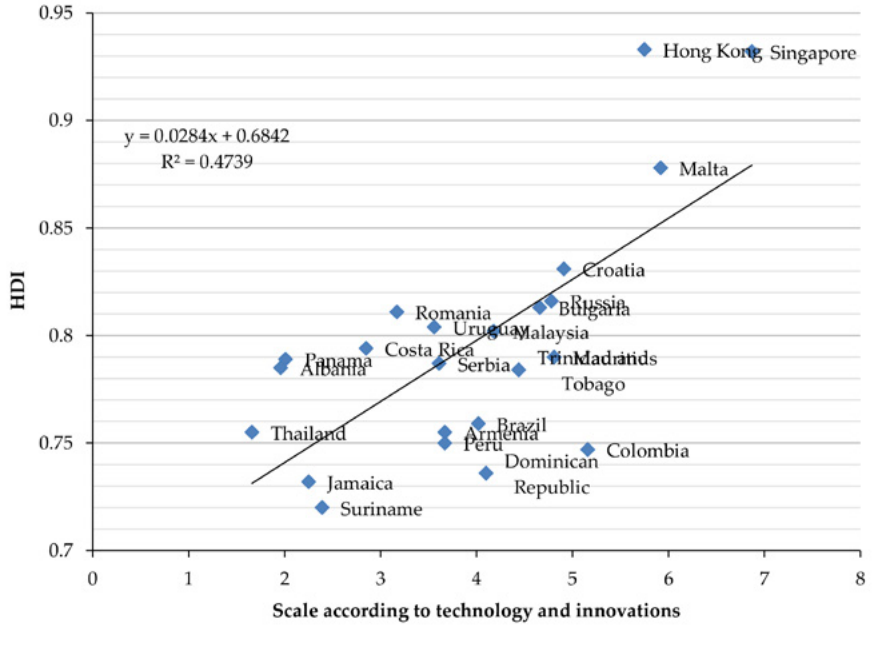
Table 8. Regression Analysis of Data on the Level of Technological Innovations and HDI in a Random Sample of Countries Outside the OECD

Regression Statistics	
R Square	0.4739
Adjusted R Square	0.450583
Standard Error	0.040733
Observations	24
Regression coefficient	0.028382
Standard Error	0.006368
F	19.86252
Significance F	0.000198
F crit	2.737849
Test	dismissed

Source: Authors' calculation

51.2% of variable Y – HD index. In other words, digitalisation and innovations affect the level of human development index in a country, in the degree of about 52.2%. The multiple correlation coefficient (R) equals 0.7155027 which means that there is a strong direct relationship between

Illustration 6. Regression Analysis of Data on the Level of Technological Innovations and HDI in a Random Sample of Countries Outside the OECD



Source: Authors' calculation

However, when we look at the relation between digitalisation and innovations by countries of OECD and the HD index, we obtain the table 5.

R squared (R^2) equals 0.5119. That means that the independent variable (variable X – level of digitalisation and innovations) accounts for

the independent and the dependent variable. At this moment we can offer arguments for the cause-and-effect relationship in both directions, for all variables and digitalisation. For example, GDP creates conditions for the development of digitalisation, while the digitalisation of economy facilitates the growth of GDP, enabling more assets

Tabela 9. Regresiona analiza podataka za nivo tehnoloških inovacija i BDP *per capita* u slučajnom uzorku zemalja van OECD-a

Regression Statistics	
R Square	0,4527
Adjusted R Square	0,428576449
Standard Error	10772,48644
Observations	24
Regression coefficient	0
Standard Error	0
F	18,25035364
Significance F	0,00031045
F crit	2,737849206
Test	odbacujemo

Izvor: Kalkulacija autora

nivoa digitalizacije i inovacija i BDP-a *per capita* (korelacija od oko 67,34% i determinacija od oko 45,34%).

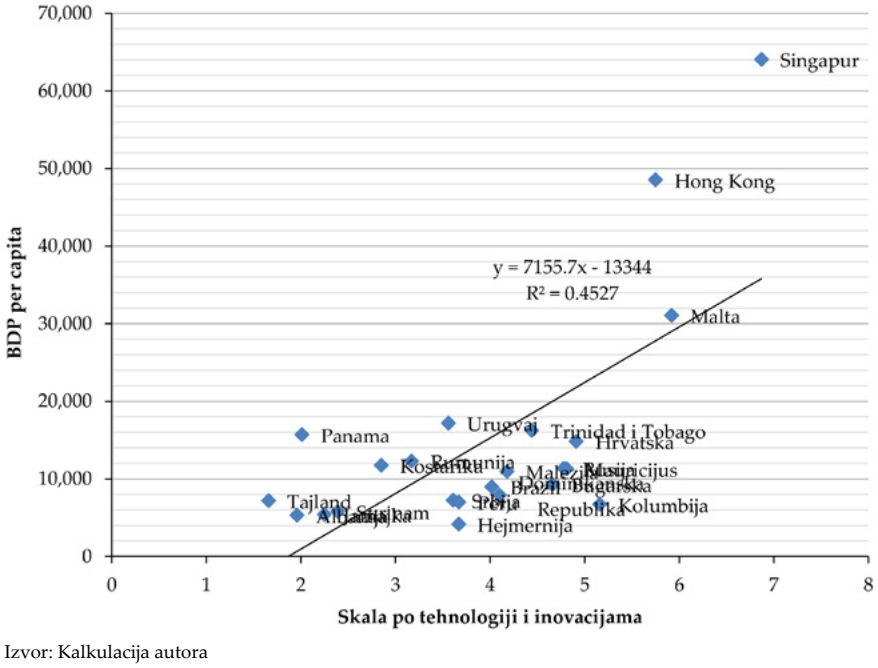
slučajno izabranih zemalja za koje postoje parametri koje posmatramo (Prilog 2).

Zaključna razmatranja

Pokazali smo da nivo digitalizacije i inovacija ne utiče na nivo razvoja finansijskog tržišta. Ovu hipotezu smo potrvrdili na uzorku zemalja iz OECD-a i na uzorku manje razvijenih zemalja. S druge strane, pokazali smo da nivo digitalizacije i inovacija utiče na nivo humanog razvoja i na nivo BDP-a po glavi stanovnika.

Pokazali smo da digitalizacija i inovacije utiču tek oko 13,9% na razvijenost finansijskog tržišta kod zemalja OECD-a. Koeficijent višestruke korelacije jednak je oko 37,13% što znači da postoji slaba direktna veza između nezavisne i zavisne varijable. S obzirom na to

Ilustracija 7. Regresiona analiza podataka za nivo tehnoloških inovacija i BDP *per capita* u slučajnom uzorku zemalja van OECD



Izvor: Kalkulacija autora

R kvadrat (R2) jednak je 0,1950785. To znači da nezavisna varijabla (varijabla X – nivo digitalizacije i inovacija) objašnjava 19,5% varijable Y - BDP *per capita*. Drugim riječima, digitalizacija i inovacije utiču oko 19,5% na nivo BDP *per capita* u zemlji. Koeficijent višestruke korelacije (R) jednak je 0,44167693 što znači da postoji srednja direktna veza između nezavisne i zavisne varijable.

S ciljem da još iste hipoteze provjerimo na drugom uzorku izabrali smo manji uzorak

da je p vrijednost 0,02575015 veća od 0,01 sa sigurnošću od 99% ne možemo da odbacimo hipotezu da „tehnologije i inovacije ne utiču na FD indeks" i da zaključimo da nivo digitalizacije i inovacija stoje u statistički značajnoj vezi vezi sa FD indeksom.

S druge strane, pokazali smo da digitalizacija i inovacije utiču oko 52,2% na nivo indeksa humanog razvoja u zemlji. Koeficijent višestruke korelacije (R) jednak je 0,7155027 što znači da postoji jaka direktna veza između

for, for instance, education, which increases the human development index, while education also affects both GDP and digitalisation. The relation to the financial development is less obvious.

Considering that the p value, 0.0000009365 is significantly lower than 0.01, we can dismiss with a 99% certainty the hypothesis that "technology and innovations do not affect the HD index" and we can conclude that the level of digitalisation and innovations is related to the FD index, assuming that other variables remain unchanged.

In addition, when we look at the relation between digitalisation and innovations by countries of OECD and GDP *per capita*, we obtain the data from table 6.

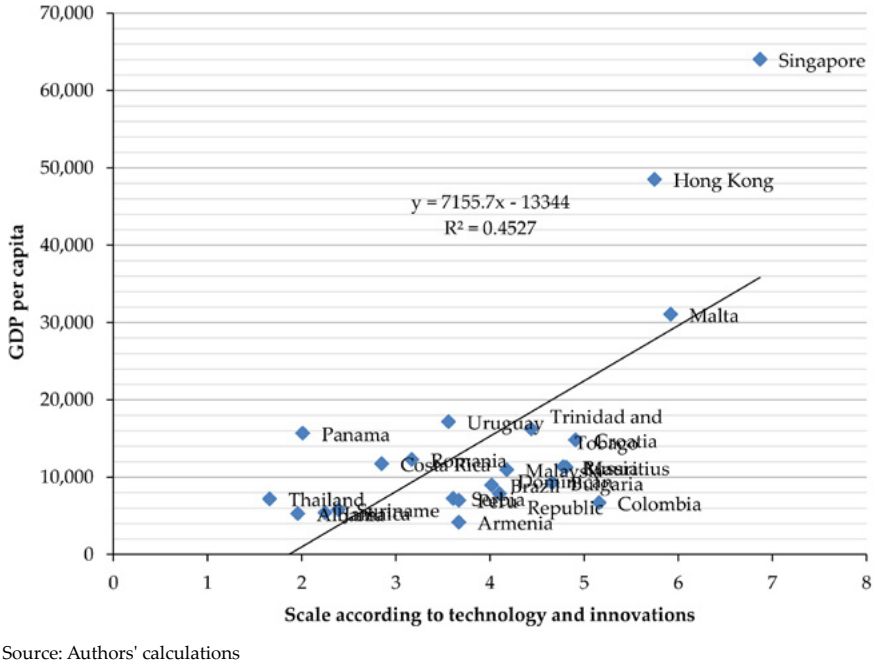
After repeating the examination of hypotheses, we reach these conclusions: we cannot dismiss the first one and we will dismiss the second and third hypotheses with a 99% certainty. Therefore, technology and innovations do not affect the FD index but they do affect HDI and GDP *per capita*. We have shown that there is a weak relationship, i.e. a low correlation (0.49%) between the level of digitalisation and innovations and FDI and that there is a 24.65% determination. However, we have shown that there is a high correlation between the level of digitalisation and innovations and HDI (a 68.88% correlation and about 47.45% determination), as well as the level of digitalisation and innovations and GDP *per capita* (a 67.34% correlation and about 45.34% determination).

Table 9. Regression Analysis of Data on the Level of Technological Innovations and GDP *Per Capita* in a Random Sample of Countries Outside the OECD

Regression Statistics	
R Square	0.4527
Adjusted R Square	0.428576449
Standard Error	10772.48644
Observations	24
Regression coefficient	0
Standard Error	0
F	18.25035364
Significance F	0.00031045
F crit	2.737849206
Test	dismissed

Source: Authors' calculation

Illustration 7. Regression Analysis of Data on the Level of Technological Innovations and GDP Per Capita in a Random Sample of Countries Outside the OECD



Source: Authors' calculations

R squared (R^2) equals 0.1950785. That means that the independent variable (X variable – level of digitalisation and innovations) accounts for 19.5% of variable Y – GDP *per capita*. In other words, digitalisation and innovations affect the level of GDP per capita in the country in the degree of

nezavisne i zavisne varijable. S obzirom na to da je p vrijednost 0,0000009365 značajno manja od 0,01 sa sigurnošću od 99% možemo da odbacimo hipotezu da „tehnologije i inovacije ne utiču na HD indeks" i da zaključimo da nivo digitalizacije i inovacija veoma utiče na FD indeks pod pretpostavkom nepromjenjenih ostali varijabli.

Na kraju, digitalizacija i inovacije utiču oko 19,5% na nivo BDP *per capita* u zemlji. Koeficijent višestruke korelacije (R) jednak je 0,44167693 što znači da postoji srednja direktna veza između nezavisne i zavisne varijable.

Iste zaključke dobili smo kada smo hipoteze testirali na slučajno odabranom uzorku zemalja koje nisu članice OECD-a.

Nakon ponavljanja provjere hipoteze navedenih testova dolazimo do istovjetnih zaključaka: ne možemo odbaciti prvu hipotezu, a odbacujemo drugu i treću hipotezu sa sigurnošću od 99%. Prema tome, tehnologije i inovacije ne utiču na FD indeks ali utiču na HDI i na BDP *per capita*. Pokazali smo da postoji slaba veza odnosno slaba korelacija (0,49%) između nivoa digitalizacije i inovacija i FD indeksa, a postoji determinacija od oko 24,65%. Međutim, pokazali smo da postoji snažna korelacija između nivoa digitalizacije i inovacija i HD indeksa (korelacija od oko 68,88% i determinacija od oko 47,45%), te nivoa digitalizacije i inovacija i BDP-a *per capita* (korelacija od oko 67,34% i determinacija od oko 45,34%).

Analiziranjem dosadašnjih trendova i pokazatelja nivoa razvoja digitalizacije finansijskih usluga, očigledno je da će finansijski posrednici u zemljama u razvoju biti prinuđeni da mijenjaju svoje poslovne modele i prilagođavaju ih ubrzanim promjenama na tržištu ili da sklapaju savezništva sa velikim tehnološkim kompanijama, kao i sa manjim firmama koje imaju komplementarna rješenja kao što ih imaju i banke. Osim toga, finansijski sektor će se razvijati prema otvorenim finansijskim uslugama, što će dodatno uticati na banke i ostale učesnike u finansijskoj industriji da dodatno prilagođavaju svoje poslovanje i usluge. U skladu sa tim, potrebno je regulativu mijenjati u pravcu podsticanja digitalizacije i inovacija i u finansijskom sektoru. Rezultati rada pokazuju da finansijske institucije u zemljama u razvoju, a prije svih banke - jer su one „najbliže" stanovništvu, treba da djeluju što prije kako bi se pripremile za budućnost u kojoj će presudnu ulogu imati inovacije i nove tehnologije, gradeći prilagodljive i digitalno pripremljene poslovne modele koji će im pomoći da odgovore na sve izazove koji ih čekaju. Rad navodi i na preporuke za dalja istraživanja iz ove oblasti, jer je potrebno istražiti koje inovacije najviše doprinose određenim segmentima finansijskog sistema i društva.

Površna interpretacija rezultata ukazala bi na zaključak da niži R^2 regresija koje imaju indeks finansijskog razvoja kao zavisnu promenljivu upućuje na dokaz slabije uzročno-posledične veze između inovacija i digitalizacije sa jedne i finansijskog razvoja sa druge strane, bez obzira u kojem smjeru je ta veza (tj. od inovacija ka finansijskom razvoju, ili obrnuto). Međutim, istina je da i na jednu i na drugu od ove promenljive utiče mnoštvo faktora, i viši R^2 regresija između recimo inovacija i ljudskog razvoja ne mora da znači da ove dve promenljive značajno utiču jedna na drugu, već može da znači i da ih determiniše neki treći faktor, kao što je na primjer BDP. Primjera radi, vrijednosni sistem dva brata može da bude gotovo isti, ali ne zato jer su uticali jedan na drugoga, već zato što su ih vaspitali isti roditelji. Prema tome, značaj koji se praksi pridaje R^2 treba da bude manji nego što je akcenat u ovom istraživanju, ali i dalje vrijedi naglastiti da je on u regresijama sa indeksom finansijskog razvoja niži. Dakle, od međusobnih veza sve četiri promenljive ona sa indeksom finansijskog razvoja je najslabija - bez obzira na to da li je u pitanju rezultat slabijeg međusobnog uticaja navedenih promenljivih ili različitih drugih faktora koji u radu nisu razmatrani, a eventualno ih determinišu.

Drugo, ostaje pitanje interpretacije statističkog značaja regresionih koeficijenata. U radu se insistira na tome da odnos inovacija sa finansijskim razvojem nije značajan, dok je odnos sa drugim promenljivima značajan. Takva interpretacija se zasniva na korišćenju praga od 1%, dok nije održiva pri korišćenju praga od recimo 5% koji bi u ovom kontekstu takođe bio sasvim prihvatljiv. Ovu činjenicu je važno naglasti da ne bismo prenaglasili značaj razlike koju smo analizom podataka pronašli.

U radu smo pokazali da veza inovacija i indeksa finansijskog razvoja jeste nešto slabija.

about 19.5%. The multiple correlation coefficient (R) equals 0.44167693, which means that there is an average direct relationship between the independent and dependent variable.

With the aim of examining the same hypotheses in a different sample, we have chosen a smaller sample of randomly chosen countries for which parameters observed exist (Supplement 2).

Concluding Remarks

We have proved that the level of digitalisation and innovations does not affect the level of the financial market development. This hypothesis was confirmed in a sample of countries outside OECD and in a sample of less developed countries. On the other hand, we have shown that the level of digitalisation and innovations affects the level of human development and the level of GDP *per capita*.

We have shown that digitalisation and innovations affect the financial market development in countries of OECD to a degree of only 13.9%. The multiple correlation coefficient equals about 37.13%, which means that there is a low direct correlation between the independent and the dependent variable. Considering that the p value of 0.02575015 is higher than 0.01, with a 99% certainty we cannot dismiss the hypothesis that "technology and innovations do not affect the FD index" and conclude that the level of digitalisation and innovations are in a statistically significant correlation with the FD index.

On the other hand, we have shown that digitalisation and innovations affect the level of human development index in a country to a degree of about 52.2%. The multiple correlation coefficient (R) equals 0.7155027, which means that there is high direct correlation between the independent and dependent variable. Considering that the p value of 0.0000009365 is significantly lower than 0.01, with a 99% certainty we can dismiss the hypothesis that "technology and innovations do not affect the HD index" and conclude that the level of digitalisation and innovations significantly affects the FD index, provided that other variables remain unchanged.

In the end, digitalisation and innovations affect the level of GDP *per capita* in a country, to a degree of about 19.5%. The multiple correlation coefficient equals 0.44167693, which means that there is a moderate direct correlation between the independent and dependent variable.

We reached the same conclusions when we examined the hypotheses in a randomly chosen sample of countries outside the OECD.

After repeating the examination of the hypothesis, we reach the same conclusions: we cannot dismiss the first one and we dismiss the second and third hypotheses with a 99% certainty. Therefore, technology and innovations do not affect the FD index but they do affect HDI and GDP *per capita*. We have shown that there is a weak relationship, i.e. a low correlation (0.49%) between the level of digitalisation and innovations and FDI and there is a 24.65% determination. However, we have shown that there is a high correlation between levels of digitalisation and innovations and HDI (a 68.88% correlation and about 47.45% determination), as well as between the level of digitalisation and innovations and GDP *per capita* (a 67.34% correlation and about 45.34% determination).

By analysing the existing trends and indicators of the level of development of financial services digitalisation, it is obvious that financial intermediaries in developing countries will be obliged to change their business models and adjust them to accelerated changes in the market, or to form alliances with large technological companies, as well as with smaller companies which have complementary solutions in the same manner as banks. Besides, the financial sector will develop towards open-ended financial services, which will lead banks and other participants in the financial industry to further adjust their business and services. In accordance with that, the regulations need to be changed in the direction of facilitating digitalisation and innovations in the financial sector, as well. The results of the paper indicate that financial institutions in developing countries, primarily banks, since they are the closest to the populations, should react as soon as possible in order to prepare for the future, when innovations and new technologies will have the principal role, by constructing adaptable and digitally prepared business models which will help them answer all the upcoming challenges. The paper also points to

Međutim, to još uvijek ne znači da digitalizacija i inovacije nisu prodrle u finansijski sektor onoliko koliko u ostatak privrede. Prvo, to bi moglo da znači i da digitalizacija i inovacije ne mijenjaju dubinu, pristup i efikasnost finansijskog sistema, *iako* su u njemu zastupljene. Drugo, to bi moglo da znači da digitalizacija jeste važna za finansijski razvoj, ali da stari indeks to ne mjeri dobro, dakle da bi možda trebalo menjati indeks koji se koristi. Treće, to bi moglo i da znači ono što se u radu naglašava, a to je da digitalizacija finansijskog sektora kaska za digitalizacijom ostatka privrede. Međutim i dve interpretacije su moguće. S tim u vezi ostavljen je i prostor budućim istraživanjima da razvrstaju koji je od ovih faktora odgovaran za manju vezu između inovacija i finansijskog razvoja u poređenju sa ljudskim razvojem ili BDP.

Bez sumnje, razvoj finansijskog sektora kaska za promjenama u digitalizaciji. Ideja se uklapa u nešto veću p-vrijednost koeficijenta kojim digitalizacija objašnjava indeks finansijskog razvoja nego druge dvije promjenljive. Ova tvrdnja dobija na značaju kada znamo kako je konstruisan indeks finansijskog razvoja. Naime, faktori koji na njega utiču, po samoj njegovoj definiciji, nisu u značajnoj vezi sa digitalizacijom, pa je otuda i veza slabija.

Rad pokazuje korelacije između digitalizacije i tehnoloških inovacija sa jedne strane i FD indeksa, HD indeksa i BDP *per capita* sa druge strane. Određivanje toga šta u kojoj meri uzrokuje ovo drugo ostavljeno je za buduća istraživanja.

Nakon ponavljanja provjere hipoteze navedenih testova dolazimo do istovjetnih zaključaka: ne možemo odbaciti prvu hipotezu, a odbacujemo drugu i treću hipotezu sa sigurnošću od 99%. Prema tome, tehnologije i inovacije ne utiču na FD indeks, ali utiču na HDI i na BDP *per capita*. Pokazali smo da postoji slaba veza, odnosno slaba korelacija (0,49%), između nivoa digitalizacije i inovacija i FD indeksa, gde postoji determinacija od oko 24,65%. Međutim, pokazali smo da postoji snažna korelacija između nivoa digitalizacije i inovacija i HD indeksa (korelacija od oko 68,88% i determinacija od oko 47,45%), te nivoa digitalizacije i inovacija i BDP-a *per capita* (korelacija od oko 67,34% i determinacija od oko 45,34%).

recommendations for further research in this field, because it is necessary to explore which innovations contribute the most to specific segments of the financial system and society.

A superficial interpretation of the results would lead to the conclusion that a lower R^2 of regressions having the FDI as a dependent variable points to a weaker cause-and-effect relationship between innovations and digitalisation on the one hand and financial development on the other hand, disregarding the direction of the relationship (i.e. from innovation toward financial development, or vice versa). However, it is true that both these variables are affected by a variety of factors and a higher R^2 of regressions between, for example, innovations and human development does not necessarily mean that these two variables significantly affect each other, but it might mean that they are determined by a third factor, like for example GDP. For example, the system of values followed by two brothers may be almost the same, but not because they influenced each other, but because they were raised by the same parents. Therefore, the significance assigned to R^2 should have less emphasis than in this research, but it is still worth to emphasise that it is lower in regressions with FDI. Hence, among the interrelationships of all four variables, the one with the FDI is the weakest – without considering if that is the result of a mutual weaker influence of these factors, or of other different factors not considered in this paper and potentially influential.

Secondly, the issue remains of the interpretation of the statistical significance of the regression coefficient. The paper insists on the relation between innovations and financial development is not significant, while the relation to other variables is substantial. Such interpretation is based on using a 1% threshold, while it is not sustainable when using, for example, a 5% threshold, which would also be quite acceptable in this context. This fact needs to be emphasised so as not to exaggerate the significance of the distinction found through data analysis.

In the paper we have shown that the relation of innovations and the FDI is somewhat weaker. However, that still does not mean that digitalisation and innovations have not entered the financial sector to the extent that they already permeate the rest of the economy. First, that might also mean that digitalisation and innovations do not change the depth, access and efficiency of the financial system, *although* they are present in it. Secondly, it might mean that digitalisation is important for financial development, but that the old index does not measure that properly, i.e. that potentially the index being used should be changed. Thirdly, it could also mean what is emphasised in the paper, i.e. that the digitalisation of the financial sector is falling behind in comparison with the digitalisation of the rest of the economy. However, two interpretations are also possible. In relation to that, there is some space for future research to determine which of these factors facilitates a weaker relationship between innovations and financial development, in comparison with the human development or GDP.

Undoubtedly, the financial sector's development is falling behind when it comes to changes in digitalisation. This idea fits in with the higher p-value of the coefficient, which digitalisation uses to explain the FDI over the other two variables. This claim becomes significant if we know how the FDI is constructed. Namely, the factors affecting it are not significantly linked to digitalisation by their very definition, hence the weaker relation.

The paper indicates correlations between digitalisation and technological innovations on the one hand and FD index, HD index and GDP *per capita* on the other hand. Determining what and to what extent determines the other is left for further research.

After repeating the examination of the hypothesis, we reached the same conclusions: we cannot dismiss the first one, and we dismiss the second and third hypotheses with a 99% certainty. Therefore, technology and innovations do not affect the FD index but they do affect HDI and GDP *per capita*. We have shown that there is a weak relationship, i.e. a low correlation (0.49%) between the level of digitalisation and innovations and FDI, and there is 24.65% determination. However, we have shown that there is a high correlation between the levels of digitalisation and innovations and the HDI (a 68.88% correlation and about 47.45% determination), as well as between the levels of digitalisation and innovations and GDP *per capita* (a 67.34% correlation and about 45.34% determination).

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Prilog

Tabela 10. Pregled korištnih pokazatelja za grupu zemalja iz OECD-a.

Zemlja	Kontinent	Skala po tehnologiji i inovacijama	FD Indeks	HDI	BDP *per capita*
Australija	Australija	5,81	0,8541623	0,939	56.352
Japan	Azija	7,28	0,8684092	0,909	39.306
Južna Koreja	Azija	8,39	0,855473	0,903	31.346
Austrija	Evropa	6,8	0,6375566	0,908	51.509
Belgija	Evropa	6,32	0,5801436	0,916	46.724
Kanada	Evropa	6,43	0,8621565	0,926	46.261
Čile	Evropa	2,73	0,4665055	0,843	16.079
Češka	Evropa	6,96	0,3680759	0,888	22.850
Danska	Evropa	7,34	0,643344	0,929	60.692
Estonija	Evropa	6,74	0,329207	0,871	22.990
Finska	Evropa	8,85	0,6626749	0,92	49.845
Francuska	Evropa	7,05	0,7647089	0,901	42.878
Nemačka	Evropa	7,94	0,6983447	0,936	48.264
Grčka	Evropa	6,12	0,5393584	0,87	20.408
Mađarska	Evropa	2,83	0,4355711	0,838	15.924
Island	Evropa	6,29	0,542841	0,935	74.278
Irska	Evropa	8,25	0,6912758	0,938	76.099
Izrael	Evropa	7,46	0,568392	0,903	41.644
Italija	Evropa	5,99	0,8011451	0,88	34.260
Letonija	Evropa	5,36	0,2913639	0,847	18.032
Litvanija	Evropa	5,87	0,2573722	0,858	19.143
Luksemburg	Evropa	6,05	0,7459558	0,904	114.234
Meksiko	Evropa	4,19	0,4091886	0,774	9.807
Holandija	Evropa	8,68	0,7055485	0,931	53.106
Novi Zeland	Evropa	6,81	0,6053087	0,917	41.267
Norveška	Evropa	7,46	0,6906703	0,953	81.695
Poljska	Evropa	5,71	0,4737788	0,865	15.431
Portugal	Evropa	3,89	0,6911288	0,847	23.186
Slovačka	Evropa	4,52	0,3241126	0,855	19.582
Slovenija	Evropa	7,78	0,3851537	0,896	26.243
Španija	Evropa	6,78	0,8811775	0,891	30.697
Švedska	Evropa	7	0,7154871	0,933	53.873
Švajcarska	Evropa	6,51	0,9374488	0,944	82.950
Turska	Evropa	4,99	0,8270872	0,791	9.346
Velika Britanija	Evropa	8,99	0,8244633	0,922	42.558
Sjedinjene Američke Države	Sjeverna Amerika	6,99	0,8735749	0,924	62.606

Izvor: Readiness for the Future of Production Report 2018; the National Bureau of Economic Research (2019), Organizacija za ekonomsku saradnju i razvoj (2019), Svjetski ekonomski forum (World Economic Forum, 2018) i Međunarodni monetarni fond (2019).

Supplement

Table 10. An Overview of Used Indicators for the Group of Countries from OECD

Country	Continent	Scale according to technology and innovations	FD Index	HDI	GDP *per capita*
Australia	Australia	5.81	0.8541623	0.939	56,352
Japan	Asia	7.28	0.8684092	0.909	39,306
South Korea	Asia	8.39	0.855473	0.903	31,346
Austria	Europe	6.8	0.6375566	0.908	51,509
Belgium	Europe	6.32	0.5801436	0.916	46,724
Canada	Europe	6.43	0.8621565	0.926	46,261
Chile	Europe	2.73	0.4665055	0.843	16,079
Czech Republic	Europe	6.96	0.3680759	0.888	22,850
Denmark	Europe	7.34	0.643344	0.929	60,692
Estonia	Europe	6.74	0.329207	0.871	22,990
Finland	Europe	8.85	0.6626749	0.92	49,845
France	Europe	7.05	0.7647089	0.901	42,878
Germany	Europe	7.94	0.6983447	0.936	48,264
Greece	Europe	6.12	0.5393584	0.87	20,408
Hungary	Europe	2.83	0.4355711	0.838	15,924
Iceland	Europe	6.29	0.542841	0.935	74,278
Ireland	Europe	8.25	0.6912758	0.938	76,099
Israel	Europe	7.46	0.568392	0.903	41,644
Italy	Europe	5.99	0.8011451	0.88	34,260
Latvia	Europe	5.36	0.2913639	0.847	18,032
Lithuania	Europe	5.87	0.2573722	0.858	19,143
Luxembourg	Europe	6.05	0.7459558	0.904	114,234
Mexico	Europe	4.19	0.4091886	0.774	9,807
Netherlands	Europe	8.68	0.7055485	0.931	53,106
New Zealand	Europe	6.81	0.6053087	0.917	41,267
Norway	Europe	7.46	0.6906703	0.953	81,695
Poland	Europe	5.71	0.4737788	0.865	15,431
Portugal	Europe	3.89	0.6911288	0.847	23,186
Slovakia	Europe	4.52	0.3241126	0.855	19,582
Slovenia	Europe	7.78	0.3851537	0.896	26,243
Spain	Europe	6.78	0.8811775	0.891	30,697
Sweden	Europe	7	0.7154871	0.933	53,873
Switzerland	Europe	6.51	0.9374488	0.944	82,950
Turkey	Europe	4.99	0.8270872	0.791	9,346
United Kingdom	Europe	8.99	0.8244633	0.922	42,558
United States	North America	6.99	0.8735749	0.924	62,606

Source: Readiness for the Future of Production Report 2018; the National Bureau of Economic Research (2019), the Organisation for Economic Co-ordination and Development (2019), the World Economic Forum (2018) and the International Monetary Fund (2019).

Tabela 11. Regresiona analiza podataka za nivo digitalizacije i HD indeksa za ostale izabrane i posmatrane zemlje

Zemlja	Kontinent	Skala po tehnologiji i inovacijama	FD Indeks	HDI	BDP per capita
Mauricijus	Afrika	4,81	0,4325249	0,79	11.281
Hong Kong	Azija	5,75	0,7334458	0,933	48.517
Malezija	Azija	4,18	0,6600142	0,802	10.942
Singapur	Azija	6,87	0,7140425	0,932	64.041
Tajland	Azija	1,66	0,7278029	0,755	7.187
Albanija	Evropa	1,96	0,2099448	0,785	5.289
Jermenija	Evropa	3,67	0,2474243	0,755	4.169
Bugarska	Evropa	4,66	0,3779879	0,813	9.267
Hrvatska	Evropa	4,91	0,4113067	0,831	14.816
Malta	Evropa	5,92	0,5728436	0,878	31.058
Rumunija	Evropa	3,17	0,308145	0,811	12.285
Rusija	Evropa	4,78	0,5111977	0,816	11.327
Srbija	Evropa	3,61	0,2664316	0,787	7.243
Brazil	Latinska Amerika	4,02	0,5709821	0,759	8.968
Kolumbija	Latinska Amerika	5,16	0,4423328	0,747	6.684
Kostarika	Latinska Amerika	2,85	0,2749437	0,794	11.744
Dominikanska Republika	Latinska Amerika	4,1	0,1801991	0,736	7.881
Jamajka	Latinska Amerika	2,25	0,2715746	0,732	5.392
Panama	Latinska Amerika	2,01	0,3529089	0,789	15.679
Peru	Latinska Amerika	3,67	0,3750551	0,75	7.002
Surinam	Latinska Amerika	2,39	0,2158981	0,72	5.799
Trinidad iTobago	Latinska Amerika	4,44	0,3375334	0,784	16.223
Urugvaj	Latinska Amerika	3,56	0,2499323	0,804	17.165

Izvor: Readiness for the Future of Production Report 2018; the National Bureau of Economic Research (2019), Organizacija za ekonomsku saradnju i razvoj (2019), Svjetski ekonomski forum (World Economic Forum, 2018) i Međunarodni monetarni fond (2019).

Table 11. Regression Analysis of Data on the Level of Digitalisation and HD Index for Other Chosen and Observed Countries

Country	Continent	Scale according to technology and innovations	FD Index	HDI	GDP *per capita*
Mauritius	Africa	4.81	0.4325249	0.79	11,281
Hong Kong	Asia	5.75	0.7334458	0.933	48,517
Malaysia	Asia	4.18	0.6600142	0.802	10,942
Singapore	Asia	6.87	0.7140425	0.932	64,041
Thailand	Asia	1.66	0.7278029	0.755	7,187
Albania	Europe	1.96	0.2099448	0.785	5,289
Armenia	Europe	3.67	0.2474243	0.755	4,169
Bulgaria	Europe	4.66	0.3779879	0.813	9,267
Croatia	Europe	4.91	0.4113067	0.831	14,816
Malta	Europe	5.92	0.5728436	0.878	31,058
Romania	Europe	3.17	0.308145	0.811	12,285
Russia	Europe	4.78	0.5111977	0.816	11,327
Serbia	Europe	3.61	0.2664316	0.787	7,243
Brazil	Latin America	4.02	0.5709821	0.759	8,968
Colombia	Latin America	5.16	0.4423328	0.747	6,684
Costa Rica	Latin America	2.85	0.2749437	0.794	11,744
Dominican Republic	Latin America	4.1	0.1801991	0.736	7,881
Jamaica	Latin America	2.25	0.2715746	0.732	5,392
Panama	Latin America	2.01	0.3529089	0.789	15,679
Peru	Latin America	3.67	0.3750551	0.75	7,002
Suriname	Latin America	2.39	0.2158981	0.72	5,799
Trinidad and Tobago	Latin America	4.44	0.3375334	0.784	16,223
Uruguay	Latin America	3.56	0.2499323	0.804	17,165

Source: Readiness for the Future of Production Report 2018; the National Bureau of Economic Research (2019), the Organisation for Economic Co-ordination and Development (2019), the World Economic Forum (2018) and the International Monetary Fund (2019).

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BITCOIN I DIVERSIFIKACIJA PORTFOLIJA: PERSPEKTIVA GLOBALNOG INVESTITORA

Prevod obezbedili autori

„Dobar portfolio je mnogo više od duge liste dobih akcija i obveznica. Portfolio je uravnotežena celina koja investitoru pruža zaštitu i mogućnosti u pogledu širokog sprektra nepredviđenih situacija", Harry Markowitz (1997).

Rezime

U ovom istraživanju se ispituje da li je poželjno u investicioni portfolio koji sadržava tradicionalne finansijske instrumente uključiti Bitcoin. Cilj rada jeste da se istraži da li Bitcoin može biti dobar izvor diversifikacije, ukoliko se posmatra investitor koji investira sredstva na globalnom finansijskom tržištu. Za tu svrhu kreirana su dva portfolija: portfolio kojem je cilj minimalizovanje rizika i portfolio koji je označen kao „agresivni", a koji nudi veće stope povraćaja na dnevnom nivou, ali i veći rizik. Portfoliji su kreirani primenom Markowitz teorije optimizacije, a uključili su tradicionalne instrumente (akcije, obveznice, zlato) i Bitcoin. Korišćeni su podaci visoke frekvencije (dnevni podaci). Analizirani period je od kraja jula 2010. godine do kraja juna 2019. godine, što predstavlja period aktivnog trgovanja Bitcoin-om. Rezultati istraživanja pokazuju da Bitcoin može biti dobar izvor diversifikacije u portfoliju koji sadrži tradicionalne aktive (zlato, obveznice i akcije), kako za investitora koji nije sklon riziku, tako i za one investitore koji imaju veći apetit za rizik. Ipak, uzimajući u obzir visoki stepen volatilnosti, investitori treba da budu veoma pažljivi kada donose odluke o uključivanju Bitcoin-a u portfolio.

Ključne reči: diversifikacija, Bitcoin, portfolio teorija, optimizacija, rizik, povraćaj

JEL: G11, G12, G15, G24

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BITCOIN IN PORTFOLIO DIVERSIFICATION: THE PERSPECTIVE OF A GLOBAL INVESTOR

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Translation provided by the authors

"A good portfolio is more than a long list of good stocks and bonds. It is a balanced whole, providing the investor with protections and opportunities with respect to a wide range of contingencies." Harry Markowitz (1997)

Summary

This paper examines whether it is advisable to include some portion of Bitcoin in a portfolio of traditional financial assets. The goal is to explore whether Bitcoin could be a good source of diversification from the perspective of a global investor. Two portfolios have been created for this purpose: a portfolio aimed at minimizing risk and a portfolio designated as "aggressive" that offers higher rates of daily return but also a higher risk. Portfolios were created using Markowitz's optimization theory and included traditional instruments (stocks, bonds, gold) and Bitcoin. In portfolio optimization, high-frequency data (daily data) were used. The analysed period is from the end of July 2010 to the end of June 2019, which is the period of active Bitcoin trading. The results show that Bitcoin could be a good source of diversification for a portfolio that consists of traditional financial instruments, for investors trading daily. It could be a good source of diversification for the risk-averse investor and those investors who have a higher risk appetite. Considering the high volatility of Bitcoin, the investors should be very careful when they decide to include Bitcoin in a portfolio.

Keywords: diversification, Bitcoin, portfolio theory, optimization, risk, return

JEL: G11, G12, G15, G24

1. Uvod

Teorija portfolija, u svojoj osnovi, sugeriše da nije mudra odluka „sva jaja držati u istoj korpi". Jedan od načina da se dostigne dobar odnos između rizika i povraćaja jeste primena diversifikacije koja podrazumeva uključivanje onih instrumenata u portfolio koji nisu visoko korelisani. Na taj način se eliminiše nesistemska komponenta rizika.

Bitcoin je po prvi put predstavio Nakamoto (2008) kao medijum razmene, kao oblik virtuelne valute. Interes za ovim instrumentom, ukoliko se u obzir uzme njegova cena, nije bio značajan do kraja 2015. godine. Tokom 2016. godine cena Bitcoin-a postepeno beleži rast, da bi maksimalni nivo cene bio dostignut krajem 2017. godine.

Od 2015. godine pojavljuje se obimna literatura koja nastoji da identifikuje prirodu Bitcoin-a, kao i njegovu ulogu u diversifikaciji portfolija. S obzirom na izraženu popularnost, kao i medijsko promovisanje Bitcoin-a, brojna istraživanja nastoje da ispitaju i pokažu špekulativnu prirodu Bitcoin-a (Kristoufek, 2015; Yermack, 2015; Baek and Elbeck, 2015, Dyhrberg, 2016b). Kristoufek (2015) i Yermack (2015) ispituju prirodu Bitcoin-a i zaključuju da se ona ne može objasniti savremenim ekonomskim teorijama jer iskazuje više špekulativnih karakteristika u odnosu na druge instrumente i valute. Drugi autori pokušavaju da shvate da li je Bitcoin valuta ili dobro, roba (na primer Dyhrberg, 2016ab; Fry i Cheah, 2016; Katsiampa, 2017; Pieters i Vivanco, 2017). Pored toga, Dyhrberg (2016ab) pronalazi da Bitcoin ispoljava neke sličnosti sa ostalim klasama aktive poput kurseva valuta i zlata, te kao takav nudi široke mogućnosti diversifikacije portfolija. Sa druge strane Baur et al. (2018) pokazuju da su karakteristike Bitcoin-a drugačije u odnosu na ostale aktive poput zlata ili dolara. Za razliku od drugih klasa aktive Bitcoin nema neku aktivu koja se nalazi u njegovoj osnovi, te su stoga investitori veoma oprezni prilikom ulaganja u ovaj instrument. S obzirom na slabu ili nikakvu povezanost Bitcoin-a sa ostalom aktivom, on se prepoznaje kao modus zaštite od rizika u menadžmentu portfolija. Koristeći mesečne podatke o povraćaju, Chan et al. (2019) demonstriraju da Bitcoin može efektivno poslužiti kao zaštita od rizika u odnosu na Euro STOXX, Nikkei, Shanghai A-Share, S&P 500 kao i TSX Index. Ipak, ovi autori pronalaze da je zaštita od rizika u odnosu na S&P 500 i Euro STOXX atraktivna za podatke srednje frekvencije, dok je zaštita od rizika u odnosu na Shanghai A-Share najefektivnija kod niskofrekventnih podataka, kao što su mesečni povraćaji.

Ram (2019) sprovodi opsežnu analizu koristeći Sharpe racio te pokazuje da Bitcoin obezbeđuje povraćaje ponderisane rizikom koji su veći u odnosu na druge klase aktive. Trautman i Dorman, (2018) sprovode korelacionu analizu među različitim klasama aktive poput akcija, zlata, nekretnina i obveznica te dokazuju da su koristi od diversifikacije povezane sa nižom korelacijom ovih aktiva sa drugim aktivama. Uprkos niskoj korelaciji sa drugim aktivama Bitcoin je veoma volatilan i nekada može postati nelikvidan, uzimajući u obzir da ne postoji neka aktiva koja se nalazi u njegovoj osnovi. Ovo može značiti da investitori nekada iznenada povuku investicije u ovaj instrument, u periodima krize, što najčešće rezultira značajnim padom cene, te nekada ta aktiva može postati bezvredna. Uzimajući u obzir navedeno, sprovedene su i analize koje su ispitale rizike povezane sa Bitcoin-om. Eisl et al. (2015) u analizi polaze od uslovnog VaR-a, odnosno okvira za njegovo izračunavanje, sa ciljem da ispitaju da li Bitcoin optimizuje performanse portfolija. Njihovi nalazi sugerišu da, iako Bitcoin povećava VaR, dodatni rizik je kompenzovan visokim povraćajem koji Bitcoin nudi.

Koristeći multivarijantnu dinamičko uslovnu korelaciju (DCC model) Chuen et al. (2018) ispituju da li uključivanje deset kriptovaluta u tradicionalni portfolio donosi dodatne koristi povraćaju prilagođenom za rizik.

Rezultati istraživanja ovih autora sugerišu da uključivanje indeksa kriptovaluta obezbeđuje značajna poboljšanja u sveukupnom portfoliju i njegovim performansama, što je potvrđeno i spaninig testom. Slične nalaze iznose i Ehlers i Gauer (2019) koji primenjuju Kolmogorov-Smirnov test kao i test racija varijanse pod pretpostavkom heteroskedastičnosti kako bi pokazali ulogu pet vodećih kriptovaluta kao što su Bitcoin, Ethereum, Ripple, Litecoin i Dash u portfoliju. Ovi autori dolaze do saznanja da jedino Bitcoin i Ripple pružaju minimalne pogodnosti u portfoliju i volatilnosti koji su u

1. Introduction

The very basics of portfolio theory suggest that it is not a wise decision to put all your eggs in one basket. One way to achieve a good risk-return trade-off is to spread the risk and reward associated with investment portfolio by diversifying the individual assets with a variety of non-correlated assets, which nearly eliminates the unsystematic component of risk.

Bitcoin was first introduced by Nakamoto (2008) as a medium of exchange and there was no significant interest shown by investors until 2015, after which its price began to increase gradually. Interest in this instrument, given its price, was not significant until the end of 2015. During 2016, the price of Bitcoin gradually increased, reaching its maximum level at the end of 2017.

Since 2015, voluminous literature started dealing with identifying the nature and diversification benefits of Bitcoin. Given the popularity and excessive media coverage promoting Bitcoin, several scholars attempted to examine the speculative nature of Bitcoin (See e.g. Kristoufek, 2015; Yermack, 2015; Baek and Elbeck, 2015, Dyhrberg, 2016b). In particular, Kristoufek (2015) and Yermarck (2015) studied the nature of Bitcoin and concluded that it cannot be explained by contemporary theories of economics, as it exhibits more speculative characteristics than a medium of exchange. Another section of scholars attempted to understand whether Bitcoin is a currency or a commodity (See for example Dyhrberg, 2016ab; Fry and Cheah, 2016; Katsiampa, 2017; Pieters and Vivanco, 2017). Also, Dyhrberg (2016ab) finds that Bitcoin exhibits some similarities to other classes of assets such as exchange rate and gold and, as such, it offers a wide array of opportunities for portfolio diversification. Arguing to the contrary, Baur et al. (2018) demonstrated that the characteristics of Bitcoin are different from that of other assets such as gold and the US dollar. Unlike other classes of assets, Bitcoin does not have an underlying asset and, as such, investors must invest with caution. Given the little or no correlations with other classes of assets, Bitcoin has now been recognized as a mode of hedging risk in portfolio management. Using monthly return data, Chan et al. (2019) demonstrated that Bitcoin can effectively be hedged against Euro STOXX, Nikkei, Shanghai A-Share, S&P 500, and the TSX Index. However, they found that hedging against the S&P 500 and Euro STOXX is attractive for medium-frequency data and hedging against Shanghai A-Share is most effective for low-frequency data, such as monthly returns.

Ram (2019) carried out an extensive analysis using the Sharpe ratio and showed that the Bitcoin provides risk-adjusted returns over and above the return on other classes of assets. Trautman and Dorman, (2018) carried out a correlation analysis among different asset classes such as stocks, gold, real estates and bonds and concluded that the diversification benefits are associated with its low correlation with other classes of assets. Despite its low correlation with other assets, Bitcoin has high volatility and may sometimes become illiquid given the fact that there is no underlying asset. This might cause the investors' sudden withdrawal of investments in the case of a crisis, which usually results in a significant drop in price; it may sometimes become valueless. As such, studies must include adequate controls in the regression analyses for this illiquidity risk. Eisl et al. (2015) use conditional value-at-risk a framework to examine whether the Bitcoin optimizes the portfolio performance. Their findings suggest that—although the Bitcoin increases the value-at-risk— the additional risk is compensated for by the excessive return on Bitcoin investments.

Using the multivariate dynamic conditional correlation (DCC) model, Chuen et al. (2018) examined whether the inclusion of ten cryptocurrencies in a traditional portfolio of nine assets will bring additional benefits on risk-adjusted returns.

Their findings suggest that the inclusion of the cryptocurrency index provides large improvements in the overall portfolio performance based on mean-variance, which was confirmed by the spanning test employed. Similarly, Ehlers and Gauer (2019) employed the Kolmogorov–Smirnov test and variance ratio test (VRT) with heteroscedasticity adjustment to understand the role of five leading cryptocurrencies such as Bitcoin, Ethereum,

skladu sa idejom optimizacije portfolija prema Markowitz teoriji.

Briere et al. (2015) su u analizi koristili nedeljne podatke u periodu od 2010 - 2013. godine i analizirali su investiranje u Bitcoin sa aspekta SAD investitora koji investira u tradicionalne instrumente (akcije, obveznice i ključne valute) kao i alternativne investicije (dobra, hedž fondove i nekretnine). Ovi autori zaključuju da, tokom analiziranog perioda, ulaganja u Bitcoin imaju vrlo prepoznatljive karakteristike uključujući veoma visoki nivo povraćaja i rizika. Takođe, ovi autori zaključuju da Bitcoin investicije nude značajne koristi diversifikacije.

Carpenter (2016) koristi modifikovani pristup koji je zasnovan na varijansi i očekivanoj vrednosti i pokazuje da Bitcoin može biti održiv diversifikacijski alat.

Bouri et al. (2017) koristi dinamički korelacioni model i ispituje da li Bitcoin može da deluje kao zaštita od rizika i kao sigurna aktiva u portfoliju koji uključuje glavne akcijske indekse, obveznice, naftu, zlato, te generalne indekse dobara kao što je US dolar indeks. Autori u istraživanju koriste dnevne i nedeljne podatke u periodu od jula 2011. godine do decembra 2015. godine. Empirijski rezultati su pokazali da Bitcoin nudi siromašnu zaštitu od rizika i može da posluži samo kao diversifikacijski alat.

Cilj ovog istraživanja jeste da ispita da li je preporučljivo uključiti određeni udeo Bitcoin-a u portfolio koji sadrži tradicionalne finansijske instrumente. Polazi se od hipoteze da Bitcoin predstavlja osnovu za diversifikaciju potfolija. Za potrebe ove analize korišćena je tehnologija optimizacije portfolija kojom je procenjen optimalan udeo tradicionalnih finansijskih instrumenata i Bitcoin-a u portfoliju. Za potrebe optimizacije korištena je Markowitz portfolio teorija.

Istraživanje je segmentirano kroz nekoliko delova. Prvi deo jeste uvodni deo, dok drugi deo nudi metodološki pristup, a treći prikazuje podatke koji su korišćeni, kao i deskriptivnu statistiku. Takođe, u ovom delu je ukazano na ključne nalaze istraživanja, te je data diskusija. Četvrti deo pokazuje testiranje diversifikacije primenom Wald testa, dok peti deo predstavlja zaključak.

2. Metodološki pristup

Sa ciljem da se analizira uloga Bitcoin-a u diversifikaciji portfolija, neophodno je izračunati povraćaje svake aktive koja se uključuje u portfolio. Dnevni povraćaj za svaki instrument je izračunat prema formuli koju su koristili Bodie, et al. (2014) kao i Šoja (2019), na sledeći način:

$$r_{it} = \ln(\frac{p_{it}}{p_{it-1}})$$

Pri čemu r_{it} predstavlja povraćaj aktive i u portfoliju, a ln predstavlja prirodni logaritam. Dalje, p_{it} predstavlja cenu (odnosno vrednost indeksa) u periodu t, a p_{it-1} je cena, odnosno vrednost aktive u prethodnom periodu (i.e. t - 1).

Prosečan povraćaj može biti izračunat na sledeći način:

$$r_i = \frac{r_{it} + \cdots r_{in}}{N}$$

Pri čemu N predstavlja broj opservacija.

Standardna devijacija je korišćena sa ciljem da se pokaže i shvati disperzija povraćaja serije podataka u odnosu na srednju vrednost, a izračunata je kao kvadratni koren varijanse. Novija literatura pokazuje da korišćenje modela volatilnosti, poput GARCH modela, rezultira u inkorektnim VaR procenama (Caporale and Zekokh 2019) zbog prisustva podataka koji mogu značajno da utiču na model i mere rizika (Trucíos 2019). Polazeći od toga, u ovom istraživanju korišćena je metodologija predložena od strane Bodie, et al. (2014).

Aktiva koja je volatilna ima visoku standardnu devijaciju, dok je standardna devijacija kod relativno stabilne aktive najčešće niska. Sa druge strane, ona meri neizvesnost kao rizik, čak i u slučaju kada postoje natprosečni povraćaji koji su poželjni za investitora. Standardna devijacija je izračunata na sledeći način:

$$\text{Standardna devijacija} = \sqrt{\frac{\sum_{j=1}^{n}(r_j - \bar{r})^2}{N}}$$

Pri čemu:

r_j predstavlja vrednost *jth* u datom setu podataka.

$\bar{r}$ predstavlja prosečan povraćaj posmatrane

Ripple, Litecoin, and Dash in a portfolio. They unearthed interesting findings that only Bitcoin and Ripple were shown to provide minimum variance portfolio benefits and volatility exposure, in line with Harry Markowitz's idea on the mean-variance portfolio.

Briere at al. (2015) used weekly data over the period from 2010-2013, and they analyzed a Bitcoin investment from the standpoint of a U.S. investor with a diversified portfolio including both traditional assets (worldwide stocks, bonds, hard currencies) and alternative investments (commodities, hedge funds, real estate). They concluded that, during the observed period, Bitcoin investment had highly distinctive features, including the exceptionally high average return and volatility. Also, they concluded that Bitcoin investments offer significant diversification benefits.

Carpenter (2016) used a modified mean-variance framework and showed that Bitcoin can be a viable diversification tool. His research showed that Bitcoin investment could be skewed by return activity that occurred during a speculative bubble in 2013.

Bouri et al. (2017) used a dynamic conditional correlation model and examined whether Bitcoin can act as a hedge and a haven in a portfolio which included major world stock indices, bonds, oil, gold, the general commodity index, and the US dollar index. The authors used daily and weekly data from July 2011 to December 2015. The empirical results showed that Bitcoin offers poor hedge and only can serve as a diversification tool.

The objective of this research is to examine whether it is advisable to include some portion of Bitcoin in a portfolio of traditional financial instruments. The portfolio optimization technique is used to estimate the optimal portfolio level using Markowitz's portfolio theory.

This paper is organized as follows: section one is the introduction, while section two provides the methodological approach and section three outlines the data set used and provides descriptive statistics. It also recapitulates the findings and discusses the practical implications. Section five shows the diversification testing via the Wald test, and section four concludes the paper.

2. Methodological Approach

In order to analyze the role of Bitcoin in portfolio diversification, the return of each asset in the portfolio of assets is computed in the following manner for the three regimes. The daily return of each instrument is computed in the sense of Bodie, et al. (2014) and Šoja (2019) as follows.

$$r_{it} = \ln(\frac{p_{it}}{p_{it-1}})$$

Where r_{it} is the return of asset i in the portfolio and *ln* denotes the natural logarithm. p_{it} is the price (or the index value) at the time period t and p_{it-1} is the price or value of assets in the prior period (i.e. t - 1).

The average of return can be computed in the following manner:

$$r_i = \frac{r_{it} + \cdots r_{in}}{N}$$

Where N is the number of observations.

The standard deviation is used to understand the dispersion of return series relative to its mean and is calculated as the square root of the variance. Recent literature shows that the use of *volatility models such as GARCH results in incorrect VaR estimates* (Caporale and Zekokh 2019) because the presence of outliers has a critical impact on the model's performance to produce more accurate estimates of risk measures (Trucíos 2019). As such, this paper utilizes the methodology proposed by Bodie, et al. (2014).

A volatile asset has a high standard deviation, while the standard deviation of a relatively stable asset is usually rather low. On the downside, it measures the uncertainty as risk even at times when above average returns favour the investors. The standard division is computed as follows.

$$\text{Standard Deviation} = \sqrt{\frac{\sum_{j=1}^{n}(r_j - \bar{r})^2}{N}}$$

Where:

r_j is the value of *jth* point in the data set.

$\bar{r}$ is the mean return in the return series.

N is the number of observations.

Value-at-risk (VaR) is used to model the

serije povraćaja.
N je broj opservacija.

Value-at-risk (VaR) predstavlja metodologiju koja se često koristi za izračunavanje potencijalnih gubitaka na investiciji kao i verovatnoće nastanka takvih gubitaka. Putem VaR modela se procenjuje najlošiji scenario gubitaka sa kojim se investitor može suočiti po pitanju ulaganja u konkretnu aktivu. Tri komponente se uključuju u procenu VaR-a: vremenski period, stepen poverenja i suma gubitka izražena procentualno. VaR pokazatelj, prema Bodie, et al. (2014) izračunava se na sledeći način:

$$VaR_{x,a} = -z_a \sigma S$$

Pri čemu z_a predstavlja kvantilni red dok je α standardizovana slučajna varijabla a S je vrednost pozicije. Sa ciljem da se izračuna VaR portfolija primenom Makrowitz metodologije, neophodno je izračunati kovarijansu i korelaciju među aktivama, očekivani povraćaj i rizik pojedinačne aktive koja se uključuje u portfolio. Prema Levišauskait (2010), očekivani povraćaj pojedinačne aktive u portfoliju može biti izračunat korišćenjem sledećeg izraza:

$$E_{r(p)} = \sum_{i=1}^{n} W_1 E_{i(r)} = W_1 E_{1(r)} + W_2 E_{2(r)} + \cdots + W_N E_{N(r)}$$

U ovom slučaju $E_{r(p)}$ predstavlja očekivani povraćaj *r* portfolija, *p* i *W* predstavljaju udele aktive *i* u portfoliju *p*. Sa ciljem da se shvati kako se kreću aktive koje se uključuju u portfolio, neophodno je izračunati korelaciju među njima. Uprkos tome što neki autori jednostavno zaključuju da Bitcoin nudi mogućnosti diversifikacije, odnosno nosi koristi kroz diversifikaciju na osnovu korelacione analize, korisno je uključiti i VaR u analizu, uzimajući u obzir visoki stepen volatilnosti Bitcoin-a, s obzirom na to da on u sebi ne sadrži neku aktivu koja bi činila njegovu osnovu.

Kovarijansa između dve aktive u portfoliju se izračunava na sledeći način:

$$\text{Kovarijansa (A, B)} = \frac{\sum(r_A - \bar{r}_A)(r_B - \bar{r}_B)}{N}$$

Pri čemu r_A predstavlja povraćaj aktive A, a r_B predstavlja povraćaj aktive B koja se nalazi u portfoliju, dok $\bar{r}_A$ predstavlja prosečan povraćaj aktive A, a $\bar{r}_B$ prosečan povraćaj aktive B. *N* i u ovom slučaju predstavlja broj opservacija. Korelacija između aktiva A i B može biti izračunata na sledeći način:

$$\text{Korelacija } (p) = \frac{Cov\ (A,B)}{\sigma_A \sigma_B}$$

Pri čemu *Cov(A,B)* predstavalja kovarijansu između aktive A i B, dok σ_A i σ_B predstavljaju standardnu devijaciju aktive A i aktive B.

Za testiranje diversifikacije portfolija u koji se uključuje Bitcoin korišćen je Wald test. U prvom koraku korišćen je test koji su razvili Huberman i Kendel (1987) prema kojem se koristi OLS regresija u koju je uključen povraćaj Bitcoin-a R_E koji je stavljen u regresijski odnos sa povraćajem K aktive koja čini portfolio, odnosno koji čini efikasan portfolio, bez Bitcoin-a a koji je označen kao $R^k{}_B$, k =1,...,K. Ovaj model je sledeći:

$$R_{e,t} = \alpha + \sum_{k=1}^{K} \beta_k R_{B,t}^k + \varepsilon_t; \quad t=1,2,\ldots T$$

Neophodan uslov za ovaj test jeste sledeći:

$$H_0: \alpha = 0 \ and \ \sum_{k=1}^{K} \beta_k = 1$$

Nulta hipoteza koja se testira jeste da portfolio koji sadrži K aktivu ima isti očekivani povraćaj ali nižu varijansu nego aktiva koja se testira, s obzirom na to da su instrumenti uključeni u portfolio K nekorelisani sa ε_t. Varijable su testirane primenom Wald testa kojim se ispituje značaj varijabli u modelu. Formula za Wald test je sledeća:

$$W_T = \frac{\left[\hat{\theta} - \theta_0\right]^2}{1/I_n\ (\hat{\theta})} = I_n(\hat{\theta})\left[\hat{\theta} - \theta_0\right]^2$$

Putem Wald testa se testira hipoteza da je alfa u modelu jednaka nuli, a da je beta jednaka jedinici. Isto tako, Wald test ispituje da li je posmatrana varijabla statistički značajna u modelu. Ukoliko je značajna, ona povećava validnost modela i kao takva treba biti uključena u isti.

3. Podaci i empirijski nalazi

Prilikom određivanja optimalnog portfolija koji uključuje Bitcoin, posmatrano sa aspekta investitora koji ulaže na globalnom nivou, izabrano je nekoliko instrumenata koji aproksimiraju globalne investicijske

potential for any loss in the investment asset being considered and the probability of occurrence of such loss. It assesses the worst-case scenario that an investor could face with regard to investment in assets. Three components are involved in the estimates of VaR statistics: time period, the confidence level and the amount of loss in percentages. The VaR in the sense of Bodie, et al. (2014) can be computed as follows:

$$VaR_{x,a} = -z_a \sigma S$$

Where z_a is the quantile order α of the standardized random variable and S is the value of the position. In order to compute the VaR using Markowitz's method, one must compute the correlation and covariance among assets, expected returns and the risk of individual assets in the portfolio. In the sense of Levišauskait, (2010), the expected return of individual assets in the portfolio could be computed by the following equation.

$$E_{r(p)} = \sum_{i=1}^{n} W_1 E_{i(r)} = W_1 E_{1(r)} + W_2 E_{2(r)} + \cdots + W_N E_{N(r)}$$

Where $E_{r(p)}$ is the expected return r on the portfolio p and W is the weight of asset i in the portfolio p. In order to understand to what extend the assets in the portfolio move together, one must need to compute the correlation among individual assets. Although some authors simply conclude that the Bitcoin offers diversification benefits based on the correlation analysis, it would be more appropriate to consider VaR given the high volatility and the fact that there are no underlying assets.

The covariance between any two assets in the portfolio is computed as follows.

$$\text{Covariance (A, B)} = \frac{\sum(r_A - \bar{r}_A)(r_B - \bar{r}_B)}{N}$$

Where r_A is the return of asset A and r_B is the return of asset B in the portfolio and $\bar{r}_A$ denotes the average return of asset A and $\bar{r}_B$ denotes the average return of asset B. N as usual is the number of observations. The correlation between assets A and B could be computed in the following manner:

$$\text{Correlation } (p) = \frac{Cov\,(A,B)}{\sigma_A \sigma_B}$$

Where *Cov(A,B)* is the covariance between asset A and asset B. σ_A and σ_B are the standard deviation of asset A and asset B.

We test the diversification of portfolios that include Bitcoin via the Wald test. At the first stage we used the test developed by Huberman and Kendel (1987) which includes running OLS regression of Bitcoin return R_E on the returns of K assets that represents an efficient frontier without Bitcoin, $R^k{}_B$, k =1,...,K. That model is the following:

$$R_{e,t} = \alpha + \sum_{k=1}^{K} \beta_k R_{B,t}^k + \varepsilon_t; \quad t=1,2,\ldots T$$

The necessary condition for this test is:

$$H_0: \alpha = 0 \; and \; \sum_{k=1}^{K} \beta_k = 1$$

The null hypothesis in this test is that portfolio comprising K assets has the same expected return but a lower variance than the tested assets since the K benchmark assets are uncorrelated with ε_t. After this condition we run a Wald test to assume if the explanatory variables in a model are significant. The formula for Wald test is:

$$W_T = \frac{\left[\hat{\theta} - \theta_0\right]^2}{1/I_n\,(\hat{\theta})} = I_n(\hat{\theta})\left[\hat{\theta} - \theta_0\right]^2$$

Through the Wald test we test the hypothesis that the alpha in the model is equal to zero and beta is equal to 1. Also, the Wald test examines whether the observed variable is statistically significant in the model. If so, it increases the validity of the model and, as such, should be included in it.

3. Data and Empirical Findings

In order to explore the optimal portfolio diversification using Bitcoin for a global investment portfolio, a few investment instruments were chosen, because they provide a good approximation for the global investment opportunities. Financial instruments considered for the optimization process are as follows:

- Monetary gold denominated in USD;
- S&P 500, which represents stock market

mogućnosti. Korišćeni su podaci visoke frekvencije i dnevni podaci na zatvaranju tržišta. Finansijski instrumenti koji su uključeni u proces optimizacije su:

- Monetarno zlato denominirano u dolarima;
- Akcijski indeks S&P koji predstavlja globalno tržište akcija;
- Globalni indeks obveznica dospeća 1-10 godina denominovan u dolarima, a koji predstavlja globalno tržište obveznica;
- Bitcoin denominovan u dolarima.

Svi instrumenti su posmatrani na dnevnom nivou u periodu od 30.7.2010. do 30.6.2019. U prvom koraku izračunati su dnevni povraćaji za instrument koji se uključuje u proces optimizacije. U narednom koraku, koristeći Markowitz metodologiju portfolija, izračunat je efikasan portfolio, odnosno optimalan portfolio, koji nosi najmanji rizik izražen standardnom devijacijom. Ograničenja koja su postavljena prilikom izračunavanja optimalnog portfolija su sledeća:

- Udeo svakog instrumenta je određen između 0% do 100%. To znači da je prilikom simulacija udeo svakog instrumenta mogao da se kreće u ovom intervalu;
- Cilj optimizacije bio je dvostruk: da se iznađe portfolio sa minimalnim rizikom, minimalnom standardnom devijacijom i da se odredi agresivniji portfolio koji nosi veći stepen povraćaja;
- Prodaje na kratko nisu dozvoljene;
- Bezrizična kamatna stopa je određena na 0%.

Optimizacija portfolija je izračunata nad dnevnim podacima za sva tri posmatrana perioda. U prvom koraku dat je pregled deskriptivne statistike za svaki analizirani instrument. U drugom koraku izračunata je korelacija među instrumentima, a nakon toga su određeni optimalni portfoliji.

3.1. Deskriptivna statistika

Deskriptivna statistika za analizirani period prikazana je tabelom broj 1 i obuhvata podatke o prosečnom povraćaju, standardnoj devijaciji, učestalosti negativnog povraćaja i VaR-u.

Dnevni povraćaji za analizirane instrumente pokazuju da je povraćaj kod tradicionalnih instrumenata veoma skroman i kreće se nešto iznad 0%, dok Bitcoin nosi prosečan dnevni povraćaj od 0,72%. Međutim, i standardna devijacija, kao mera rizika, je najveća kod Bitcoin-a, što je potvda da je ovaj instrument najrizičniji. Zlato i indeks S&P imaju skoro isti nivo rizika, ukoliko se posmatra standardna devijacija.

Tabela 1. Deskriptivna statistika: dnevni podaci 19.7.2010. do 30.6.2019.

	Bitcoin	S&P Index	Zlato	1-10 g globalni indeks obveznica
Prosek	0,72%	0,04%	0,01%	0,00%
StDev	6,67%	0,94%	0,95%	0,29%
Freq<0	43,03%	45,62%	48,42%	48,68%
Parametric VaR	-10,25%	-1,50%	-1,55%	-0,48%
Empirical VaR	-8,36%	-1,56%	-1,49%	-0,47%
Parametric CVaR	-13,04%	-1,90%	-1,95%	-0,60%
Empirical CVaR	-14,03%	-2,32%	-2,30%	-0,68%

Izvor: Računica autora

Ukoliko rizik značajno varira tokom vremena, standardna devijacija daje manje pouzdane procene rizika. Stoga je za procenu rizika korisno primeniti i metod VaR. Merom VaR se procenjuje koliko investitor može da očekuje da će izgubiti investirajući sredstva u neku aktivu, pod normalnim tržišnim uslovima, unutar određenog vremenskog okvira. Regulatori, poput centralnih banaka kao i drugih kreatora politika u finansijskom sektoru, koriste ovu meru kako bi ocenili koji deo aktive treba biti pokriven od potencijalnog gubitka za dati nivo rizika. U ovoj analizi izračunati su parametarski i empirijski VaR, kao i CvaR, uz interval poverenja od 95%. Rezultati parametarskog i empirijskog VaR-a za Bitcoin za sva tri posmatrana perioda pokazuju da

investments;
- Global Bond Index (global bonds maturity 1-10y) denominated in USD, which represents bond market investments;
- Bitcoin denominated in USD.

All instruments were observed on a daily basis from 30.7.2010 until 30.6.2019. In the first step, the daily returns for each instrument were calculated. In the next step, using Markowitz's portfolio methodology, the efficient portfolio was calculated, i.e. the optimal portfolio that carried the least amount of risk expressed through the standard deviation. The limitations that were set when calculating the optimal portfolio were as follows:
- The share of each instrument is set between 0% and 100% That means that, during the simulations, the share of each instrument could change within this interval;
- The aim of the optimisation was twofold: to end up with a minimal risk portfolio, with a minimal standard deviation and to set a more aggressive portfolio with a higher yield;
- Short selling is not allowed;
- The risk-free rate is 0%.

Portfolio optimization is calculated for daily data. Firstly, the descriptive statistics are computed for all analyzed instruments. Secondly, the correlations between the analyzed instruments are computed and after that, the portfolio optimization was performed.

3.1. Descriptive Statistics

Descriptive statistics of the sample data for daily time horizons are summarized in Table 1. Descriptive statistics show the mean of returns for all instruments, standard deviation, frequency of negative returns and VaR.

Daily returns show that returns on traditional instruments are very modest, earning just above 0%, while Bitcoin carries an average daily return of 0.72%. However, standard deviation, as a measure of risk, is the highest with Bitcoin, which is to say that this instrument is the riskiest one. Gold and the S&P index have almost the same level of risk if the standard deviation is observed.

If the risk varies significantly over time, the standard deviation gives less reliable risk estimates. Therefore, the VaR method is also useful for risk assessment. The VaR measures how much an investor can expect to lose by investing in an asset, under normal market conditions, within a specified time frame. Regulators, such as central banks and other policymakers in the financial sector, use this measure to gauge what portion of assets should be covered by a potential loss for a given level of risk. In this analysis, parametric and empirical VaR as well as CvaR were calculated, with a confidence interval of 95%. The results of parametric and empirical VaR for Bitcoin for all three observed periods show that this instrument carries a higher risk than other instruments. Data for VaR, parametric VaR, suggest that the investor could lose up to 10.2% of their investment in Bitcoin on a daily basis over the period under review. Bitcoin is known to be a less stable instrument and therefore parametric VaR may not show a true level of risk. In order to overcome these obstacles, the

Table 1. Descriptive statistics: daily data from 19.7.2010 to 30.6.2019

	Bitcoin	S&P Index	Gold	1-10 Year Global Government Index
Mean	0.72%	0.04%	0.01%	0.00%
StDev	6.67%	0.94%	0.95%	0.29%
Freq<0	43.03%	45.62%	48.42%	48.68%
Parametric VaR	-10.25%	-1.50%	-1.55%	-0.48%
Empirical VaR	-8.36%	-1.56%	-1.49%	-0.47%
Parametric CVaR	-13.04%	-1.90%	-1.95%	-0.60%
Empirical CVaR	-14.03%	-2.32%	-2.30%	-0.68%

Source: Authors' calculations

ovaj instrument nosi veći rizik od ostalih instrumenata. Podaci za VaR, parametarski VaR, sugerišu da bi investitor mogao izgubiti do 10,2% ulaganja u Bitcoin na dnevnoj osnovi tokom posmatranog perioda. Poznato je da je Bitcoin manje stabilan instrument, te stoga parametarski VaR možda ne pokazuje istinitu sliku rizika. Kako bi se prevazišle ove prepreke, primenjuje se uslovni VaR, CvaR, koji obuhvata i modifikuje određene nedostatke parametarskog modela. VaR procenjuje najgori scenario, najveći stepen gubitka za datu verovatnoću i za dati vremenski okvir. Podatak za parametarski i empirijski VaR za dnevne povraćaje pokazuje da investitor može izgubiti do 14,03% investicije u Bitcoin u celom posmatranom vremenskom periodu investiranja.

Tabela 2. Matrica korelacije, dnevni povraćaji (19.7.2010. do 30.6.2019)

	Bitcoin	S&P Index	Zlato	1-10 g globalni indeks obveznica
Bitcoin	1			
S&P Index	0,003917	1		
Zlato	0,036688	0,049956	1	
1-10 g globalni indeks obveznica	-0,01537	0,023119	0,035422	1

Izvor: Računica autora

3.2. Optimizacija portfolija

Optimizacija portfolija koju je razvio Markowitz sugeriše da dobra diversifikacija portfolija treba da uključi one instrumente koji nisu međusobno visoko korelisani. Polazeći od tog prvog uslova, izračunata je korelacija za analizirane instrumente, što pokazuje tabela broj 2.

Rezultati pokazuju da je korelacija veoma niska između posmatranih instrumenata, skoro da i ne postoji, dok je blago negativna između Bitcoin-a i obveznica (-0,01537). Ovakav rezultat pokazuje da analizirani instrumenti mogu kreirati diversifikovan portfolio. Kako bi se ispitali uloga i doprinos Bitcoin-a u portfoliju analizirana su dva portfolija. Jedan koji ima za cilj minimalizovanje rizika investitora, odnosno kreiranje portfolija koji nosi prihvatljiv nivo rizika uz određeni nivo povraćaja i drugi, agresivniji portfolio, koji investitoru nosi veći stepen povraćaja na dnevnom nivou. Tabela broj 3 pokazuje diversifikovanu strukturu portfolija kojem je cilj minimalizovanje rizika

Tabela 3. Diversifikacija portfolija, portfolio sa minimalnim rizikom, dnevni podaci od 19.7.2010. do 30.6.2019.

Rizik i povraćaj			Struktura portfolija			
Prosečan povraćaj	St. devijacija	Šarp racio	Bitcoin	S&P	Zlato	Državne obveznice
0,00%	0,29%	0,0117	0,00%	0,00%	0,00%	100,00%
0,01%	0,28%	0,0180	0,00%	2,82%	6,90%	90,28%
0,01%	**0,27%**	**0,0296**	**0,17%**	**7,51%**	**6,98%**	**85,34%**
0,05%	0,46%	0,1084	5,33%	20,47%	5,63%	68,57%
0,08%	0,69%	0,1154	9,02%	29,75%	4,67%	56,55%
0,10%	0,86%	0,1165	11,48%	35,94%	4,03%	48,55%
0,12%	**1,03%**	**0,1168**	**13,94%**	**42,13%**	**3,39%**	**40,54%**
0,15%	1,29%	0,1167	17,65%	51,45%	2,42%	28,48%
0,17%	1,46%	0,1165	20,11%	57,64%	1,78%	20,47%
0,20%	1,72%	0,1162	23,79%	66,89%	0,82%	8,50%
0,22%	1,90%	0,1161	26,26%	73,15%	0,31%	0,28%
0,25%	2,16%	0,1156	30,68%	69,32%	0,00%	0,00%
0,27%	2,35%	0,1151	33,64%	66,36%	0,00%	0,00%
0,30%	2,63%	0,1143	38,11%	61,89%	0,00%	0,00%
0,32%	2,81%	0,1137	41,06%	58,94%	0,00%	0,00%
0,35%	3,10%	0,1129	45,51%	54,49%	0,00%	0,00%

Izvor: Računica autora

Table 2. Correlation matrix, daily returns (19.7.2010 to 30.6.2019)

	Bitcoin	S&P Index	Gold	1-10 Year Global Government Index
Bitcoin	1			
S&P Index	0.003917	1		
Gold	0.036688	0.049956	1	
1-10 Year Global Government Index	-0.01537	0.023119	0.035422	1

Source: Authors' calculations

implementation refers to the conditioned VaR, CvaR, which captures and modifies certain disadvantages of the parametric model. VaR estimates the worst-case scenario, the highest degree of loss for a given probability and for a given time frame. Data for parametric and empirical VaR for daily returns shows that an investor can lose up to 14.03% of an investment in Bitcoin over the entire investment time period.

3.2. Portfolio Optimization

Markowitz's portfolio theory suggests that, for good portfolio diversification, it is necessary to include financial instruments that are not highly correlated with each other. Considering this, correlations analysis is carried out and the results are outlined below (See Table 2).

The results show that the correlation is very low between all instruments and a mildly negative correlation was noted between Bitcoin and bonds (-0.01537) can be observed. These results show that all analysed instruments are good for diversification. In order to explore the role and benefit of Bitcoin in investment portfolios we created two portfolios. One which is aimed at creating portfolios that carry an acceptable level of risk with a certain level of return and a second, more aggressive portfolio, which gives the investor a higher level of return on a daily basis. Table 3 shows the diversified portfolio structure aimed at minimizing the risk, expressed through standard deviation.

Table 3 shows the different portfolio structures for a given degree of risk and return. The results show that if the portfolio does not include Bitcoin in its structure and aims to minimize the risk, such portfolio carries

Table 3. Portfolio diversification, minimum variance portfolio, daily data from 19.7.2010 to 30.6.2019.

Risk and return			Portfolio structure			
Return	St. deviation	Sharp ratio	Bitcoin	S&P	Gold	1-10 Year Global Government Index
0.00%	0.29%	0.0117	0.00%	0.00%	0.00%	100.00%
0.01%	0.28%	0.0180	0.00%	2.82%	6.90%	90.28%
0.01%	**0.27%**	**0.0296**	**0.17%**	**7.51%**	**6.98%**	**85.34%**
0.05%	0.46%	0.1084	5.33%	20.47%	5.63%	68.57%
0.08%	0.69%	0.1154	9.02%	29.75%	4.67%	56.55%
0.10%	0.86%	0.1165	11.48%	35.94%	4.03%	48.55%
0.12%	**1.03%**	**0.1168**	**13.94%**	**42.13%**	**3.39%**	**40.54%**
0.15%	1.29%	0.1167	17.65%	51.45%	2.42%	28.48%
0.17%	1.46%	0.1165	20.11%	57.64%	1.78%	20.47%
0.20%	1.72%	0.1162	23.79%	66.89%	0.82%	8.50%
0.22%	1.90%	0.1161	26.26%	73.15%	0.31%	0.28%
0.25%	2.16%	0.1156	30.68%	69.32%	0.00%	0.00%
0.27%	2.35%	0.1151	33.64%	66.36%	0.00%	0.00%
0.30%	2.63%	0.1143	38.11%	61.89%	0.00%	0.00%
0.32%	2.81%	0.1137	41.06%	58.94%	0.00%	0.00%
0.35%	3.10%	0.1129	45.51%	54.49%	0.00%	0.00%

Source: Authors' calculations

izraženog kroz standardnu devijaciju.

Tabela broj 3 prikazuje različite strukture portfolija za dati stepen rizika i povraćaja. Rezultati pokazuju da ukoliko portfolio ne uključuje u svojoj strukturi Bitcoin, a za cilj ima minimalizovanje rizika, takav portfolio nosi povraćaj od 0,01% i standardnu devijaciju od 0,28%. Ipak, ukoliko se određeni udeo Bitcoin-a uključi u strukturu portfolija, moguće je blago smanjiti ukupan rizik. Portfolio koji nosi minimalan rizik jeste onaj koji uključuje veoma mali udeo Bitcoin-a od 0,17%, S&P indeks sa udelom od 7,51%, zlato sa udelom od 6,98% i državne obveznice dospeća od 1 do 10 godina sa udelom od 85,34%. Takav portfolio investitoru nudi dnevni povraćaj od 0,01% uz rizik od 0,27%. Međutim, optimalan portfolio ne mora da bude, i najčešće nije, onaj koji nosi minimalan rizik, nego onaj koji nudi veći pokazatelj Šarp racija. Onaj portfolio koji nudi veći Šarp racio ujedno nudi i bolje performanse portfolija koji je prilagođen za rizik.

indeksa S&P, 3,39% zlata i 40,54% državnih obveznica. Ovakav portfolio investitoru nudi dnevni povraćaj od 0,12% i rizik od 1,03%. Na osnovu prikazane strukture portfolija zaključuje se da Bitcoin nudi mogućnost diversifikacije i da je poželjeno određeni udeo ovog instrumenta uključiti u portfolio, bez obzira na to da li investitor želi minimalizovati rizik ili želi da razvije portfolio koji maksimizuje Šarp racio. Uzimajući u obzir da je Bitcoin veoma volatilan i samim tim rizičan instrument, povraćaj ovog instrumenta je takođe visok. Takve karakteristike ovog instrumenta investitoru mogu da osiguraju mnogo veće nivoe povraćaja u odnosu na tradicionalne instrumente investiranja. Stoga je konstruisan portfolio koji je označen kao „agresivni portfolio" a koji nudi investitoru visoki nivo dnevnog povraćaja, značajno veći u odnosu na povraćaje koje nosi portfolio kojem je u fokusu minimalizovanje rizika. Struktura takvog portfolija prikazana je tabelom broj 4.

Tabela 4. Diversifikacija portfolija, agresivni portfolio sa većim stepenom dnevnog povraćaja, dnevni podaci od 19.7.2010. do 30.6.2019.

Rizik i povraćaj			Struktura potfolija			
Prosečan povraćaj	St. devijacija	Šarp racio	Bitcoin	S&P	Zlato	Državne obveznice
0,60%	1,84%	0,3265	0,61%	46,94%	0,00%	52,45%
1,00%	2,64%	0,3795	2,54%	46,00%	0,00%	51,46%
2,00%	5,51%	0,3632	7,36%	43,65%	0,00%	48,99%
3,00%	8,62%	0,3479	12,17%	41,29%	0,00%	46,53%
4,00%	11,79%	0,3392	16,99%	38,94%	0,00%	44,07%
5,00%	**14,32%**	**0,3491**	**20,12%**	**73,68%**	**6,21%**	**0,00%**
6,00%	17,48%	0,3433	24,94%	71,32%	3,74%	0,00%
7,00%	20,64%	0,3392	29,72%	69,93%	0,00%	0,36%
8,00%	23,87%	0,3352	34,63%	65,37%	0,00%	0,00%
9,00%	27,11%	0,3320	39,57%	60,43%	0,00%	0,00%
10,00%	30,36%	0,3294	44,51%	55,49%	0,00%	0,00%
11,00%	33,61%	0,3272	49,44%	50,56%	0,00%	0,00%
12,00%	36,87%	0,3254	54,38%	45,62%	0,00%	0,00%
13,00%	40,14%	0,3239	59,31%	40,69%	0,00%	0,00%
14,00%	43,39%	0,3226	64,25%	35,75%	0,00%	0,00%
15,00%	46,66%	0,3214	69,19%	30,81%	0,00%	0,00%

To znači da portfolio koji nosi veći Šarp racio nudi i veću korisnost investitoru posmatrano sa aspekta povraćaja i rizika. U ovom slučaju portfolio koji nosi najveći Šarp racio jeste onaj u koji se uključuje 13,94% Bitcoin-a, 42,13%

Ukoliko investitor u strukturu portfolija uključi veći udeo Bitcoin-a, čime bi kreirao agresivan portfolio, postoji mogućnost da osigura veći nivo dnevnog povraćaja, kako je i prikazano tabelom broj 4. Međutim, ukoliko

a return of 0.01% and a standard deviation of 0.28%. However, if a certain percentage of Bitcoin is included in the portfolio structure, it is possible to slightly reduce the overall risk. The minimum risk portfolio is one that includes a very low Bitcoin share of 0.17%, S&P index with a share of 7.51%, gold with a share of 6.98% and government bonds with a maturity of 1-10 years with a share of 85.34%. Such a portfolio offers the investor a daily return of 0.01% with a risk of 0.27%. However, the optimal portfolio does not have to be, and mostly is not, the one that carries minimal risk, but one that offers a higher Sharp ratio. The portfolio that offers a higher Sharp ratio also offers better risk-adjusted portfolio performance.

This means that a portfolio that carries a larger Sharp ratio offers better portfolio performance, considering risk and returns. In this case, the portfolio that carries the largest Sharp ratio is the one that includes 13.94% of Bitcoin, 42.13% of S&P Index, 3.39% of gold and 40.54% of government bonds. The portfolio that includes this share of instruments can offer a daily return of 0.12% and a risk of 1.03%. Considering this, it is concluded that Bitcoin offers the possibility of diversification and it is desirable to include a certain share of this instrument in the portfolio, regardless of whether the investor wants to minimize the risk or wants to develop a portfolio that maximizes Sharp ratio. Considering that Bitcoin is very volatile and therefore a risky instrument, the return on this instrument is also high. Such features of this instrument can provide investors much higher levels of return than traditional instruments. Therefore, a portfolio was created that was marked as an "aggressive portfolio" and which offers the investor a high level of daily return, significantly higher than the returns brought by a portfolio which focuses on minimizing risk. The structure of such a portfolio is shown in Table 4.

If an investor incorporates a higher portion of Bitcoin into the portfolio, thereby creating an aggressive portfolio (higher risk), there is a possibility to provide a higher level of daily return, as shown in Table 4. However, if the degree of diversification utility was considered, considering the level of Sharp ratio, the investor who prefers a higher degree of risk should choose a portfolio structure that includes 20.12% of Bitcoin, 73.68% of S&P and 6.21% of gold, excluding government bonds. Such a

Table 4. Portfolio diversification, aggressive portfolio with higher daily returns, daily data from 19.7.2010 until 30.6.2019

Risk and return			Portfolio structure			
Return	St. deviation	Return	St. deviation	Return	St. deviation	Return
0.60%	1.84%	0.3265	0.61%	46.94%	0.00%	52.45%
1.00%	2.64%	0.3795	2.54%	46.00%	0.00%	51.46%
2.00%	5.51%	0.3632	7.36%	43.65%	0.00%	48.99%
3.00%	8.62%	0.3479	12.17%	41.29%	0.00%	46.53%
4.00%	11.79%	0.3392	16.99%	38.94%	0.00%	44.07%
5.00%	**14.32%**	**0.3491**	**20.12%**	**73.68%**	**6.21%**	**0.00%**
6.00%	17.48%	0.3433	24.94%	71.32%	3.74%	0.00%
7.00%	20.64%	0.3392	29.72%	69.93%	0.00%	0.36%
8.00%	23.87%	0.3352	34.63%	65.37%	0.00%	0.00%
9.00%	27.11%	0.3320	39.57%	60.43%	0.00%	0.00%
10.00%	30.36%	0.3294	44.51%	55.49%	0.00%	0.00%
11.00%	33.61%	0.3272	49.44%	50.56%	0.00%	0.00%
12.00%	36.87%	0.3254	54.38%	45.62%	0.00%	0.00%
13.00%	40.14%	0.3239	59.31%	40.69%	0.00%	0.00%
14.00%	43.39%	0.3226	64.25%	35.75%	0.00%	0.00%
15.00%	46.66%	0.3214	69.19%	30.81%	0.00%	0.00%

se posmatra stepen korisnosti diversifikacije, uzimajući u obzir visinu Šarp racija, investitor koji preferira veći stepen rizika trebalo bi da izabere strukturu portfolija koja uključuje 20,12% Bitcoin-a, 73,68% indeksa S&P te 6,21% zlata, bez uključivanja državnih obveznica. Takav portfolio bi investitoru nosio dnevni povraćaj od čak 5%, ali uz rizik od 14,32%. Diversifikacija portfolija koja uključuje veći udeo Bitcoin-a nosi mnogo veće dnevne povraćaje, međutim, upitno je koliko je prihvatljivo uključivanje visokog rizika u portfolio. To, naravno, zavisi od stepena rizika koji je investitor spreman da prihvati.

4. Testiranje diversifikacije

Nakon što je pokazana uloga Bitcoin-a u procesu diversifikacije portfolija, ispitan je značaj uključivanja ovog instrumenta u investicioni portfolio. Za testiranje Bitcoin-a u strukturi portfolija korišten je Wald test kojim je ispitan značaj parametra regresije. Testira se da li je parametar regresije, u ovom slučaju Bitcoin, značajan u modelu. Parametar je značajan ukoliko je različit od nule. Wald testom se ispituje osnovna hipoteza da je analizirani parametar ravan nuli. U prvom koraku izračunata je regresija, prema predloženoj metodologiji, a nakon toga je Wald testom ispitan značaj ovog parametra. Rezultati su prikazani tabelom broj 5 za posmatrane tri strukture portfolija:

Tabela 5. Wald test, dnevni podaci

Wald test Hypothesis: α=0; β=1	F-statistics	Verovatnoća	Hipoteza
Minimalizovanje rizika	0,00	0,00	Odbacuje se
Max Šap uz min. rizika	0,00	0,00	Odbacuje se
Agresivan portfolio	0,00	0,00	Odbacuje se

Izvor: Računica autora

- Portfolio koji nosi minimalan rizik izražen kroz standardnu devijaciju. Struktura portfolija: Bitcoin 0,17%, S&P 7,51%, zlato 6,98% i državne obveznice 85,34%;
- Portfolio koji nudi maksimalan Šarp racio sa ciljem nižeg rizika. Struktura portfolija: Bitcoin 13,94%, S&P 42,13%, zlato 3,39% i državne obveznice 40,54%;
- Agresivni portfolio koji nudi veći stepen dnevnog povraćaja. Struktura portfolija: Bitcoin 20,12% Bitcoin-a, S&P 73,68% i zlato 6,21%.

Rezultati Wald testa pokazuju da je tokom celog perioda posmatranja, od 19.7.2010. do 30.6.2019, Bitcoin nudio dobru osnovu za diversifikaciju i predstavljajo je značajnu varijablu u strukturi portfolija. Bitcoin je kao instrument u portfoliju značajan kako u slučaju portfolija koji nosi minimalan rizik, tako i u slučaju portfolija koji maksimizuje Šarp racio, i u slučaju agresivnog portfolija.

5. Zaključak

U poslednjih nekoliko godina, Bitcoin je postao veoma atraktivan instrument kojem se pridaje sve veća pažnja. Investitori imaju različite stavove oko Bitcoin-a, u prvom redu u delu njegovog definisanja, ali i stava prema uključivanju ovog instrumenta u investicioni portfolio, s obzirom na to da se radi o špekulativnoj i visoko volatilnoj aktivi. U ovom istraživanju analizirana je uloga Bitcoin-a u procesu diversifikacije portfolija na primeru portfolija koji uključuje tradicionalnu aktivu poput obveznica, akcija i zlata. Optimizacija portfolija je određena primenom Markowitz teorije portfolija. Rezultati pokazuju da Bitcoin može biti dobar izvor diversifikacije portfolija, ukoliko se posmatra portfolio koji uključuje tradicionalne finansijske instrumente, posmatrano prema podacima na dnevnom nivou. Rezultati pokazuju i navode na zaključak da je povoljno uključiti u strukturu portfolija mali udeo Bitcoin-a. Takođe, ukoliko investitor ima veći apetit za rizik, može kreirati agresivniji portfolio u kojem je veće učešće Bitcoin-a i koji mu, zasigurno, može doneti veći dnevni povraćaj ali i značajno veći nivo rizika.

Pre nego što donesu odluku o investiranju u Bitcoin, investitori treba da procene svoj apetit za rizik i željeni povraćaj, te da saglasno tome ocene i udeo Bitcoin-a koji žele da uključe u portfolio. Struktura portfolija prema Markowitz teoriji, koja preferira oprezan stav prema riziku, pokazuje da je optimalno u portfolio koji uključuje tradicionalne instrumente uključiti do 14% Bitcoin-a. Takav udeo ovog instrumenta

portfolio could give a daily return of as much as 5%, but the risk could be 14.32%. Portfolio diversification involving higher shares of Bitcoin definitely carries much higher daily returns. However, it is questionable how acceptable it is to include high risk in the portfolio. That, of course, depends on the degree of risk the investor is willing to accept.

4. Diversification Test

In the previous section, it was shown that Bitcoin should be included in a portfolio that is aimed towards minimizing the risk and in an aggressive portfolio. In order to have **a** full analysis, it is necessary to test the portfolio diversification – diversification that includes Bitcoin. In order to test the importance of Bitcoin in portfolio diversification, we used a Wald test. Through the Wald test we examined the significance of the regression parameter. The regression parameter is significant if it is different from zero. The basic hypothesis in the Wald test is that the analyzed parameter is zero. In the first step, we ran the regression analysis and after that, we tested the significance of Bitcoin in the regression model. The results are shown in Table 5 for the three portfolio structures that were observed:

- A portfolio that carries minimal risk expressed through standard deviation. Portfolio Structure: Bitcoin 0.17%, S&P 7.51%, gold 6.98% and government bonds 85.34%;
- The portfolio that maximizes the Sharp ratio and minimizies the risk. Portfolio Structure: Bitcoin 13.94%, S&P 42.13%, gold 3.39% and government bonds 40.54%;
- An aggressive portfolio that carries a higher daily return. Portfolio Structure: Bitcoin 20.12% Bitcoin, S&P 73.68% and gold 6.21%.

The results show that during the whole period of observation, from 19.7.2010 until 30.6.2019, Bitcoin was a good source of diversification and it was a significant variable in the regression model, so we conclude that is useful to include Bitcoin in a model, in a portfolio. Bitcoin is significant in a both case: in a portfolio that carries minimal risk and in the portfolio that maximizes Sharpe ratio as well as in the case of an aggressive portfolio.

Table 5. Wald test, Daily data

Wald test Hypothesis: α=0; β=1	F-statistics	Probability	Hypothesis
Minimizing risk	0.00	0.00	Rejected
Max sharp with min. risk	0.00	0.00	Rejected
Aggressive portfolio	0.00	0.00	Rejected

Source: Authors' calculations

5. Conclusion

Over the last few years Bitcoin has become a very attractive instrument that is receiving increasing attention. Investors have different opinions about Bitcoin and it appears to be a speculative asset with high volatility and lack of scalability. This paper explores the role of Bitcoin in portfolio diversification among traditional classes of assets such as bonds, stocks, and gold, using the portfolio optimization theory of Markowitz. The results show that Bitcoin can be a good source of diversification daily for a portfolio that consists of traditional financial instruments. However, it is advisable to include a small portion of Bitcoin in the portfolio because of its excessive volatility and lack of scalability. The results show that Bitcoin can be a good source of portfolio diversification if one looks at a portfolio that includes traditional financial instruments, as viewed on a daily basis. The results also indicate that it is advantageous to include a small share of Bitcoin in the portfolio structure. Also, if an investor has a higher appetite for risk, they can create a more aggressive portfolio with a higher Bitcoin share and which can certainly bring them a higher daily return but also a significantly higher level of risk. If an investor has a higher appetite for risk, they can create a more aggressive portfolio with higher Bitcoin share and which, of course, can bring them a higher daily return but also a significantly higher level of risk.

Before deciding whether to invest in Bitcoin, investors should evaluate their risk appetite, desirable returns, and evaluate the proportion

može da ponudi dobar i prihvatljiv balans između rizika i povraćaja, posmatrano na dnevnom nivou. Agresivniji portfolio sugeriše uključivanje ovog instrumenta do 20% u ukupnoj strukturi portfolija. Test diversfikacije je pokazao da i veoma mali udeo Bitcoin-a u portfoliju nudi dobru osnovu za diversifikaciju.

Uprkos ovim rezultatima, važno je naglasiti da se za Bitcoin 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 Bitcoin-a u strukturu portfolija značajno pojačava rizik portfolija, što investitori uvek moraju da imaju u vidu.

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of Bitcoins they wish to include in the portfolio accordingly. The portfolio structure according to Markowitz theory, which prefers a cautious attitude towards risk, shows that it is optimal to include up to 14% of Bitcoin in a portfolio that includes traditional instruments. Such a share of this instrument can offer a good and acceptable risk-return ratio, observed on a daily basis. A more aggressive portfolio suggests including this instrument up to 20% in the overall portfolio structure. The diversification test showed that a very small share of Bitcoin in the portfolio also offers a good basis for diversification.

Despite these results, it is important to emphasize that Bitcoin is bound by volatility and high volatility, with this instrument offering weak fundamentals of preserving value and serving more as a medium of exchange for money than an actual medium of exchange. In such circumstances, incorporating a larger share of Bitcoin into the portfolio structure significantly increases the risk of the portfolio, which investors always have to keep in mind.

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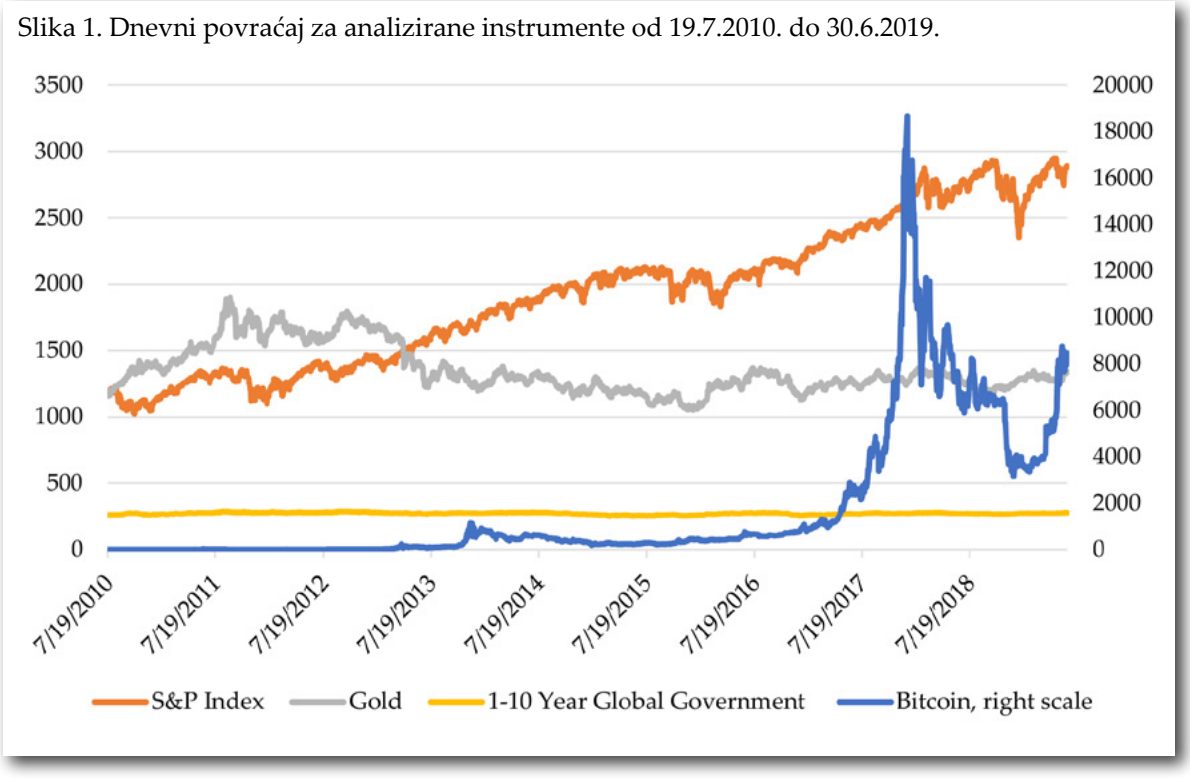
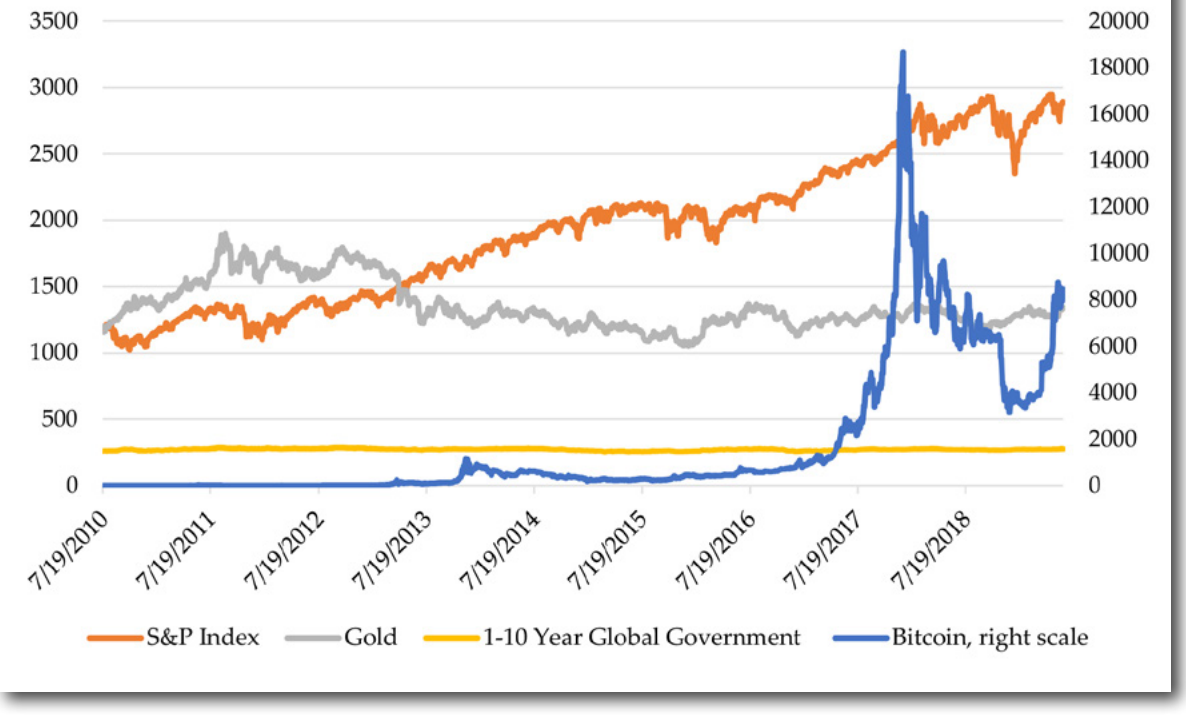
Prilog

Slika 1. Dnevni povraćaj za analizirane instrumente od 19.7.2010. do 30.6.2019.



Appendix

Figure 1. Daily values for analysed instruments from 19.7.2010 until 30.6.2019



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OGRANIČENJA KOMPOZITNIH INDEKSA U MERENJU KONKURENTNOSTI

Prevod obezbedio autor

Rezime

U ekonomskoj teoriji i praksi analiziraju se različiti aspekti konkurentnosti (produktivnost, odnos izvoza i uvoza, devizni kurs, razvijenost institucija itd.). Zbog toga, merenje nacionalne konkurentnosti podrazumeva sagledavanje i vrednovanje brojnih mikroekonomskih, makroekonomskih i institucionalnih faktora koji opredeljuju konkurentnost nacionalne privrede. Danas se merenje konkurentnosti najčešće vezuje za okvir postavljen od strane Svetskog ekonomskog foruma, Doing Business-a i Heritage fondacije. Zato će u radu biti detaljnije objašnjena metodologija koja se koristi za izračunavanje indeksa konkurentnosti navedenih organizacija.

U radu se razmatra način ocenjivanja i rangiranja konkurentnosti nacionalnih privreda prema različitim kompozitnim indeksima (Svetskog ekonomskog foruma, Doing Business liste i Heritage fondacije), kao i o ograničenjima pojedinih indikatora. U radu se testira hipoteza da kompozitni indeksi u merenju konkurentnosti ne odslikavaju u potpunosti razvijenost jedne privrede, što će se pokazati Pirsonovim koeficijentom korelacije između indeksa globalne konkurentnosti i GDP/per capita za izabrane zemlje u periodu od 2012-2017. godine..

Ključne reči: konkurentnost, kompozitni indeksi, merenje konkurentnosti, ograničenja

JEL: E02, F43, O11

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LIMITATIONS OF COMPOSITE INDICES IN COMPETITIVENESS MEASUREMENT

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Translation provided by the author

Summary

In economic theory and practice, different aspects of competitiveness are analyzed (productivity, export-import ratio, exchange rate, institutional development, etc.). Therefore, the measurement of national competitiveness involves understanding and evaluating numerous microeconomic, macroeconomic and institutional factors determining the competitiveness of the national economy. Today, measuring competitiveness is most often associated with a framework set up by the World Economic Forum, Doing Business and Heritage Foundation. Therefore, this paper will explain in more detail the methodology used to calculate the competitiveness index of these organizations.

The paper discusses the method of assessing and ranking the competitiveness of national economies according to different composite indices (World Economic Forum, Doing Business list and Heritage Foundation), as well as limitations of individual indicators. The paper examines the hypothesis that composite indices in measuring competitiveness do not fully reflect the evolution of an economy, which will be shown by Pirson's correlation coefficient between the global competitiveness index and GDP per capita for the selected countries in the period 2012-2017.

Keywords: competitiveness, composite indices, measuring competitiveness, constraints

JEL: E02, F43, O11

Uvod

U težnji za ostvarenjem prosperiteta i što veće stope privrednog rasta, koja se nameće kao nužan uslov razvoja jedne ekonomije u savremenim uslovima poslovanja, velika pažnja usmerena je na nacionalnu konkurentnost. U uslovima ograničenih resursa, neminovnosti postojećeg stanja nacionalnih privreda, datih komparativnih prednosti i nedostataka, kao i nemogućnosti potpune izmene ranijih politika i usmerenja, glavna preokupacija vlasti ostaje unapređenje konkurentskih prednosti nacionalne privrede, kao i pronalaženje novih potencijala za rast. Ovakav stav objašnjava tvrdnja Majkla Portera o tome da se „nacionalni prosperitet ne nasleđuje nego stvara" (Porter M. E., 2008, str. 159), čime se ističe da konkurentnost jedne nacije zavisi od sposobnosti njene privrede da se unapređuje i konkuriše drugim zemljama, analogno konkurenciji na mikro nivou između preduzeća. Jačanjem nacionalne konkurentnosti istovremeno se unapređuje i konkurentnost kompanija u okviru te privrede, čime one, kroz poslovanje u datim privrednim strukturama, institucijama i tržišnom ambijentu, ostvaruju prednosti u odnosu na svetske konkurente. Kada se privreda specijalizuje za proizvodnju dobra za koju ima komparativnu prednost, povećava se ukupna proizvodnja u privredi, a to povećanje dovodi do opšteg boljitka (Mankiw & Taylor, 2008, str. 53). Pojedine zemlje uspevaju da ostvare prednosti u određenim segmentima na svetskom tržištu upravo iz razloga što je njihovo domaće okruženje naprednije, dinamičnije i izazovnije od drugih. Pol Krugman, sa druge strane, ističe da domaći faktori dominantno utiču na nivo BDP-a po stanovniku i blagostanje ekonomije, a ne nacionalna konkurentnost potvrđena na svetskom tržištu (Krugman, 1994). Prema mišljenju Krugmana i Obstfelda, nacionalne privrede posluju tako što se specijalizuju za one proizvode koje proizvode jeftino, odnosno čiji su oportunitetni troškovi niži (Krugman & Obstfeld, 2003).

Nacionalna konkurentnost predstavlja ekonomske strukture i institucije države koje podstiču ekonomski rast unutar strukture globalne ekonomije (Marković & Radukić, 2014, str. 275). Povećanje nacionalne konkurentnosti je važan zadatak svake privrede, jer samo konkurentna privreda može istovremeno izdržati pritiske drugih učesnika na domaćem i međunarodnom tržištu, obezbediti održivi ekonomski rast i razvoj i podizanje životnog standarda stanovništva. Iz tog razloga, potrebno je ustanoviti efikasan sistem merenja konkurentnosti i sagledavanja njenih sastavnih elemenata, kako bi se na adekvatan način odredila pozicija jedne privrede u međunarodnim okvirima i uspostavio sistem koji na efikasan i objektivan način uvažava sve dimenzije konkurentnosti u okviru jedne ekonomije. Međutim, u oceni stanja privrede, kompozitni indeksi mogu ispoljiti određene nedostatke, pa se može predpostaviti da oni ne odražavaju u potpunosti nivo razvijenosti jedne ekonomije, te se, u sladu sa tim, može postaviti *hipoteza* da kompozitni indeksi u merenju konkurentnosti ne odslikavaju u potpunosti razvijenost jedne privrede.

Teorijski okvir i definisanje konkurentnosti

Kao ključne determinante konkurentnosti jedne privrede ističu se troškovi radne snage, devizni kurs i kamatne stope, dok vlade zemalja pokušavaju da različitim politikama i izmenama ovih, kao i drugih činilaca, podstaknu i unaprede konkurentnost svoje privrede. Pored ovih determinanti, možda i najvažniji uslov i koncept konkurentnosti na nacionalnom nivou jeste koncept produktivnosti (Porter M. E., 2008, str. 164). Naime, rast jedne privrede zavisi od rasta životnog standarda njenih građana koji je direktno srazmeran rastu produktivnosti jedne nacionalne ekonomije, tako da, ukoliko zemlja efikasno identifikuje pravi izvor svoje konkurentnosti, onda će se suočiti sa manje problema tokom svog ekonomskog razvoja (Porter, Sachs, & McArthur, 2001). Produktivnost će zavisiti od sposobnosti adekvatnog korišćenja prvenstveno radne snage i kapitala, dok održivi rast produktivnosti, kao uslov održivog privrednog rasta i unapređenja konkurentnosti, zahteva stalno unapređenje privrede, prilagođavanje tržišnim tokovima i istovremeno visok stepen inovativnosti i napretka. Konkurentnost jedne privrede se može odrediti i na osnovu sposobnosti: (1) Zarađivanja

Introduction

In the pursuit of prosperity and the highest possible rate of economic growth, which is imposed as a necessary condition for the development of an economy in modern business conditions, great attention is focused on national competitiveness. In the context of limited resources, the inevitability of the existing state of national economies, given comparative advantages and disadvantages, and the inability to completely change earlier policies and orientations, the main preoccupation of the authorities remains to enhance the competitive advantages of the national economy as well as to find new growth potentials. This view explains Michael Porter's claim that "national prosperity is not inherited but created" (Porter M. E., 2008), which emphasizes that a nation's competitiveness depends on its economy's ability to advance and compete with other countries, analogous to micro-level competition between companies. Strengthening national competitiveness also enhances the competitiveness of companies within that economy, thereby gaining advantages over global competitors through operations in given economic structures, institutions and market environments. When an economy specializes in the production of goods for which it has a comparative advantage, the total production in the economy increases, and this increase leads to an overall improvement (Mankiw & Taylor, 2008). Some countries manage to gain advantages in certain segments of the world market precisely because their home environment is more advanced, dynamic and more challenging than others'. Paul Krugman, on the other hand, points out that domestic factors dominate the GDP per capita and the well-being of the economy, and not the national competitiveness confirmed in the world market (Krugman, 1994). According to Krugman and Obstfeld, national economies operate by specializing in low-cost, lower-cost products (Krugman & Obstfeld, 2003).

National competitiveness is the economic structures and institutions of the state that stimulate economic growth within the structure of the global economy (Marković & Radukić, 2014). Increasing national competitiveness is an important task for every economy, because only a competitive economy can withstand the pressures of other players in the domestic and international markets, ensuring sustainable economic growth and development, and raising the standard of living of the population. For this reason, it is necessary to establish an effective system for measuring competitiveness and considering its constituent elements, in order to adequately determine the position of an economy in international frameworks and to establish a system that effectively and objectively respects all aspects of competitiveness within a single economy. However, in assessing the state of the economy, composite indices may exhibit some disadvantages, so it can be assumed that they do not fully reflect the level of development of an economy, and, accordingly, the *hypothesis* can be that composite indices in measuring competitiveness may not fully reflect the development of an economy.

Theoretical Framework and the Definition of Competitiveness

The key determinants of the competitiveness of an economy are labor costs, exchange rates and interest rates, while governments try to encourage and improve the competitiveness of their economy through various policies and changes to these and other factors. In addition to these determinants, perhaps the most important condition and concept of competitiveness at the national level is the concept of productivity (Porter M. E., 2008). Namely, the growth of an economy depends on the growth of its citizens' standard of living, which is directly proportional to the productivity growth of a national economy, so that if a country effectively identifies the true source of its competitiveness, then it will face fewer problems during its economic development (Porter, Sachs, & McArthur, 2001). Productivity will depend on the ability to make adequate use of primarily labor and capital, while sustainable productivity growth, as a condition of sustainable economic growth and improving competitiveness, requires a continuous improvement of the economy, adaptation to market flows, and at the same time a high degree of innovation and progress.

profita u odnosu na identične industrije u drugim državama, (2) Privlačenja faktora proizvodnje u odnosu na ostale industrije u okviru jedne države (regiona) ili iz drugih država i (3) Prilagođavanja promenama u društveno-ekonomskom okruženju (Toming, 2011).

Unapređenje konkurentnosti jedne nacionalne ekonomije, koje postaje najvažniji zadatak vlade svake zemlje, ne može se sagledati putem neke sveobuhvatne teorije, ali se u svim definicijama konkurentnosti naglašava sposobnost države da dostigne održive visoke stope ekonomskog rasta, merene BDP po glavi stanovnika, uz sposobnost da proizvede robe i usluge koje zadovoljavaju test svetskog tržišta (Maksimović, 2012, str. 100). Tokom vremena razvijen je veliki broj načina za merenje nacionalne konkurentnosti, upravo zbog velikog značaja koji ona ima. Suština rangiranja konkurentnosti nacionalne privrede i njenih performansi u odnosu na druge zemlje jeste identifikovanje potencijalnih institucionalnih i tržišnih nedostataka i slabosti ekonomske politike, koji bi mogli da ugroze budući ekonomski rast (Milovanović & Veselinović, 2009, str. 282). Korekcija ekonomske politike, jačanje tržišnih institucija, kao i institucija vladavine prava, nužni su i umnogome opredeljuju dalji tok unapređenja konkurentnosti i razvoja jedne privrede.

Brojne analize su pokazale da se zemlje koje su visoko rangirane prema konkurentnosti, visoko rangiraju i prema dohotku po glavi stanovnika, odnosno prema životnom standardu (Maksimović, 2012, str. 101). Uloga države ogleda se u ostvarenju makroekonomske i političke stabilnosti kroz uspostavljanje stabilnih državnih institucija, unapređenju mikroekonomske sposobnosti i efikasnosti, kao i u uspostavljanju pravila za sve tržišne učesnike.

Koncept institucionalnih reformi je od velike važnosti u procesu unapređenja konkurentnosti jedne privrede. Kada se jednom konstituišu, institucije ne funkcionišu zauvek u nepromenjenom obliku. One nikada nisu statične, već tokom vremena postaju izložene odgovarajućim promenama, u skladu sa realnim društveno-ekonomskim uslovima, a u tom procesu mnoge od njih bivaju zamenjene potpuno novim institucijama. Naime, društveno-ekonomski razvoj i promene uslova u kojima se odvijaju ekonomske aktivnosti, utiču da neke institucije postanu zastarele, usled čega nastaje potreba za stvaranjem novih (Leković, 2010, str. 221). Na osnovu uočavanja, merenja i upoređivanja institucionalnih pokazatelja sa relevantnim pokazateljima ostalih zemalja, moguće je odrediti mesto posmatrane zemlje u međunarodnom okruženju i doneti odgovarajuće zaključke o posmatranoj privredi i njenoj konkurentnosti na međunarodnim tržištima.

Pored ovoga, uloga države uključuje i kreiranje ambijenta koji omogućava ubrzavanje razvoja i usavršavanje postojećih struktura, čime se upravo doprinosi ostvarenju i unapređenju konkurentskih prednosti. Dobrim okvirom delovanja i adekvatnom reakcijom tržišnih aktera na unapređenje ključnih determinanti konkurentnosti, nacionalna privreda u procesu međunarodne trgovine pronalazi svoje mesto na međunarodnom tržištu na kojem aktivno konkuriše.

U daljem tekstu biće razmatrani načini ocenjivanja i rangiranja nacionalnih privreda prema različitim kompozitnim indeksima, koji su kreirani od strane međunarodno priznatih specijalizovanih organizacija za procenu tržišnog ambijenta. Takođe, biće ukazano na ograničenja pojedinih indikatora i načina vrednovanja pojedinih dimenzija konkurentnosti. U kasnijem izlaganju, analiza će biti usmerena na konkretne podatke za Republiku Srbiju, kvalitet njenih institucija prema međunarodnim kriterijumima i adekvatno poređenje sa privredama iz okruženja. Nakon toga, primenom Pirsonovog koeficijenta korelacije, biće ispitan odnos ocene globalnog indeksa konkurentnosti i razvijenosti jedne ekonomije merene BDP-om per capita.

Načini merenja konkurentnosti i vrednovanja institucija

Mogu se identifikovati brojni faktori koji utiču na dugoročnu sposobnost zemlje da proizvodi i da se takmiči na svetskom tržištu, kao što su: efikasnost sa kojom finansijska tržišta transformišu štednju u investicije, sposobnost i brzina prihvatanja tehnoloških inovacija, sposobnost radnika da steknu veštine koje zahteva tržište rada, kvalitet poslovnih odluka

The competitiveness of an economy can also be determined by the ability to: (1) Earn profits over identical industries in other countries, (2) Attract factors of production relative to other industries within one country (region) or from other countries, and (3) Adapt to changes in the socio-economic environment (Toming, 2011).

Improving the competitiveness of a national economy, which is becoming the most important task of the government of every country, cannot be seen through some comprehensive theory, but all the definitions of competitiveness emphasize the state's ability to achieve sustained high rates of economic growth, measured by GDP per capita, with the ability to produce goods and services that meet the world market test (Maksimović, 2012). Over time, many ways have been developed to measure national competitiveness, precisely because of the great importance it has. The essence of ranking the competitiveness of a national economy and its performance relative to other countries is to identify potential institutional and market weaknesses and economic policy weaknesses that could threaten future economic growth. (Milovanović & Veselinović, 2009). Economic policy correction, strengthening of market institutions, as well as the rule of law institutions, are necessary and largely determine the further course of improving the competitiveness and development of an economy.

Numerous analyzes have shown that countries that are highly ranked in terms of competitiveness, are also ranked high in terms of per capita income or standard of living (Maksimović, 2012). The role of the state is reflected in the achievement of macroeconomic and political stability through the establishment of stable state institutions, the improvement of microeconomic capacity and efficiency, and the establishment of rules for all market participants.

The concept of institutional reform is of great importance in the process of improving the competitiveness of an economy. Once constituted, institutions do not function forever in an unchanged form. They are never static, but over time they become exposed to the corresponding changes, in accordance with the real socio-economic conditions, and in the process many of them are replaced by completely new institutions. Specifically, socio-economic development and changes in the conditions under which economic activities take place make some institutions obsolete, causing the need to create new ones. (Leković, 2010). Based on the observation, measurement and comparison of institutional indicators with the relevant indicators of other countries, it is possible to determine the place of the observed country in the international environment and to draw appropriate conclusions about the observed economy and its competitiveness in international markets.

In addition, the role of the state includes creating an environment that enables accelerated development and refining existing structures, thereby contributing precisely to the realization and advancement of competitive advantages. With a good framework of action and an adequate reaction of market players to advancing the key determinants of competitiveness, the national economy, in the process of international trade, finds its place in the international market in which it actively competes.

In the following sections, we will discuss ways to evaluate and rank national economies according to different composite indices, created by internationally recognized specialized organizations for assessing the market environment. Also, the limitations of individual indicators and ways of evaluating particular dimensions of competitiveness will be pointed out. In a later presentation, the analysis will focus on concrete data for the Republic of Serbia, the quality of its institutions according to international criteria and adequate comparison with the economies in the region. Subsequently, applying the Pearson correlation coefficient, the relationship between the global competitiveness index and the development of an economy as measured by GDP per capita will be examined.

Ways to Measure the Competitiveness and Evaluation of Institutions

A number of factors can be identified that affect a country's long-term ability to produce and compete in the global market, such as: the efficiency with which financial markets transform savings into investment,

menadžmenta i političkih odluka vlade i drugi faktori (Dani, 2007). U skladu sa raznovrsnošću koncepata konkurentnosti, razvijeni su i različiti pristupi u merenju konkurentnosti, pri čemu se mogu izdvojiti dve opcije u njenom merenju. Prva se bazira na određivanju dohotka per capita ili rastu produktivnosti, a druga na određivanju učinka u međunarodnoj trgovini (McFetridge, 1995).

S obzirom na to da ne postoji jedinstveni koncept za određivanje konkurentnosti (Sieggel, 2006), mora se uzeti u obzir više različitih aspekata konkurentnosti jedne privrede pri donošenju konačne ocene, pa tako merenje nacionalne konkurentnosti podrazumeva šire istraživanje. Istraživanje se najčešće vezuje za okvir postavljen od strane Svetskog ekonomskog foruma, odnosno za Globalni indeks konkurentnosti (GIK), zatim za Economic Freedom Index (indeks ekonomskih sloboda) koji objavljuje Heritage Foundation, kao i ocenu prema Doing Business listi koju utvrđuje Svetska banka.

Globalni indeks konkurentnosti je kompozitni indeks koji se sastoji od dvanaest stubova konkurentnosti organizovanih u tri grupe. Prvu grupu čine Osnovni zahtevi koji u sebe uključuju sledeće stubove konkurentnosti: 1) Institucije, 2) Infrastruktura, 3) Makroekonomska stabilnost, 4) Zdravstvo i primarno obrazovanje. U drugu grupu se ubrajaju Faktori povećanja efikasnosti koju formiraju sledeći stubovi: 5) Visoko obrazovanje i obuka, 6) Efikasnost tržišta dobara, 7) Efikasnost tržišta rada, 8) Sofisticiranost finansijskog tržišta, 9) Tehnološka spremnost, i 10) Veličina tržišta. Treća grupa su Faktori inovativnosti i sofisticiranosti koji se sastoje od poslednja dva stuba konkurentnosti i to: 11) Sofisticiranost poslovnih procesa i 12) Inovacije (World Economic Forum, 2017-2018).

Ovakvom konstrukcijom Globalnog indeksa konkurentnosti obuhvaćeni su kako mikroekonomski, tako i makroekonomski faktori konkurentnosti, kao i faktori razvoja institucija, čime je kroz zajedničko preispitivanje omogućeno određenje i procena konkurentnosti jedne nacionalne privrede. Globalni indeks konkurentnosti predstavlja kompozitni indeks i formira se kao ponderisani prosek svih stubova konkurentnosti. Stubovi konkurentnosti takođe predstavljaju kompozitne indekse formirane na osnovu ponderisanih proseka podindikatora koji se dobijaju iz primarnih i sekundarnih izvora. Svi podaci, bilo da su dobijeni iz primarnih ili sekundarnih izvora, normiraju se na skali od 1 do 7, pri čemu je 1 najlošija, a 7 najbolja ocena. Ova skala važi ujedno i za vrednosti podindikatora, stubove konkurentnosti, kao i za Globalni indeks konkurentnosti u svom sumarnom izrazu. Pri analizi razlikujemo dve vrste podataka, primarne i sekundarne. Učešće primarnih podataka u GIK-u čini približno 70%, dok udeo sekundarnih podataka iznosi oko 30% (World Economic Forum, 2017-2018).

Naime, primarni podaci se dobijaju na osnovu anketa koje su standardizovane i koje se sprovode u obuhvaćenim zemljama svake godine. Anketiraju se top menadžeri preduzeća koji čine reprezentativni uzorak, a podaci dobijeni ovim putem nazivaju se mekim (soft) podacima. Ovakvi podaci, dobijeni primarnom analizom na osnovu anketiranja, koriste se za obračun onih podindikatora koji ne podležu kvantitativnoj analizi i nije ih moguće obuhvatiti putem obrade sekundarnih podataka. Kroz podatke koji se dobijaju na osnovu ankete stiče se uvid u uslove poslovanja, pravnu regulativu, tržišni ambijent, političku situaciju, itd. Za ovako dobijene podatke ne postoje međunarodno uporedive baze podataka, pa se iz tog razloga oni mogu dobiti jedino putem ankete (Ristić & Tanasković, 2011, str. 148).

Sa druge strane, za ocenu i obračun podindikatora konkurentnosti kao što su nivo poreza, stopa inflacije, budžetski deficitit, ili broj procedura da se započne neka preduzetnička delatnost, koriste se podaci koje je moguće kvantitativno izraziti i koji su prisutni u bazama podataka međunarodnih ekonomskih i finansijskih institucija kao što su MMF, Svetska banka, Svetska trgovinska organizacija, Ujedinjene nacije itd. Ovi podaci nazivaju se čvrstim (hard) podacima.

Svi indikatori Svetskog ekonomskog foruma ocenjuju se na osnovu transparentne metodologije i konzistentnih kriterijuma. Tako se ulazne veličine, koje podrazumevaju statističke podatke i odgovore dobijene putem anketa, kao i algoritmi njihove obrade, pravila agregiranja i finalni rezultati, publikuju u

the ability and speed to embrace technological innovation, the ability of workers to acquire the skills required by the market performance, quality of business management decisions and government policy decisions, and other factors (Dani, 2007). In line with the diversity of competitiveness concepts, different approaches to measuring competitiveness have been developed, with two options in measuring it. The first is based on determining per capita income or productivity growth, and the second is based on determining performance in international trade (McFetridge, 1995).

Given that there is no single concept for determining competitiveness (Sieggel, 2006), several different aspects of the competitiveness of an economy must be taken into account when making a final assessment, and thus measuring national competitiveness requires broader research. The research is most often linked to the framework set by the World Economic Forum, that is, the Global Competitiveness Index (GCI), then the Economic Freedom Index published by the Heritage Foundation, as well as the Doing Business list determined by the World Bank.

The Global Competitiveness Index is a composite index consisting of twelve pillars of competitiveness organized into three groups. The first group consists of the Basic Requirements, which include the following pillars of competitiveness: 1) Institutions, 2) Infrastructure, 3) Macroeconomic Stability, 4) Health and Primary Education. The second group includes the Factors of Efficiency Gains formed by the following pillars: 5) Higher Education and Training, 6) Efficiency of the Goods Market, 7) Efficiency of the Labor Market, 8) Sophistication of the Financial Market, 9) Technological Readiness, and 10) Market Size. The third group is Factors of Innovation and Sophistication, which consist of the last two pillars of competitiveness, namely: 11) Business Process Sophistication and 12) Innovation (World Economic Forum, 2017-2018).

This construction of the Global Competitiveness Index encompasses both microeconomic and macroeconomic competitiveness factors, as well as institutional development factors, enabling, through joint review, the determination and assessment of the competitiveness of a national economy. The Global Competitiveness Index is a composite index and is formed as a weighted average of all the pillars of competitiveness. Competitiveness pillars also represent composite indices formed on the basis of weighted averages of sub-indicators derived from primary and secondary sources. All data, whether obtained from primary or secondary sources, are normalized on a scale of 1 to 7 with 1 being the worst and 7 being the best. This scale is also valid for the values of the sub-indicators, the pillars of competitiveness, as well as the Global Competitiveness Index in its summary. In the analysis, we distinguish between two types of data, primary and secondary. The share of primary data in the GIK is approximately 70%, while the share of secondary data is approximately 30% (World Economic Forum, 2017-2018).

Specifically, primary data are obtained from standardized surveys conducted in the countries covered each year. Top managers of the companies that make up a representative sample are surveyed, and the data obtained through this is referred to as soft data. Such data, obtained through primary survey-based analysis, are used to calculate those sub-indicators that are not subject to quantitative analysis and cannot be captured through secondary data processing. The data obtained through the survey provides insight into business conditions, legal regulations, market environment, political situation, etc. There are no internationally comparable databases for the data thus obtained, and for this reason they can only be obtained through a survey (Ristić & Tanasković, 2011).

On the other hand, for the assessment and calculation of competitiveness indicators such as tax level, inflation rate, budget deficit, or number of procedures to start an entrepreneurial activity, quantitatively used data is available and is present in the databases of international economic and financial institutions such as the IMF, the World Bank, the World Trade Organization, the United Nations, etc. This data is called hard data.

All indicators of the World Economic Forum are evaluated on the basis of a transparent methodology and consistent criteria. Thus, the input sizes, which include statistics and survey responses, as well as their processing

celosti svake godine (Vujović, 2007, str. 452). Indeks globalne konkurentnosti prati preko 100 indikatora (dimenzija konkurentnosti) za približno 140 ekonomija sveta. Uspostavljanjem zajedničkog okvira i uporedivim podacima, omogućava se praćenje podataka i skreće pažnja na dugoročne determinante konkurentnosti.

Za agregiranje pojedinačnih indikatora koristi se aritmetička sredina u okviru svake kategorije, dok se za preciznije određenje vrednosti indikatora koristi procenat važnosti pojedine kategorije u okviru svakog stuba. U zavisnosti od faze razvijenosti pojedine zemlje, određeni faktori konkurentnosti imaju veći značaj i ulogu u pokretanju konkurentnosti. Tako se za nisko razvijene zemlje najpre sagledavaju „osnovni zahtevi", za srednje razvijene zemlje najvažniju ulogu u oživljavanju privrede imaju „faktori povećanja efikasnosti", dok kod najrazvijenijih zemalja proporcionalno najveći uticaj na nivo konkurentnosti i ukupnu vrednost GIK-a imaju „faktori inovativnosti i sofisticiranosti" (Ristić & Tanasković, 2011, str. 149). Prilikom konstrukcije ocene Globalnog indeksa konkurentnosti, uzima se u obzir razvojna faza u kojoj se konkretna ekonomija nalazi, tako što se konkretnim stubovima pripisuju veće relativne težine, odnosno veće procentualno učešće u strukturi ocene. Da bi se implementirao ovaj koncept, stubovi su organizovani u tri podindeksa od kojih je, kao što je već pomenuto, svaki specifičan za određenu fazu razvoja. Kriterijum koji se primenjuje u ovoj proceni jeste BDP po glavi stanovnika, što je prikazano u tabeli 1 (World Economic Forum, 2017-2018).

Izračunavanje Globalnog indeksa konkurentnosti je zasnovano na uzastopnoj agregaciji rezultata od nivoa pojedinačnih merila prema ukupnoj oceni. Za ocenu pojedinačnih podkategorija koristi se aritmetička sredina vrednosti pojedinačnih pokazatelja u okviru jedne kategorije i to prema formuli:

$$\text{Kategorija (i)} = \frac{\sum_{k-1}^{k} Indikator\ k}{K} \qquad (1)$$

Za dalje vrednovanje u cilju konstrukcije ukupnog indeksa, koristi se ocena pored svake kategorije u okviru pripadajućih indikatora koja predstavlja težinu, odnosno važnost te kategorije u posmatranom stubu konkurentnosti. U okviru osnovnih zahteva, čije se učešće u ukupnoj oceni kreće u rasponu od 20-60%, i koji uključuje ocene institucija, infrastrukture, makroekonomske stabilnosti, kao i zdravstva i primarnog obrazovanja, sva četiri stuba konkurentnosti u okviru osnovnih zahteva podjednako učestvuju u njegovoj oceni sa po 25%. Ocena faktora efikasnosti učestvuje u ukupnom indeksu u rasponu od 35-50% pri čemu u okviru ocene ove grupe pokazatelja, visoko obrazovanje i obuka, efikasnost tržišta dobara i tržišta rada, sofisticiranost finansijskih tržišta, tehnološka opremljenost i veličina tržišta imaju podjednak uticaj na ocenu sa po 17% učešća. Faktori inovativnosti i sofisticiranosti učestvuju u konstrukciji ocene ukupnog indeksa od 5-30%, a obe podkategorije u okviru ove grupe imaju podjednak uticaj od 50% u formiranju ocene ove grupe (World Economic Forum, 2017-2018).

Tabela 1: Kriterijum važnosti pojedinih faktora pri izračunavanju vrednosti GIK-a

	Faza 1	1-2	Faza 2	2-3	Faza 3
BDP per capita	<2000	2000-2999	3000-8999	9000-16999	>17000
Osnovni zahtevi	60 %	40-60 %	40 %	20-40 %	20 %
Faktori efikasnosti	35 %	35-50 %	50 %	50%	50 %
Faktori inovativ. i sofisticiranosti	5 %	5-10 %	10 %	10-30 %	30 %

Izvor: Global Competitiveness Index, str. 320

Kako bi ukupno sumiranje rezultata bilo moguće, indikatori se pretvaraju u vrednost na skali od 1 do 7, gde se rangiranje vrši na osnovu minimalne i maksimalne vrednosti dobijenih indikatora, čime se obezbeđuje redosled i uspostavlja razlika među zemljama. Pojedini pokazatelji se javljaju u dva različita stuba, pa se njihova vrednost ocenjuje polovično u svakom od stubova kako bi se izbeglo dvostruko

algorithms, aggregation rules and final results, are published in full each year (Vujović, 2007). The Global Competitiveness Index monitors over 100 indicators (the competitiveness dimension) for approximately 140 economies in the world. By establishing a common framework and comparable data, it enables the monitoring of data and draws attention to the long-term determinants of competitiveness.

The aggregation of individual indicators uses the arithmetic mean within each category, while the more accurate determination of indicator values uses the percentage of importance of each category within each pillar. Depending on the development stage of a particular country, certain competitive factors play a greater role in driving competitiveness. Thus, for the low-developed countries, the "Basic Requirements" are first considered, for the middle-developed countries the most important role in the economic recovery is the "Efficiency Factors", while in the most developed countries the "Innovation and Sophistication Factors" have the largest impact on the level of competitiveness and the overall value of the GCI (Ristić & Tanasković, 2011). In constructing the Global Competitiveness Index score, the development phase in which a particular economy is located is taken into account by attributing greater relative weights to the pillars, or greater percentage participation in the rating structure. In order to implement this concept, the pillars are organized into three sub-indices, each of which, as mentioned above, is specific to a particular stage of development. The criterion used in this estimate is GDP per capita as shown in Table 1 (World Economic Forum, 2017-2018).

The calculation of the Global Competitiveness Index is based on the successive aggregation of results from the level of individual benchmarks by the total score. For the evaluation of individual subcategories, the arithmetic mean of the values of individual indicators within one category is used, according to the formula:

$$\text{Category (i)} = \frac{\sum_{k-1}^{k} indicator\ k}{K} \qquad (1)$$

For further evaluation in order to construct the overall index, a rating is used next to each category within the relevant indicators representing the weight, that is, the importance of that category in the observed pillar of competitiveness. Within the framework of basic requirements, whose participation in the overall assessment ranges from 20-60%, and which includes assessments of institutions, infrastructure, macroeconomic stability, as well as health and primary education, all four pillars of competitiveness within the basic requirements participate equally in its requirements scores with 25% each. Efficiency factor ratings account for 35-50% of the overall index, and within this group of indicators, higher education and training, commodity and labor market efficiency, financial market sophistication, technological equipment and market size all have an equal impact on the assessment with a 17% share each. Innovation and sophistication factors participate in the construction of the overall index score with 5-30% share, and both subcategories within this group have an equal impact of 50% in the formation of this group's rating (World Economic Forum, 2017-2018).

In order to make the total summation of the results possible, the indicators are converted to a value on a scale of 1 to 7, where the ranking

Table 1: GCI Criteria for the importance of individual factors in the calculation of values

	Stage 1	1-2	Stage 2	2-3	Stage 3
GDP per capita	<2000	2000-2999	3000-8999	9000-16999	>17000
Basic Requirements	60 %	40-60 %	40 %	20-40 %	20 %
Efficiency Factors	35 %	35-50 %	50 %	50%	50 %
Innovation and Sophistication Factors	5 %	5-10 %	10 %	10-30 %	30 %

Source: Global Competitiveness Index, p. 320

vrednovanje. Konkretno svođenje indikatora na vrednost na skali od 1 do 7 vrši se prema sledećem obrascu:

$$6 \times \frac{ocena\ zemlje - minimum\ ocene\ u\ uzorku}{maksimum\ ocene\ u\ uzorku - minimum\ ocene\ u\ uzorku} + 1 \qquad (2)$$

Nakon ovoga, agregiranjem ocena i njihovih vrednosti dobija se ukupan rang ocene konkretne privrede. Kako bi se pri tome dobila što preciznija slika, neki parametri moraju biti precizno sagledani, kao što je slučaj sa inflacijom, koja se u okviru stuba makroekonomske stabilnosti, kao i ostali parametri, svodi na rang ocene od 1 do 7. Pri tom za nivoe inflacije od 0,5 do 2,9% zemlja dobija najvišu ocenu 7, dok se udaljavanjem od ovih vrednosti i postojanjem veće ili manje inflacije (deflacije) ocena smanjuje.

Još jedan od mogućih načina sagledavanja stepena razvoja jedne ekonomije, u smislu lakoće poslovanja i regulisanosti tržišta, jeste putem izveštaja Doing Business liste. Za razliku od Globalnog indeksa konkurentnosti, ova lista sagledava i meri propise koji omogućavaju ili sprečavaju učesnike privatnog sektora privrede da započnu, obavljaju i šire svoje poslovanje. Ova regulativa se ocenjuje pomoću 11 indikatora koji utiču na mogućnost i lakoću poslovanja a to su: 1) uslovi započinjanja novog biznisa, 2) dobijanje građevinske dozvole, 3) proizvodnja električne energije, 4) registracija imovine, 5) dobijanje kredita, 6) zaštita manjina, 7) investitori, 8) plaćanje poreza, 9) međunarodna trgovina, 10) izvršavanje ugovornih obaveza i 11) rešavanje nesolventnosti. Uz sve to, vrši se i ocenjivanje tržišta rada, ali ovaj kriterijum nije uključen u rangiranje (World Bank, 2017).

Ovi parametri usmereni su na ocenu prvenstveno malih i srednjih preduzeća, odnosno ambijenta u kojem ona posluju. Jedna od novina od 2017. godine predstavlja i uvođenje efikasnijeg praćenja poreza, poreskih olakšica i poreske revizije, a isto tako pažnja je od ove godine usmerena i na stepen polne ravnopravnosti i stepen angožovanja žena u poslovanju na višim nivoima rukovođenja.

Podaci koji se analiziraju zasnivaju se na detaljnom uvidu u domaće zakone, propise i administrativne zahteve. Izveštaj pokriva 190 zemalja, uključujući i neke od najmanjih i najsiromašnijih ekonomija za koje je dostupan samo mali broj podataka i informacija. Podaci se prikupljaju kroz nekoliko krugova komunikacije sa stručnim ispitanicima iz privatnog i državnog sektora. Kroz odgovore na unapred sastavljene upitnike, konferencije, slanje dopisa i posete ekspertskih timova, dolazi se do svih relevantnih podataka. Doing Business lista se oslanja na četiri glavna izvora informacija i to su: relevantni zakoni, propisi i regulacije; ispitanici; državno rukovodstvo i regionalni timovi Svetske banke.

Indikatori Doing Business liste se obračunavaju na osnovu podataka Svetske banke, kao i anketiranja menadžmenta preduzeća. Ovakva istraživanja omogućavaju saznanje o glavnim prednostima, ali i preprekama za razvoj poslovne aktivnosti i daju uvid u stepen ozbiljnosti određenih problema. Veća vrednost pokazatelja upućuje na bolje propise i efikasnije funkcionisanje institucija, kao i na jednostavniji način prihvatanja određenih propisa uz manje troškove njihovog implementiranja. Ocena se vrši po principu određivanja vrednosti zadatog parametra i stavljanjem u odnos te vrednosti sa ostalim, čime se vrši rangiranje zemalja. Svaki od indikatora odnosi se na poseban segment poslovanja i zahteva poseban i adekvatan pristup prilikom njegove procene (World Bank, 2017).

Metodologija Svetske banke (Doing Business lista) je dizajnirana tako da se može lako ponoviti način za određivanje specifičnih aspekata poslovne regulacije. Prilikom korišćenja podataka moraju se imati na umu prednosti i ograničenja ovih pokazatelja, a osiguranje uporedivosti podataka na globalnom nivou je centralno razmatranje pri konstrukciji indikatora Doing Business liste. Oni se baziraju na standardizovanom scenariju slučajeva sa određenim pretpostavkama. Vrednovanje pokretanja biznisa vrši se ocenom neophodnog broja procedura, potrebnim vremenom i minimalnim sredstvima za pokretanje sopstvenog biznisa. Izdavanje građevinskih dozvola takođe se ocenjuje na osnovu brzine dobijanja svih potrebnih dokumenata za izgradnju i procene kvaliteta i sigurnosti ovih postupaka. U oceni dobijanja električne energije sagledava se potrebno vreme za priključenje na električnu mrežu, pouzdanost snabdevanja i transparentnost tarifnog sistema, dok se

is made on the basis of the minimum and maximum values of the obtained indicators, thus providing order and establishing a difference between countries. Individual indicators occur in two different pillars, so their value is halved in each of the pillars to avoid double calculation. The specific reduction of the indicator to a value on a scale from 1 to 7 is done according to the following formula:

$$6 \times \frac{country\ rating - minimum\ grade\ in\ the\ sample}{maximum\ grade\ in\ the\ sample - minimum\ grade\ in\ the\ sample} + 1 \quad (2)$$

After this, aggregating the ratings and their values gives the overall ranking of a particular economy. In order to get a more accurate picture, some parameters need to be carefully considered, as in the case of inflation, which, within the pillar of macroeconomic stability, as well as other parameters, comes down to a rating of 1 to 7. At the same time, for inflation levels of 0.5 to 2.9%, the country gets the highest score of 7, while moving away from these values and with the existence of higher or lower inflation (deflation), the score decreases.

Another possible way of looking at the level of development of an economy, in terms of ease of doing business and market regulation, is through the Doing Business List report. Unlike the Global Competitiveness Index, this notes and measures the regulations that enable or prevent private sector participants from starting, running and expanding their businesses. This regulation is evaluated using 11 indicators that affect the ability and ease of doing business, namely: 1) conditions for starting a new business, 2) obtaining a building permit, 3) generating electricity, 4) registering property, 5) obtaining a loan, 6) protecting minorities, 7) investors, 8) tax payment, 9) international trade, 10) contractual obligations, and 11) insolvency resolution. In addition, the labor market is evaluated, but this criterion is not included in the ranking (World Bank, 2017).

These parameters are aimed at evaluating primarily small and medium-sized enterprises and the environment in which they operate. One of the innovations of 2017 is the introduction of more efficient monitoring of taxes, tax breaks and tax audit, as well as the focus on gender equality and the share of women engaged at higher level management positions.

The data to be analyzed is based on a thorough insight into national laws, regulations and administrative requirements. The report covers 190 countries, including some of the smallest and poorest economies for which only a small amount of data and information is available. The data is collected through several rounds of communication with expert respondents from both the private and public sectors. All relevant information is obtained through responses to pre-prepared questionnaires, conferences, correspondence and visits by expert teams. The Doing Business List relies on four main sources of information: relevant laws and regulations; respondents; government and World Bank regional teams.

The Doing Business list indicators are calculated based on World Bank's data as well as business management surveys. Such research provides an insight into the main advantages and obstacles for the development of business activity and gives insight into the severity of certain problems. The higher value of the indicators points to better regulations and more efficient functioning of institutions, as well as a simpler way of adopting certain regulations at lower costs for their implementation. The assessment is made on the principle of determining the value of a given parameter and putting it in relation to the rest, which results in the ranking of countries. Each of the indicators relates to a specific segment of the business and requires a separate and adequate approach to its assessment (World Bank, 2017).

The World Bank's Doing Business List methodology is designed in such a way that it is easy to repeat the way to determine specific aspects of business regulation. When using data, the benefits and limitations of these indicators must be kept in mind, and ensuring comparability of data globally is a central consideration when constructing Doing Business list indicators. They are based on a standardized case scenario with specific assumptions. Valuation of starting a business is done by evaluating the required number of procedures, the time required and the minimum means to start your own business. The issuance of building permits is also evaluated on the basis of the speed of obtaining all the necessary documents for construction and the assessment of the quality and safety of

prilikom ocene registracije imovine takođe koristi merilo zahtevanog vremena i troškovi sticanja i prenosa vlasničkih prava. Proces izdavanja kredita i zaštite imovinskih prava ocenjuje se na osnovu zakonskih propisa u ovim oblastima. Plaćanje poreza takođe obuhvata ocenu propisa i visine pojedinačnih poreskih stopa, a međunarodna trgovina ispituje se prema vremenu i troškovima izvoza, kao i sagledavanjem komparativnih prednosti. Efikasnost sprovođenja ugovora procenjuje se na osnovu vremena i troškova rešavanja sporova i kvaliteta sudskih procesa, a efikasnost procesa rešavanja nesolventnosti poistovećuje se sa potrebnim vremenom i snagom finansijskog sistema i pravnog okvira koji se tiče ove oblasti, što važi i za ocenu tržišta rada (World Bank, 2017). Ovi parametri ocenjuju se prema utvrđenoj skali ocena i pripisuju se ovim kategorijama, čime je moguće ustanoviti stepen efikasnosti svih pojedinačnih indikatora, kao i izvršiti rangiranje ukupne liste.

Korist od ovakvog istraživanja ostvaruju vlade zemalja prilikom sagledavanja i procene ekonomske politike i uočavanja prednosti i nedostataka postojećeg stanja, kao i istraživači, koji na osnovu uvida u rang zemalja mogu donositi određene procene. Pojedinačni podaci mogu biti irelevantni za donošenje zaključaka, pa se iz tog razloga uzima ukupan rang ocena kao merodavan reprezent razvijenosti tržišnog ambijenta i institucija. Adekvatnost tržišnog ambijenta i njegova pogodnost za poslovanje analizira se kroz sagledavanje konkretnih slučajeva i fokusira se na pravila koja su relevantna za analizu. Jedinstven skup podataka omogućava analizu sa ciljem boljeg razumevanja regulisanja poslovanja, postojeće situacije i mogućnosti postizanja održivog rasta i razvoja.

Ispitivanje stanja jedne ekonomije i njenih performansi može se obaviti i putem izveštaja koji objavljuje Heritage fondacija, i to putem indeksa ekonomskih sloboda (Index of Economic Freedom). Prema ovom izveštaju, ekonomska sloboda predstavlja ključni element ljudskog blagostanja i glavni faktor u održavanju slobode ljudskog društva. Ključne odrednice ovakvog stava jesu da put svake zemlje ka rastu i razvoju mora biti prilagođen vlastitoj kulturi, istoriji i jedinstvenim uslovima. Međutim, postoje određene osnovne karakteristike koje su zajedničke za sve zemlje, tako da nacije sa većim stepenom ekonomske slobode imaju tendenciju da u potpunosti iskoriste i kapitalizuju znanje i sposobnosti svakog pojedinca u društvu. Za društvo u celini to će stvoriti uslove za dinamičan ekonomski rast, povećanje inovativnosti i efikasnu alokaciju resursa. Pojedinac je ekonomski slobodan ako ima potpunu kontrolu nad svojim radom i vlasništvom, bez uplitanja države. Uloga države svedena je na zaštitu tako definisane slobode, a idealni (najviši) stupanj ekonomske slobode osigurava pojedincu apsolutno pravo privatne svojine, potpunu slobodu kretanja kapitala, rada i prometa robe, navodi se u izveštaju Heritage fondacije (Economic Freedom, 2017).

Indeks ekonomske slobode obezbeđuje ubedljiv dokaz o širokom opsegu opipljive prednosti življenja u društvu sa većim stepenom ekonomske slobode. Indeks analizira razvoj ekonomske politike u 186 zemalja koje su ocenjene i rangirane u okviru 12 kriterijuma ekonomskih sloboda, a koji ocenjuju vladavinu prava, veličinu javne uprave i državnog sektora, regulatornu efikasnost i otvorenost tržišta.

U okviru vladavine prava posebno se ocenjuju prava svojine, efikasnost sudstva, kao i integritet države. Analiza veličine državnog sektora uključuje poresko opterećenje, upravljanje državnom potrošnjom i „fiskalno zdravlje", odnosno stanje državnih finansija. U sklopu regulatorne efikasnosti ocenjuje se poslovna sloboda, sloboda tržišta rada i monetarnih institucija, dok otvorenost tržišta podrazumeva slobodnu trgovinu, finansijske i investicione slobode. Ocenom svakog pojedinačnog kriterijuma, u skladu sa postavljenom skalom, dobija se ukupna ocena svake zemlje iz čega se uviđa njen položaj i stepen ekonomskih sloboda u odnosu ostale zemalje (Economic Freedom, 2017).

U procenjivanju uslova u ove četiri kategorije, indeks uključuje 12 specifičnih komponenti ekonomske slobode koji su standardizovani i podobni za stvaranje ukupne ekonomske procene svake privrede. Rang ukupne ocene se kreće u intervalu od 0 do 100, pri čemu sa većim stepenom ekonomske slobode raste i rang ocene. Zemlje su klasifikovane u zavisnosti od ocene u 5 kategorija, od „potisnute" do

these procedures. The assessment of electricity generation takes into account the time required to connect to the electricity grid, security of supply and transparency of the tariff system, while the assessment of property registration also uses the measure of required time and the cost of acquiring and transferring ownership rights. The process of granting loans and protecting property rights is evaluated on the basis of legal regulations in these areas. Payment of taxes also includes the assessment of regulations and the amount of individual tax rates, and international trade is examined according to the time and cost of exports, as well as considering the comparative advantages. The effectiveness of contract implementation is evaluated on the basis of the time and cost of dispute resolution and the quality of litigation, and the efficiency of the insolvency resolution process is equated with the time and strength of the financial system and the legal framework relevant to this area, which also applies to labor market assessments (World Bank, 2017). These parameters are evaluated according to the established rating scale and are assigned to these categories, which makes it possible to determine the degree of efficiency of all individual indicators and to rank the overall list.

The governments of countries benefit from such research when reviewing and evaluating economic policies and identifying the strengths and weaknesses of the current situation, while researchers benefit from the ability to make certain estimates based on insights into the ranking of countries. Individual data may be irrelevant for drawing conclusions, and for this reason the overall ranking is considered as a relevant representative of the development of the market environment and institutions. The adequacy of the market environment and its suitability for business is analyzed through case studies and focuses on rules that are relevant to the analysis. The unique data set enables analysis in order to better understand business regulation, the current situation, and the ability to achieve sustainable growth and development.

An examination of the state of an economy and its performance can also be done through a report published by the Heritage Foundation, through the Index of Economic Freedom. According to this report, economic freedom is a key element of human well-being and a major factor in maintaining the freedom of human society. The key determinants of this attitude are that each country's path to growth and development must be adapted to its own culture, history and unique conditions. However, there are certain basic characteristics common to all countries, so nations with greater degrees of economic freedom tend to fully utilize and capitalize on the knowledge and capabilities of each individual in their society. For society as a whole, this will create the conditions for dynamic economic growth, increased innovation and efficient allocation of resources. An individual is economically free if they have complete control over their work and property, without government interference. The role of the state is reduced to protecting such a defined freedom, and the ideal (highest) degree of economic freedom provides an individual with an absolute right of private property, complete freedom of movement of capital, labor and trade in goods, according to a report by the Heritage Foundation (Economic Freedom, 2017).

The Economic Freedom Index provides compelling evidence of the wide range of tangible benefits of living in a society with greater degrees of economic freedom. The index analyzes the development of economic policy in 186 countries that are rated and ranked within the 12 criteria of economic freedom, and which assess the rule of law, size of public administration and public sector, regulatory efficiency and market openness.

Within the rule of law, property rights, the efficiency of the judiciary and the integrity of the state are evaluated separately. The analysis of the size of the public sector includes tax burden, government spending management and "fiscal health", the state of public finances. Regulatory efficiency assesses business freedom, freedom of the labor market and monetary institutions, while market openness implies free trade, financial and investment freedoms. The assessment of each individual criterion, in accordance with the set scale, gives an overall rating of each country, which gives an insight into its position and the degree of economic freedom in relation to other countries (Economic Freedom, 2017).

In assessing the conditions in these four categories, the index includes 12 specific

„slobodne".[1] Zemlje su rangirane po ukupnoj oceni, ali i po regionima kojima pripadaju, pa je tako omogućeno preciznije poređenje i donošenje zaključaka.

Nedostaci postojećih načina merenja konkurentnosti i ocene institucionalnog ambijenta

Pri izračunavanju i merenju toga koliko je neka privreda zaista konkurentna može se naići na određen broj nedostataka i propusta koji su posledica neadekvatnosti izabrane metodologije i načina konstruisanja pojedinih kompozitnih indeksa. Iz tog razloga, stvarno stanje može u većoj ili manjoj meri da odstupa od prikazanog sumarnog indikatora, u zavisnosti od načina ponderisanja, uključivanja i izostavljanja pojedinih podindikatora i načina vrednovanja pojedinih pozicija koje se uključuju u konačnu ocenu. Pored toga, postoje mišljenja da ovako visoka detaljizacija faktora može imati za posledicu sakrivanje same suštine konkurentnosti i načina njenog unapređenja (Matejić, 2003). Prilikom sagledavanja ocena konkurentnosti, može se primetiti precenjenost, kao i podcenjenost pojedinih zemalja prema postojećim kriterijumima, što ukazuje na to da važeća merila ne pružaju dovoljno dobar pregled trenutne konkurentnosti zemalja i da postoji prostor za napredak postojećih indikatora (Djogo & Stanisic, 2016).

U analizi putem Globalnog indeksa konkurentnosti, naročita pristrasnost ocena može se videti kod tzv. mekih (soft) indikatora koji su rezultat anketiranja. Međutim, kvalitet podindikatora, koji se koriste u donošenju konačne ocene i čije su vrednosti dobijene na osnovu međunarodnih komparativnih baza, i koji su kvantitativne prirode, može biti konstruktivan iz razloga što je ista metodologija primenjena na sve zemlje. Čak i u slučaju da metologija nije ispravna, ona je važeća i ista za sve zemlje, pa se tako može izvršiti validno međunarodno poređenje (Ristić & Tanasković, 2011, p. 154). Generalno, pristrasnosti u poređenjima i ocenama dobijenim na osnovu „čvrstih podataka" su manja u poređenju sa „mekim podacima" dobijenim na osnovu ankete.

Prilikom korišćenja subjektivnih ocena u procesu međunarodnog poređenja mogu se javiti određeni nedostaci i samim tim dovesti u pitanje validnost dobijenih ocena. Prilikom ocenjivanja kvaliteta određenih institucija u procesu anketiranja, uprkos postojanju konsenzusa ispitanika oko određenog problema, njihov rang ocena može biti pesimističan ili optimističan, pa tako može doći do različitog vrednovanja i iskazivanja različitih ocena neke konkretne pojave. Pristrasnost prilikom ovog vida ocenjivanja može uticati na pomeranje ranga zemlje u međunarodnom poređenju.

Osim toga, može postojati i problem odabira referentne tačke, odnosno za šta će se ispitanik vezivati kao uzor u svojoj proceni. U zavisnosti od toga da li u poređenju pojava posmatra više ili manje razvijeno okruženje u odnosu na koje formira svoju procenu, rang ocena se može razlikovati. Takođe, pošto su ispitanici menadžeri preduzeća, oni mogu ispoljiti pristrasnost prilikom ocenjivanja.

Jedan od bitnih elemenata u subjektivnom ocenjivanju jeste i informisanost ispitanika, njihova percepcija okruženja, kao i eventualno trenutno nezadovoljstvo postojećim stanjem koje se može projektovati na datu ocenu. Raspored pitanja i sama konstrukcija ankete može takođe imati uticaj na krajnju ocenu privrednog ambijenta (Bertrand & Mullainathan, 2011, str. 68).

Jedan od problema vrednovanja može se javiti i prilikom ocene zdravstvenih institucija i zdravstvene zaštite. Uticaj određenih bolesti na rang ocene manifestuje se kroz njihovu učestalost, ali i troškove lečenja, pri čemu se ovi faktori takođe sagledavaju u odnosu na situacije u drugim zemljama, na osnovu čega se i formira rang ocene. Problem se može javiti usled nedostatka podataka za određene bolesti kada je učestalost jednaka nuli, pri čemu ovaj pokazatelj dobija najveću ocenu 7, pa rang ukupne ocene ovog podindikatora i stuba konkurentnosti može na pogrešan način pokazati stanje u ovoj oblasti (World Economic Forum, 2017-2018).

Uvažavajući navedene zahteve, neophodno je objektivno sagledati vrednosti podindikatora i stubova konkurentnosti i utvrditi načine

1 Prema izveštaju iz Economic Freedom 2017 samo 5 zemalja karakteriše se najvećim stepenom slobode

components of economic freedom that are standardized and eligible for generating an overall economic assessment of each economy. The ranking of the overall grade ranges from 0 to 100, where higher degree of economic freedom increases the ranking of the grade. Countries are classified according to grade in 5 categories, from "suppressed" to "free".[1] Countries are ranked by overall rating and by region to which they belong, hence providing more accurate comparisons and conclusions.

Disadvantages of the Existing Ways of Measuring Competitiveness and Assessing the Institutional Setting

When calculating and measuring how competitive an economy really is, one can come across a number of shortcomings and omissions that result from the inadequacy of the chosen methodology and how to construct individual composite indices. For this reason, the actual situation may deviate to a greater or lesser extent from the summary indicator presented, depending on the weighting, inclusion and omission of individual sub-indicators and the valuation of particular positions to be included in the final assessment. In addition, there are opinions that such a high level of detail of factors can result in hiding the very essence of competitiveness and how to improve it (Matejić, 2003). When looking at competitiveness assessments, one can notice the overestimation, as well as the underestimation, of individual countries according to the existing criteria, which indicates that the current criteria provide an insufficient overview of the current competitiveness of countries, and that there is space for improvement concerning existing indicators (Djogo & Stanisic, 2016).

In the analysis through the Global Competitiveness Index, particular bias of the ratings can be seen in the so-called soft indicators resulting from the survey. However, the quality of the sub-indicators used in making the final assessment and whose values are derived from international comparative bases and which are quantitative in nature, can be constructive because the same methodology is applied to all countries. Even if the methodology is incorrect, it is valid and the same for all countries, so a valid international comparison can be made (Ristić & Tanasković, 2011). In general, the biases in comparisons and ratings obtained from "hard data" are smaller compared to "soft data" obtained from the survey.

When using subjective assessments in the international comparison process, certain shortcomings may occur and therefore jeopardize the validity of the assessments obtained. When assessing the quality of particular institutions in the survey process, despite the consensus of respondents about a particular problem, their ranking may be pessimistic or optimistic, and thus different evaluations and different ratings of a particular phenomenon may occur. Bias in this type of evaluation can affect the shift of the country ranking in international comparison.

In addition, there may be a problem of selecting a reference point, i.e. what the respondent will relate to as a role model in their assessment. Depending on observation of more or less developed environment in the comparison of phenomena in relation to which assessment is formed, the ranking of the ratings may differ. Also, since respondents are in managing positions, they may exhibit bias when evaluating.

One of the important elements in the subjective evaluation is the information of the respondents, their perception of the environment, as well as any current dissatisfaction with the existing state that can be projected on the given assessment. The layout of the questions and the construction of the survey can also have an impact on the final assessment of the economic environment (Bertrand & Mullainathan, 2011).

One of the problems of this evaluation can also arise when evaluating health institutions and health care. The impact of certain diseases on the rank of the rating is manifested through their frequency and costs of treatment, and these factors are also considered in relation to situations in other countries on the basis of which the rating rank is formed. The problem can be due to the lack of data for certain diseases when the frequency is

1 According to the Economic Freedom 2017 report, only 5 countries show the highest level of freedom

dobijanja njihove ocene kako bi bili sigurni da krajnji indikatori na odgovarajući način reflektuju stanje određene privrede. Uvidom u vrednosti ocena za analiziranu zemlju mogu se uočiti nedostaci konkretne privrede ali, isto tako, moguće je pronaći prostor za napredak u određenim segmentima. Kao reper poređenja mogu poslužiti privrede sličnog institucionalnog ambijenta, sličnog nivoa razvijenosti, bogatstva i efikasnosti iskorišćenja resursa.

Nedostaci koji su prisutni u okviru Doing Business liste, i procene tržišnog ambijenta u okviru te analize, ogledaju se u zanemarivanju oblasti koje nisu pokrivene njihovom analizom. Oblasti koje nisu uključene u konačnu ocenu su: makroekonomska stabilnost, razvoj finansijskog sistema, kvalitet radne snage, korupcija, veličina tržišta, kao i propusti i nedostaci sigurnosti.

Pored ovoga, prisutne su i oblasti koje nisu obuhvaćene analizom, a nalaze se u području koji se istražuje i uključuje u rang ukupne ocene na Doing Business listi. Na primer, u okviru analize plaćanja poreza nije obuhvaćena stopa poreza na dohodak građana, dok kod analize uslova kreditiranja, nije uključena pozicija monetarne politike, kao ni dostupnost kreditnih uslova. Isto tako, u oblasti analize trgovine preko granice, odnosno međunarodne trgovine, ne obraća se pažnja na izvozne i uvozne tarife i subvencije. U rešavanju nesolventnosti privrede, zanemarena su pravila pri rešavanju pojedinačnih slučajeva nesolventnosti tržišnih učesnika i njihovih stečaja (World Bank, 2017).

Ocena ekonomske slobode, prema kriterijumu Economic Freedom indeksa u okviru Heritage fondacije, karakteriše jasan stav u korelaciji ekonomskog rasta i stepena slobode različitih institucija i segmenata privrede koji utiču na poslovanje u jednoj ekonomiji. Međutim, potrebno je naznačiti da rang ocena, koji je najvećim delom subjektivnog karaktera i može se formirati bez mogućnosti pristupa i uvida u sve relevantne informacije, može predstaviti određenu privredu u izvesnom stepenu slobode koji se razlikuje od stvarnog (Economic Freedom, 2017).

Pojedine pozicije koje naglašavaju stepen sloboda teško su merljive i ne podležu u potpunosti projektovanju na zadatu skalu ocena. Jedan od nedostataka ovog indeksa jeste i to što prilikom analize uzima u razmatranje 12 kriterijuma u okviru 4 grupe pokazatelja, ali u svojoj oceni zanemaruje makroekonomske pokazatelje koji su prisutni u konstrukciji drugih indeksa sloboda, kao što je slučaj sa kanadskim Fraser Institute indeksom EFW.

Pored toga, uvidom u stepen sloboda određene ekonomije može se proširiti slika celokupne privrede. Dopunjavanjem kvantitativnih ekonomskih pokazatelja indeksom ekonomskih sloboda, stiče se kompletan utisak o načinu funkcionisanja tržišnih mehanizama unutar jedne privrede. Različite skale rangiranja pomenutih kompozitnih indeksa mogu ispoljiti određena odstupanja u poziciji pojedine zemlje na svetskoj listi, ali i pored toga primetan je zavidan stepen korespondencije među pozicijama zemalja na ovim listama.

Konkurentska pozicija i kvalitet institucija Srbije

U daljem tekstu će biti analiziran trenutni položaj Republike Srbije, njenih institucija i ključnih pokazatelja konkurentnosti prema izveštajima Svetskog ekonomskog foruma, Doing Business liste, kao i Heritage fondacije, odnosno indeksu Economic Freedom-a. Uvidom u konkretne vrednosti indikatora i pozicije Srbije prema ovim izveštajima, kao i njihovim poređenjem sa indikatorima zemalja iz okruženja, moguće je sagledati kvalitet posmatranih institucija i trenutnu poziciju u regionalnim i međunarodnim okvirima.

Srbija se, prema izveštaju Svetskog ekonomskog foruma za 2017. godinu, nalazi na 90. mestu liste koja obuhvata 138 zemalja, što predstavlja napredak za četiri mesta u odnosu na prethodnu godinu (kada je bila rangirana kao 94. na listi). BDP po glavi stanovnika je 5.119,8 američkih dolara, a vrednost Globalnog indeksa konkurentnosti iznosi 4,0 i predstavlja neznatan napredak u odnosu na raniji period. Najbolju ocenu Srbija ima u grupi pokazatelja Osnovni zahtevi gde prednjači ocena stuba Zdravstvo i primarno obrazovanje sa ocenom 6,0. Nivo ocene ovog stuba konkurentnosti jednak je proseku Evrope i Severne Amerike i u izvesnom stepenu podiže rang ukupne ocene. Gledajući samo ovaj stub, Srbija se nalazi na 53. mestu od 138 zemalja.

zero, with this indicator getting the highest score 7, so the ranking of the overall score of this sub-indicator and the competitiveness pillar may misrepresent the situation in this filed (World Economic Forum, 2017-2018).

In view of the above requirements, it is necessary to objectively consider the values of the sub-indicators and pillars of competitiveness and to determine ways of obtaining their assessment in order to be sure that the end indicators adequately reflect the state of a particular economy. An insight into the value of the ratings for the analyzed country can reveal the shortcomings of a particular economy, but it is also possible to find room for progress in certain segments. As a benchmark, economies with a similar institutional environment, and similar levels of development, wealth and resource efficiency can serve as benchmarks.

The shortcomings present in the Doing Business list, and the assessment of the market environment within that analysis, are reflected in the neglect of areas not covered by their analysis. Areas not included in the final assessment are: macroeconomic stability, development of the financial system, quality of the workforce, corruption, size of the market, as well as security gaps.

In addition, there are areas that are not covered by the analysis and are in the area under study and included in the ranking of the overall Doing Business list. For example, the analysis of tax payments does not include the personal income tax rate, while the analysis of credit conditions does not include the position of monetary policy or the availability of credit conditions. Likewise, in the area of trade analysis across borders, international trade, no attention is paid to export and import tariffs and subsidies. In resolving the insolvency of the economy, the rules for resolving individual cases of insolvency of market participants and their bankruptcies were ignored (World Bank, 2017).

The economic freedom rating, according to the criteria of the Economic Freedom Index within the Heritage Foundation, is characterized by a clear attitude in the correlation of economic growth and the degree of freedom of different institutions and segments of the economy that affect business in a given economy. However, it should be noted that ratings, which are mostly subjective and can be formed without the ability to access and view all relevant information, can represent a particular economy in a degree of freedom that is different from the real situation (Economic Freedom, 2017).

Certain positions that emphasize the degree of freedom are difficult to measure and are not fully projectable on a given rating scale. One of the drawbacks of this index is that, when analyzing, it considers 12 criteria within 4 groups of indicators, but in its assessment ignores the macroeconomic indicators present in the construction of other indices of freedom, as is the case with the Canadian Fraser Institute index EFW.

In addition, an insight into the degree of freedom of a particular economy can broaden the picture of the whole economy. By supplementing quantitative economic indicators with the index of economic freedoms, it gets a complete impression of how market mechanisms work within one economy. The different ranking scales of the composite indices mentioned above may show some variations in the position of a particular country on the world list, but there is also an enviable degree of correspondence between the positions of countries on these lists.

Competitive Position and Quality of Serbian Institutions

The following section will analyze the current position of the Republic of Serbia, its institutions and key competitiveness indicators according to the reports of the World Economic Forum, Doing Business List as well as the Heritage Foundation, or the Economic Freedom Index. By looking at the specific values of the indicators and the position of Serbia according to these reports, as well as their comparison with the indicators of the countries from the region, it is possible to see the quality of the observed institutions and the current position in the regional and international frameworks.

According to the 2017 World Economic Forum report, Serbia ranks 90th in the list of 138 countries, up four places from the previous year (when it was ranked 94th on the list). The GDP per capita is US $ 5,119.8, and the value of the Global Competitiveness Index is 4.0 and represents a slight improvement over the previous period.

Sa druge strane, daleko najslabiju grupu pokazatelja konkurentnosti čine stubovi iz grupe Faktora inovativnosti i sofisticiranosti, sa rangom ocene (3,1). To je ispod proseka zemalja Zapadne Evrope, najviše usled jako niskih izdvajanja sredstava za istraživanje i razvoj u okviru domaćih preduzeća i slabe nabavke i uvođenja savremenih tehnologija. Ova grupa pokazatelja svrstava Srbiju tek na 120. mesto liste rangiranih država. Pokazatelji druge grupe konkurentnosti, faktori povećanja efikasnosti, takođe su ispod prosečnih vrednosti. Visoko obrazovanje i obuka odlikuju se najvišim rangom ocene u ovoj grupi pokazatelja, a ocene ovih stubova konkurentnosti nije se bitnije menjala, iako je status Srbije i mogući napredak konkurentskih prednosti najviše opredeljen statusom i kretanjem ovih indikatora.

Ono što pravi razliku, posmatrajući stubove konkurentnosti ovih zemalja, jesu drugi i treći stub konkurentnosti, odnosno faktori povećanja efikasnosti i faktori inovativnosti i sofisticiranosti. Ovo nam ukazuje na to da su pomenute zemlje, koje su sada članice EU, napredak ostvarile u najvećoj meri upravo kroz unapređenje podindikatora pomenutih stubova. Ipak, podindikatori faktora inovativnosti i sofisticiranosti i dalje su ispod proseka razvijenih zemalja.

Prema stepenu lakoće poslovanja, odnosno Doing Business listi, Srbija se nalazi na 47. mestu od 190 rangiranih zemalja. Napredak u odnosu na prošlu godinu je značajan s obzirom da je u 2016. Srbija bila na 59. mestu ove liste. Rang ukupne ocene iznosi 72,29 (na skali od 1-100), a najbolja pozicija je na polju Međunarodne trgovine gde je Srbija ocenjena kao 23. zemlja od svih rangiranih zemalja. Najnezavidnija situacija je sa kategorijom Proizvodnja električne energije, po kom parametru je Republika Srbija tek na 92. mestu. Pozitivan pomak ostvaren je kroz olakšavanje plaćanja poreza čime je rang ocene ovog indikatora porastao i uslovio promenu pozicije sa 143. na 78. mesto liste rangiranih zemalja prema ovom kriterijumu.

Tabela 2: Rang i vrednost ocene Globalnog indeksa konkurentnosti za Srbiju, Hrvatsku, Bosnu i Hercegovinu, Rumuniju i Bugarsku u 2017.

Zemlja	BDP per capita US$	GCI, rang	Ocena 1-7	Osnovni uslovi, rang	Faktori efikasnosti, rang	Faktori inovativnosti, rang
Srbija	5.119,8	90	4,0	4,3	3,9	3,1
Hrvatska	11.572,9	74	4,1	4,6	4,1	3,4
B i H	4.088,2	107	3,8	4,2	3,6	3,0
Rumunija	8.906,3	62	4,3	4,6	4,3	3,3
Bugarska	6.831,7	50	4,4	4,7	4,4	3,6

Izvor: Global Competitiveness Report 2016-2017, str. 326-327.

Poredeći Srbiju sa ostalim zemljama Balkana, na osnovu podataka WEF-a vidimo, na osnovu sličnosti pojedinih podataka, da je reč o zemljama koje su prošle ili još uvek prolaze proces tranzicije. Najbolje rangirana ekonomija prema GIK-u jeste Bugarska koja zauzima 50. mesto na listi sa najvišom ocenom konkurentnosti među analiziranim zemljama (4,4). Stubovi konkurentnosti beleže najviše vrednosti od svih posmatranih zemalja. Sličan rang ocene ima i Rumunija (4,3), dok se Hrvatska, poslednja pridružena članica EU, odlikuje daleko najvećom vrednošću BDP per capita od 11.572,9 američkih dolara, što u poređenju sa Srbijom predstavlja više od dvostruke vrednosti. Najniži rang ocene posmatranih zemalja ima Bosna i Hercegovina koja se nalazi na 107. mestu liste i ima najslabije ocene indikatora konkurentnosti.

Posmatrane države regiona pokazuju sličan položaj u odnosu na Srbiju, kao što je slučaj i u analizi prema Globalnom indeksu konkurentnosti. Najbolju poziciju na Doing Business listi imaju Rumunija i Bugarska kao 36, odnosno 39. zemlja prema rangu ukupne ocene. Hrvatska zauzima 43, a Bosna i Hercegovina 81. mesto (World Bank, 2017). Ono što izdvaja Hrvatsku i Rumuniju, i umnogome doprinosi njihovom rejtingu, jeste najviša moguća

Serbia has the highest score in the indicator group Basic Requirements where the pillar score is Health and Primary Education with a score of 6.0. The rating level of this pillar of competition is equal to the average of Europe and North America and to some extent raises the ranking of the overall rating. Looking at this pillar alone, Serbia ranks 53rd out of 138 countries.

On the other hand, the weakest group of competitiveness indicators is the pillars of the Innovation and Sophistication Factors group, with a rating of (3.1). This is below the average of Western European countries, mainly due to the very low R&D allocation of domestic enterprises and poor procurement and introduction of modern technologies. This group of indicators ranked Serbia only 120th on the list of ranked countries. Indicators of the other competitiveness group, the Efficiency Increasing Factors, are also below average. Higher education and training have the highest ranking in this group of indicators, and the ratings of these pillars of competitiveness have not changed significantly, although the status of Serbia and the possible advancement of competitive advantages are mostly determined by the status and movement of these indicators.

Comparing Serbia with other Balkan countries, we see from WEF data, based on the similarity of individual data, that these are countries that have undergone or are still undergoing a transition process. The most ranked economy according to the GIK is Bulgaria, which ranks 50th in the list with the highest competitiveness score among the analyzed countries (4.4). Competitiveness pillars record the highest values of all countries observed. Romania (4.3) has a similar rating, while Croatia, the last associated EU member state, has by far the highest GDP per capita value of US $ 11,572.9, which is more than double that of Serbia. Bosnia and Herzegovina has the lowest ranking of the observed countries, ranks as 107th in the list of competitiveness indicators.

What makes the difference when looking at the pillars of competitiveness of these countries are the second and third pillars of competitiveness, respectively, the factors of efficiency increase and the factors of innovation and sophistication. This indicates to us that the mentioned countries, which are now EU members, have made the most progress through the improvement of the sub-indicators of the mentioned pillars. However, the indicators of innovation and sophistication are still below the average of developed countries.

Table 2: Rank and Value of the Global Competitiveness Index for Serbia, Croatia, Bosnia and Herzegovina, Romania and Bulgaria in 2017

Country	GDP per capita US$	GCI, rank	Value 1-7	Basic requirements, rank	Efficiency Factors, rank	Innovation and sophistication factors, rank
Serbia	5,119.8	90	4.0	4.3	3.9	3.1
Croatia	11,572.9	74	4.1	4.6	4.1	3.4
B&H	4,088.2	107	3.8	4.2	3.6	3.0
Romania	8,906.3	62	4.3	4.6	4.3	3.3
Bulgaria	6,831.7	50	4.4	4.7	4.4	3.6

Source: Global Competitiveness Report 2016-2017, p. 326-327.

According to the degree of ease of doing business, or Doing Business list, Serbia ranks 47th out of 190 ranked countries. Progress over last year is significant given that in 2016 Serbia was ranked 59th on this list. The overall rating is 72.29 (on a scale of 1-100), and the best position is in the field of International Trade, where Serbia is ranked 23rd out of all ranked countries. The most unenviable situation is with the category Electricity Generation, by which parameter the Republic of Serbia is only in 92nd place. A positive shift was made by facilitating tax payments, which increased the ranking of this indicator and caused the change of position from 143rd to 78th place in the list of ranked countries according to this criterion.

ocena parametra Međunarodne trgovine. Relativno visok rejting ovog parametra kod svih posmatranih zemalja ukazuje na nužnost otvorenosti ovih privreda prema međunarodnom okruženju, čime se ostvaruje mogućnost za dalji privredni rast i razvoj. Ono što je negativna konstatacija parametara Doing Business liste posmatranih zemalja jeste jako niska ocena indikatora Dobijanje električne energije po čemu se sve posmatrane države nalaze na niskoj poziciji liste rangiranih zemalja.

Tabela 3: Ocena, trenutna i prethodna pozicija na Doing Business listi za Srbiju, Hrvatsku, Bosnu i Hercegovinu, Rumuniju i Bugarsku u 2017.

Zemlja	Ocena 0-100	Pozicija na DB listi 2017	Pozicija na DB listi 2016
Srbija	72,29	47	59
Hrvatska	72,99	43	40
B i H	63,87	81	79
Rumunija	74,26	36	37
Bugarska	73,51	39	38

Izvor: Doing Business Report 2017, str. 7.

Parametar koji meri stepen slobode tržišta i tržišnih učesnika, indeks Ekonomskih sloboda (Economic Freedom, The Heritage Foundation), svrstava Srbiju na 99. mesto rangiranih država sveta prema kriterijumu ekonomskih sloboda sa vrednošću indeksa od 58,9. Ova pozicija predstavlja nazadovanje u odnosu na izveštaj za prethodnu godinu kada se Srbija nalazila na 77. mestu ove liste (62,1 indeksnih poena).

Prosek ocene za region Evrope iznosi 68 indeksnih poena, a među evropskim zemljama Srbija zauzima nezavidno 39. mesto od 45 rangiranih zemalja. I prema svetskom nivou ocene ekonomskih sloboda, Srbija se svrstava među „neslobodne" (mostly unfree) privrede. Od svih pokazatelja stanja tržišnih institucija i ocene konkurentnosti, ovaj indeks karakteriše privredu Srbije sa najlošijom ocenom.

Međutim, prema izveštaju Economic Freedom-a, konkurentnost domaće privrede podržavaju niske fiksne stope poreza, relativna otvorenost prema međunarodnoj trgovini i sprovođenje tekućih regulatornih reformi koje podrazumevaju konsolidaciju, privatizaciju i oživljavanje bankarskog sektora. Uprkos izvesnim naznakama napretka, ukupne ekonomske slobode u Srbiji su ograničene zbog, kako se naglašava u ovom izveštaju, nedostatka političke volje za preduzimanjem potrebnih reformi i sporog procesa njihove implementacije. Državna potrošnja se ocenjuje kao visoka i loša, a prvenstveni zahtevi tiču se sprovođenja institucionalnih reformi u cilju suzbijanja birokratije, smanjenja korupcije i jačanja pravosudnog sistema koji je, prema proceni, osetljiv na političko uplitanje. Napredak je do sada ostvaren u poreskoj politici, monetarnoj stabilnosti i trgovini, dok još uvek zabrinjavaju i zahtevaju progres oblasti koje se tiču vladavine prava, državna potrošnja i stanje fiskalnih pokazatelja (Economic Freedom, 2017).

Prema ovom izveštaju ekonomija Srbije se karakteriše niskom stopom inflacije od 1,4%, stopom nezaposlenosti od 19% i učešćem javnog duga u BDP-u od 77,4%, dok je priliv stranih direktnih investicija u prethodnoj godini iznosio 2,3 milijarde američkih dolara (Economic Freedom, 2017). U poređenju sa

Tabela 4: Ocena ekonomskih sloboda i pozicije ključnih makroekonomskih pokazatelja za Srbiju, Hrvatsku, Bosnu i Hercegovinu, Rumuniju i Bugarsku u 2017.

Zemlja	EF, rang (svet/ region)	Ocena 0-100	Nezaposlenost u %	% javnog duga u BDP	% rasta BDP za poslednjih 5 godina
Srbija	99/39	58,9	19	77,4	0,4
Hrvatska	95/37	59,4	16,1	87,7	- 0,4
B i H	92/36	60,2	30,3	45,5	1,3
Rumunija	39/20	69,7	6,9	39,4	2,4
Bugarska	47/23	67,9	9,8	26,9	1,5

Izvor: Economic Freedom Index, Heritage Foundation 2017, str. 216-220, 274, 278.

Observed countries in the region show a similar position to Serbia as in the Global Competitiveness Index. Romania and Bulgaria are ranked 36th and 39th, respectively, in the Doing Business list by overall ranking. Croatia ranks 43rd and Bosnia and Herzegovina 81st (World Bank, 2017). What sets Croatia and Romania apart, and largely contributes to their rating, is the highest possible estimate of the International Trade parameter. The relatively high rating of this parameter in all observed countries indicates the necessity of openness of these economies to the international environment, thus creating the opportunity for further economic growth and development. The negative finding of the parameters of the Doing Business list of the observed countries is the very low rating of the Obtaining Electricity indicator, whereby all the observed countries are in the low position on the global list.

The parameter that measures the degree of freedom of the market and market participants, the Economic Freedom Index (Heritage Foundation), ranks Serbia in 99th place in the ranked countries of the world according to the criterion of economic freedoms with an index value of 58.9. This position is a setback compared to the previous year's report when Serbia ranked 77th on this list (62.1 index points). The average score for the region of Europe is 68 index points, and among European countries, Serbia is ranked 39th out of 45 ranked countries. According to the global level of assessment of economic freedoms, Serbia ranks among the "mostly unfree" economies. Of all the indicators of the state of market institutions and competitiveness assessment, this index characterizes the economy of Serbia with the worst rating.

However, according to the Economic Freedom report, the competitiveness of the domestic economy is supported by low fixed tax rates, relative openness to international trade and the implementation of ongoing regulatory reforms that entail consolidation, privatization and the revival of the banking sector. Despite some signs of progress, overall economic freedom in Serbia is limited, as highlighted in this report, by the lack of political will to undertake the necessary reforms and the slow process of their implementation. Government spending is judged to be high and poor, and the primary requirements concern the implementation of institutional reforms aimed at suppressing red tape, reducing corruption and strengthening the judiciary, which is estimated to be vulnerable to political interference. Progress has been made so far in tax policy, monetary stability and trade,

Table 3: Rating, Current and Previous Position on Doing Business List for Serbia, Croatia, Bosnia and Herzegovina, Romania and Bulgaria in 2017

Country	Rating 0-100	Position on DB list in 2017	Position on DB list in 2016
Serbia	72.29	47	59
Croatia	72.99	43	40
B&H	63.87	81	79
Romania	74.26	36	37
Bulgaria	73.51	39	38

Source: Doing Business Report 2017, p. 7.

Table 4: Assessment of Economic Freedoms and the Position of Key Macroeconomic Indicators for Serbia, Croatia, Bosnia and Herzegovina, Romania and Bulgaria in 2017

Country	EF, rank (world/region)	Rating 0-100	Unemployment in %	% of public debt in GDP	% of GDP growth over the last 5 years
Serbia	99/39	58.9	19	77.4	0.4
Croatia	95/37	59.4	16.1	87.7	- 0.4
B&H	92/36	60.2	30.3	45.5	1.3
Romania	39/20	69.7	6.9	39.4	2.4
Bulgaria	47/23	67.9	9.8	26.9	1.5

Source: Economic Freedom Index, Heritage Foundation 2017, p. 216-220, 274, 278.

državama regiona, Srbija se uz Hrvatsku odlikuje visokom stopom učešća javnog duga u BDP-u kao i dvocifrenom stopom nezaposlenosti. Ono što je primetno jeste i to da je pozitivna stopa inflacije, od svih analiziranih zemalja, prisutna samo u Srbiji. U susednim zemljama vidimo prisustvo blagog iznosa negativne inflacije, odnosno deflacije.

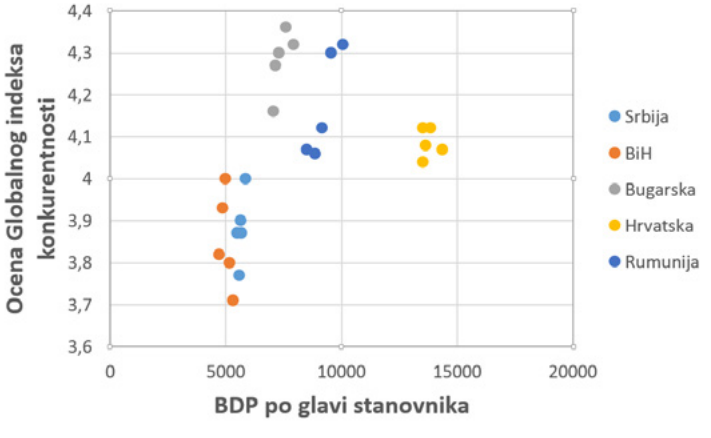
Tabela 5: Korelacioni pokazatelji Pirsonovog koeficijenta

		BDP po glavi stanovnika	Ocena GIK-a
BDP po glavi stanovnika	Pirsonov koef. korelacije Sig. N	1 25	0,447* 0,025 25
Ocena GIK-a	Pirsonov koef. korelacije Sig. N	0,447* 0,025 25	1 25

*Korelacija je značajna na nivou 0,05

Najviši rang prema kriterijumu ekonomskih sloboda od ovih posmatranih država poseduju Rumunija i Bugarska (Rumunija 39, Bugarska 47. zemlja na listi), dok je Srbija u najnezavidnijem položaju među posmatranim zemljama regiona sa najnižim indeksom ocene Economic Freedom-a. Prema kategorijama ocene proizilazi da je ocena otvorenosti tržišta zadovoljavajuća za sve posmatrane zemlje regiona, dok se kao najlošije ocenjeni ističu indikatori vladavine prava.

Grafikon 1: Ocene Globalnog indeksa konkurentnosti i BDP-a po glavi stanovnika za posmatrane zemlje za period od 2013. do 2017. godine



Izvor: Projekcija autora prema podacima WEF-a (The Global Competitiveness Report)

Validnost ocena institucija i parametara konkurentnosti mogu se uporediti sa privrednim rastom, odnosno razvijenošću jedne privrede merenim BDP-om po glavi stanovnika. Na grafikonu 1 može se uočiti odnos ocene konkurentnosti prema GIK-u i BDP-a po glavi stanovnika za posmatrane zemlje. Za posmatrani period od pet godina uočava se koncentrisanost podataka određenih zemalja prema ova dva parametra ali uz određena odstupanja, naročito kada je reč o značajnijoj promeni ocene GIK-a uz istovremenu stagnaciju BDP-a po stanovniku, što je primetno na primeru Bosne i Hercegovine i Rumunije. Takođe, primećujemo i to da Hrvatska u svim posmatranim godinama beleži najveći iznos BDP-a po glavi stanovnika, ali ne i najveću ocenu Globalnog indeksa konkurentnosti, što ukazuje na ne baš jak odnos ove dve varijable.

Precizniji odnos među posmatranim varijablama i njihova međuzavisnost u poslednjih pet godina može se utvrditi putem statističkog metoda korelacije, tačnije Pirsonovog koeficijenta linearne korelacije. Primenom ove metode biće utvrđen smer i intenzitet veze između ocene Globalnog indeksa konkurentnosti i BDP-a po glavi stanovnika, što omogućava precizan uvid u njihov odnos. Dobijeni rezultati mogu se videti u tabeli 5.

Dobijena vrednost Pirsonovog koeficijenta je pozitivna, što ukazuje na to da postoji pozitivna korelacija između ocene Globalnog indeksa konkurentnosti i BDP-a po glavi stanovnika, a vrednost koeficijenta od 0,447 (r=0,447) pokazuje da je odnos ovih promenljivih na srednjem nivou.

Zaključak

Nivo konkurentnosti jedne privrede svakako predstavlja jedan od osnovnih faktora rasta i unapređenja životnog standarda svake tržišno orijentisane ekonomije. Ostvarenjem konkurentskih prednosti stiče se mogućnost

Table 5: Pearson Coefficient Correlation Indicators

		GDP per capita	GCI assessment
GDP per capita	Pearson correlation coeff. Sig. N	1 25	0.447* 0.025 25
GCI assessment	Pearson correlation coeff. Sig. N	0.447* 0.025 25	1 25

*The correlation is significant at the 0.05 level

while still worrying and requiring progress in the areas of rule of law, government spending and the state of fiscal indicators (Economic Freedom, 2017).

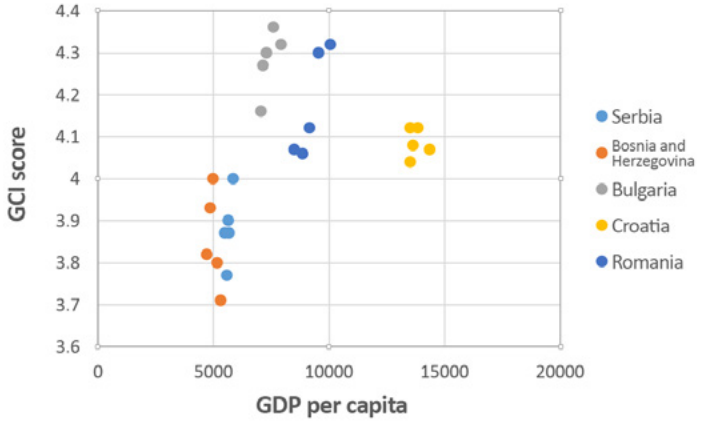
According to this report, Serbia's economy is characterized by a low inflation rate of 1.4%, unemployment rate of 19% and a share of public debt in GDP of 77.4%, while the inflow of foreign direct investment in the previous year amounted to US$ 2.3 billion (Economic Freedom, 2017). Compared to the countries in the region, Serbia is characterized by a high public debt-to-GDP ratio and a double-digit unemployment rate alongside Croatia. What is noticeable is that a positive inflation rate, out of all the analyzed countries, is present only in Serbia. In the neighboring countries, we see the presence of a slight amount of negative inflation, i.e. deflation.

Romania and Bulgaria have the highest rank on the criterion of economic freedom from these observed countries (Romania is 39th, Bulgaria is 47th on the list), while Serbia is in the most unenviable position among the observed countries of the region with the lowest Economic Freedom rating index. According to the rating categories, it appears that the market openness rating is satisfactory for all observed countries in the region, while the rule of law indicators are the worst rated.

The validity of the institutions' ratings and competitiveness parameters can be compared with economic growth, that is, the development of an economy as measured by GDP per capita. Chart 1 shows the ratio of competitiveness assessment to GCI and GDP per capita for the observed countries. For the observed period of five years, there is a concentration of data of certain countries according to these two parameters, but with certain deviations, especially when it comes to a significant change in the GCI estimate with the simultaneous stagnation of GDP per capita, which is noticeable in the case of Bosnia and Herzegovina and Romania. Also, we note that in all observed years, Croatia has recorded the highest amount of GDP per capita but not the highest score of the Global Competitiveness Index, which indicates a not very strong relationship between these two variables.

The more precise relationship between the observed variables and their interdependence over the last five years can be determined by the statistical method of correlation, more precisely the Pearson coefficient of linear correlation.

Chart 1: Global Competitiveness Index and GDP Per Capita Estimates for Observed Countries for 2013-2017



Source: Author projection according to WEF data (The Global Competitiveness Report)

Applying this method will determine the direction and intensity of the link between the Global Competitiveness Index and GDP per capita assessment, which allows for an accurate insight into their relationship. The results obtained can be seen in Table 5.

The Pearson coefficient obtained is positive, indicating that there is a positive correlation between the Global Competitiveness Index score and GDP per capita, and the coefficient value of 0.447 (r = 0.447) shows that the ratio of these variables is medium.

razvoja celokupne privrede čije pozitivne efekte mogu osetiti pojedini tržišni akteri, ali i celokupan sistem jedne nacionalne privrede, naročito ukoliko se odgovarajuća strategija unapređenja konkurentnosti primenjuje na dugoročnom planu.

Pitanje adekvatnosti ocenjivanja pojedinih aspekata konkurentnosti i ukupne ocene konkurentnosti jedne privrede prolazi kroz stalan proces ispitivanja. Pri tome se ovlašćene institucije, zadužene za rangiranje ovih parametara, konstantno prilagođavaju određenim bitnim determinantama konkurentnosti, trudeći se da svojom metologijom i projekcijom ukupnog ranga zadovolje potrebe adekvatnog ocenjivanja. Određeni parametri su diskutabilni iz ugla valjanosti i reprezentativnosti dobijenih vrednosti, pa se tako može doći u poziciju da ukupan rang ne pokazuje pravo stanje neke privrede ili prikazuje neadekvatan odnos pojedinih svetskih privreda. U cilju prevazileženja ovog ograničenja potrebno je neprestano ukazivati na određene nedostatke i, ukoliko je to moguće, ispraviti ih u kratkom roku. Pojedine segmente privrede ipak nije lako oceniti zbog načina prikupljanja i istinitosti pojedinih podataka, pa je poželjno određene indikatore i njihove vrednosti uzeti sa rezervom prilikom donošenja konačnog suda. Kreatori ekonomske politike, naročito kada je reč o zemljama koje su nedavno izašle iz procesa tranzicije, ili se još uvek nalaze u tranziciji, treba da pridaju značaj unapređenju tržišnog ambijenta, vodeći se unapređenjem indikatora utvrđenih od strane institucija za ocenu konkurentnosti i stanja privrede.

Sagledavanjem odnosa i analizom ocene zemalja prema Globalnom indeksu konkurentnosti i BDP-a po glavi stanovnika, došlo se do zaključka da postoji pozitivna korelacija između ova dva pokazatelja, ali je ona na srednjem nivou i pokazuje određena odstupanja na primeru pojedinih posmatranih zemalja. Ovime je potvrđena hipoteza da kompozitni indeksi u merenju konkurentnosti ne odslikavaju u potpunosti razvijenost jedne privrede, a veza između ove dve pomenute varijable je na srednjem nivou korelacije, mereno Pirsonovim koeficijentom.

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Conclusion

The level of competitiveness of an economy is certainly one of the basic factors for the growth and improvement of the standard of living in any market-oriented economy. Achieving competitive advantages gives rise to the possibility of developing an entire economy whose positive effects can be felt by individual market players, but also the whole system of a national economy, especially if the appropriate strategy for improving competitiveness is applied in the long term.

The question of the adequacy of the assessment of certain aspects of competitiveness and the overall assessment of the competitiveness of an economy is undergoing a continuous examination process. In doing so, the authorized institutions in charge of ranking these parameters are constantly adapting to certain important determinants of competitiveness, striving to meet the needs of adequate assessment with their methodology and projection of the overall ranking. Certain parameters are debatable from the angle of validity and representativeness of the obtained values, so one can come to the position that the overall ranking does not show the true state of an economy or depict the inadequate relationship of individual world economies. In order to overcome this limitation, certain deficiencies should be constantly pointed out and, if possible, corrected in the short term. However, it is not easy to evaluate certain segments of the economy because of the way data is collected and the truthfulness of data, so it is advisable to reserve certain indicators and their values when making a final judgment. Economic policy makers, especially when it comes to countries that have recently left the transition process or are still in transition, should attach importance to improving the market environment, taking into account the improvement of indicators established by the institutions for assessing competitiveness and the state of the economy.

Considering the relations and analyzing the country's assessment of the Global Competitiveness Index and GDP per capita, it was concluded that there is a positive correlation between the two indicators, but it is at the intermediate level and shows some variations in the case of some observed countries. This confirms the hypothesis that composite indices in measuring competitiveness do not fully reflect the development of an economy, and the relationship between these two variables is at the mean level of correlation, as measured by the Pearson coefficient.

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DVA SREBRNJAKA I TRI KOVNICE

Rezime

Prvi srebrni novčići Kraljevine SHS i Kraljevine Jugoslavije su 10 i 20 dinara na kojima se nalazi 1931. kao godina kovanja. Ovaj novac iskovan je u 32,5 miliona komada u ukupnoj nominalnoj vrednosti od 450 miliona dinara. U 20 miliona komada iskovan je novac od 10 dinara, a 20 dinara u 12,5 miliona komada. U Kraljevskoj kovnici u Londonu iskovano je 16 miliona komada srebrnjaka od 10 dinara, a u Pariskoj kovnici 4 miliona komada. U Kovnici AD u Beogradu iskovano je 12,5 miliona kovanica od 20 dinara. U opticaj su puštene 18. jula 1932. godine. Kovanice od 20 dinara povlačene su iz opticaja od 16. avgusta 1939. do 16. avgusta 1940. godine, a kovanice od 10 dinara od 31. maja do 31. avgusta 1940. godine. Na licu novčića prikazan je profil kralja Aleksandra Karađorđevića, a na naličju grb Kraljevine Jugoslavije. Kovanica od 10 dinara teška je 7g i ima prečnik od 25mm, dok je kovanica od 20 dinara teška 14g i ima prečnik od 31mm.

Ključne reči: kovanica, srebrni novac, 10 dinara, 20 dinara, opticaj, Kralj Aleksandar Karađorđević, Kraljevina Jugoslavija, Kraljevska kovnica London, Pariska kovnica, Kovnica AD Beograd, Zakon o kovanju srebrnog novca od 10 i 20 dinara

JEL: N14

Srebrni novac od 10 dinara iz 1931. godine - lice

The 10-dinar coin from 1931 - obverse

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TWO SILVER COINS AND THREE MINTS

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Summary

The first silver coins of the Kingdom of Serbs, Croats and Slovenes and the Kingdom of Yugoslavia were the 10- and 20-dinar coins minted in 1931. A total of 32.5 million of these coins were produced, in the nominal value of 450 million dinars. Out of those, 20 million coins were the 10-dinar coins, while 12.5 million pieces of the 20-dinar coins were made. The Royal Mint in London produced 16 million silver 10-dinar coins, while the Paris Mint made 4 million coins. The Kovnica a.d. Belgrade mint produced 12.5 million 20-dinar coins. These coins were released into circulation on 18 July 1932. The 20-dinar coins were steadily withdrawn from circulation starting from 16 August 1939 until 16 August 1940, while the 10-dinar coins were withdrawn in the period from 31 May – 31 August 1940. The obverse of the coins features the profile of King Aleksandar Karađorđević, while the reverse shows the national coat of arms of the Kingdom of Yugoslavia. The 10-dinar coins weigh 7g and have a diameter of 25mm, while the 20-dinar coins weigh 14g, with a diameter of 31mm.

Keywords: coin, silver coins, 10 dinars, 20 dinars, circulation, King Aleksandar Karađorđević, the Kingdom of Yugoslavia, the Royal Mint London, the Paris Mint, Kovnica a.d. Belgrade, the Law on Minting 10- and 20-Dinar Silver Coins

JEL: N14

Srebrni novac od 10 dinara iz 1931. godine - naličje

The 10-dinar coin from 1931 - reverse

Iako ne postoje originalna dokumenta o tome gde su iskovani srebrnjaci od 10 i 20 dinara, ipak se, zahvaljujući usaglašenim mišljenjima iznetim u brojnim katalozima novca, može pouzdano tvrditi da su ih kovale tri kovnice: Kraljevska kovnica u Londonu, Pariska kovnica i Kovnica AD u Beogradu. Ovaj novac, koji na sebi nosi 1931. kao godinu kovanja, prvi je srebrni novac Kraljevine SHS i Kraljevine Jugoslavije.

Zakon o kovanju srebrnog novca od 10 i 20 dinara donet je 28. novembra 1931. godine. Po ovom zakonu ministar finansija bio je ovlašćen da može zaključiti ugovor sa jednom ili više kovnica sa najpovoljnijom ponudom. Predviđeno je da ovaj novac državnog izdanja bude iskovan u 32,5 miliona komada (10 dinara u 20 miliona komada i 20 dinara u 12,5 miliona komada) u ukupnoj nominalnoj vrednosti od 450 miliona dinara. Zakonom su, takođe, precizirani: težina, sadržina srebra u leguri, tolerancija u težini srebra, veličina i opis ovih srebrnjaka.

Ministar finansija bio je po Zakonu obavezan da pored srebra odredi ostatak sadržine legure i da potrebno srebro nabavi kod Narodne banke, od stanovništva otkupom starog srebrnog novca po tržišnoj ceni ili, ako bude potrebno, kupovinom u inostranstvu.

Koliko je planirano, toliko je i iskovano: u Kraljevskoj kovnici u Londonu 16 miliona komada kovanica od 10 dinara, a u Pariskoj kovnici ukupno 4 miliona komada. Srebrnjak od 20 dinara iskovan je u 12,5 miliona komada u Kovnici AD u Beogradu.

Kovnica AD Beograd

O Kovnici AD, za razliku od kovnica u Londonu i Parizu, relativno se malo zna. Poznato je da je kovala dukate za Kraljevinu Jugoslaviju i još neke cirkularne kovanice. Bila je privatna kovnica porodice, odnosno braće, Bošković. Nema pouzdanih podataka kako je prestala da postoji ova beogradska kovnica. Nepotvrđeni izvori navode da se ugasila zbog finansijskih problema ili da je stradala u bombardovanju 6. aprila 1941. godine.

Kraljevska kovnica u Londonu

Kraljevska kovnica je 1986. godine proslavila 11 vekova postojanja. Prvi pisani trag o Kraljevskoj kovnici nalazimo u dokumentima koji datiraju iz 1279-1281. godine u kojima se pominje izgradnja zgrade kovnice u Londonu. Njen najpoznatiji upravnik bio je slavni fizičar Isak Njutn (1642-1727). Na ovom mestu bio je 28

Kraljevska kovnica u Londonu / The Royal Mint in London

godina, sve do svoje smrti. Njutn je u Kovnicu došao u veoma nepovoljnom trenutku kada je Engleska bila pred ekonomskim kolapsom, između ostalog i zbog nezakonitih radnji sa kovanim novcem. Naime, više od 20% kovanica bilo je krivotvoreno, a tek polovina preostalih imala je ispravnu težinu. Sve svoje sposobnosti i autoritet Njutn je usmerio na kažnjavanje onih koji su oštećivali zlatnike i srebrnjake i tako ih obezvređivali, kao i one koji su krivotvorili kovanice. Funtu sterlinga prebacio je iz srebrnog u zlatni standard, stvarajući vezu između zlatnog i srebrnog penija po osnovu zakona kraljice Ane. To su bile značajne reforme koje su donele stabilnost engleskoj ekonomiji. Zbog ovih rezultata u radu Njutn je 1705. godine dobio titulu sera.

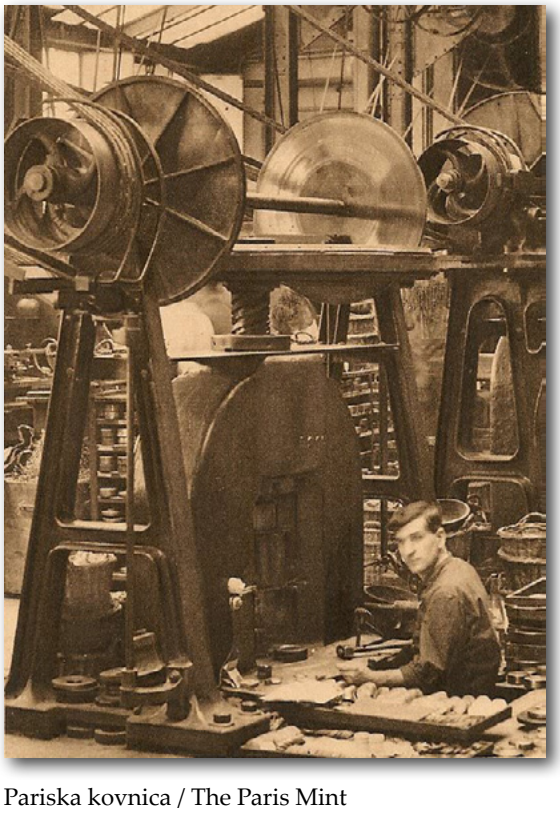
Pariska kovnica

Pariska kovnica je jedna od najstarijih ustanova u Francuskoj. Osnovana je 864. godine po nalogu francuskog kralja Karla II Ćelavog (823-877) i od tada je, kao i danas, kovnica državne valute,

Although there are no original documents confirming where the 10- and 20-dinar silver coins were minted, the consolidated opinions from various money catalogues can still justifiably confirm that they were produced in three mints: the Royal Mint in London, the Paris Mint and Kovnica a.d. Belgrade. These coins, bearing the year 1931 as the year of minting, were the first silver coins of the Kingdom of Serbs, Croats and Slovenes and the Kingdom of Yugoslavia.

The Law on Minting 10- and 20-Dinar Silver Coins was adopted on 28 November 1931. In accordance with this Law, the Minister of Finance was authorised to conclude a contract with one or more mints with the best offer. This state issued money was planned to be minted in 32.5 pieces (20 million 10-dinar coins and 12.5 million 20-dinar coins) in the total nominal value of 450 million dinars. The Law also stipulated: the mass, silver content in the alloy, tolerance in the silver's mass, size and description of the silver coins.

The Minister of Finance was required by the Law to determine the remaining content of the alloy, aside from the silver, and to procure the silver from the National Bank, by buying out old silver from the citizens at the market price, or, if necessary, by purchasing it from abroad.



Pariska kovnica / The Paris Mint

The planned amount of coins was minted: 16 million 10-dinar coins in the Royal Mint in London, and a total of 4 million coins in the Paris Mint. The Kovnica a.d. Belgrade mint produced 12.5 million 20-dinar silver coins.

Kovnica a.d. Belgrade

Unlike the mints in London and Paris, not much is known about this mint. We know that it minted golden coins for the Kingdom of Yugoslavia, and some other coins in circulation. It was the family mint of the Bošković brothers. There is no reliable information on how this Belgrade mint ceased to exist. Unconfirmed sources state that it was shut down due to financial difficulties, or that it was demolished during the bombing of Belgrade on 6 April 1941.

The Royal Mint in London

In 1986, the Royal Mint celebrated 11 centuries since its establishment. The first written evidence of the Royal Mint was found in documents dated 1279-1281, which mention the construction of the mint's building in London. Its most famous warden was the famous physicist Isaac Newton (1642-1712). He spent 28 years at that position, until he passed away. Newton came to the mint at a highly inopportune time, while England was facing an economic collapse, among other things, due to illegal proceeding with coins. Namely, over 20% of all coins were forgeries, and only a half of all coins had the correct mass. Newton directed all his capabilities and authority into punishing those who clipped golden and silver coins, thus leading to their loss in value, as well as those who forged coins. He changed the pound sterling from the gold to the silver standard, creating a link between the golden and silver penny, based on the law of Queen Anne. These were the significant reform that brought stability to the English economy. Due to these results, Newton was knighted in 1705.

The Paris Mint

The Paris Mint (Monnaie de Paris) is one of the oldest institutions in France. It was established in 864, at the order of King Charles

ali i valuta drugih država, pojedinih kovanica Evropske unije, prigodnih novčića, medalja, nakita i drugih umetničkih proizvoda. Svake godine proizvede više od milijardu kovanica, a oko 20% dobiti dolazi od proizvodnje nakita i kolekcionarskih kovanica. Usluge Pariske kovnice koristila je i Kraljevina Jugoslavija. Međutim, Kraljevina SHS i Kraljevina Jugoslavija u većoj meri su koristile usluge Banke Francuske za izradu papirnatih novčanica.

Iz opticaja povučene 1940. godine

Do kraja 1932. godine Narodnoj banci, kako stoji u njenom godišnjem izveštaju, predato je srebrnjaka u nominalnoj vrednosti od 419.200.000 dinara, a do 5. avgusta 1933. godine srebrnjaka u nominalnoj vrednosti još 30.800.000 dinara. U opticaj ih je pustio Ministar finansija 18. jula 1932. godine preko Narodne banke. Kovanice od 20 dinara povlačene su iz opticaja od 16. avgusta 1939. do 16. avgusta 1940. godine, a od 10 dinara od 31. maja do 31. avgusta 1940. godine.

Osnovne karakteristike

Zajednički elementi oba srebrnjaka su:

- Lice: reljefni profil kralja Aleksandra Karađorđevića, latinični ispis oko lika: ALEKSANDAR I KRALJ JUGOSLAVIJE i po ivici kovanica krug tačkica;
- Naličje: grb Kraljevine Jugoslavije, godina izdanja - levo od grba cifra 19 a desno 31, ispod je oznaka nominalne vrednosti 10 ili 20 i reč latinicom DINARA a po ivici krug tačkica;
- Obodi kovanica su nareckani;
- Sastav legure: srebro 50%, bakar 40%, nikl 5% i cink 5%.

Elementi koji ih razlikuju:

- Težina: 7g (kovanica od 10 dinara) i 14g (kovanica od 20 dinara);
- Prečnik: 25mm (kovanica od 10 dinara) i 31mm (kovanica od 20 dinara);
- Dozvoljena odstupanja: sadržina srebra ±5%, u težini ±2% za kovanicu od 10 dinara; sadržina srebra ±5%, u težini ±1% za kovanicu od 20 dinara.

Srebrni novac od 20 dinara iz 1931. godine - lice

The 20-dinar coin from 1931 - obverse

Main Characteristics

The identical elements of both silver coins:

- Obverse: relief profile of King Aleksandar Karađorđević, the script in Latin alphabet around the profile: ALEKSANDAR I KRALJ JUGOSLAVIJE, and a circle of dots around the edge of the coin;
- Reverse: the national coat of arms of the Kingdom of Yugoslavia, the year of issue – the number 19 left of the coat of arms and the number 31 on the right, below is the nominal value of 10 or 20 and the word DINARA, with a circle of dots around the edge;
- The edges of the coins are grooved;
- The components of the alloy: silver 50%, copper 40%, nickel 5% and zinc 5%.

The differing elements:

- Mass: 7g (10-dinar coin) and 14g (20-dinar coin);
- Diameter: 25mm (10-dinar coin) and 31mm (20-dinar coin);
- Tolerances: silver content ±5%, mass ±2% for 10-dinar coins; silver content ±5%, mass ±1% for 20-dinar coins.

II the Bald (823-877), and it has since been producing the national currency, as well as currencies from other countries, certain EU coins, commemorative coins, medals, jewellery and other art. Each year, over a billion coins is minted there, and about 20% of its revenue comes from the production of jewellery and collector coins. The Kingdom of Yugoslavia also used the services of the Paris Mint. However, the Kingdom of SCS and the Kingdom of Yugoslavia mostly used the services of the Banque de France to produce banknotes.

Withdrawn from Circulation in 1940

As is stated in its annual report, the National Bank had received silver coins in the nominal value of 419,200,000 dinars, by the end of 1932, and by 5 August 1933 it had received 30,800,000 dinars worth of silver coins. They were released into circulation via the National Bank by the Minister of Finance on 18 July 1932. The 20-dinar coins were withdrawn from circulation in period from 16 August 1939 until 16 August 1940, while the 10-dinar coins we withdrawn between 31 May and 31 August 1940.

Srebrni novac od 20 dinara iz 1931. godine - naličje

The 20-dinar coin from 1931 - reverse

Zlatnici iz 1931. godine

U 1931, kao i u narednim godinama, kovani su prigodni zlatnici: jednostruki i četvorostruki dukati. Međutim, oni se ne smatraju domaćom valutom jer je novčana jedinica Kraljevine Jugoslavije bila dinar. U Pravilniku o kovanju dukata sa likovima kralja Aleksandra i kraljice Marije Karađorđević i puštanju tih dukata u promet, u stavu 2. člana 4, kaže se da „dukati nisu novac već roba".

Jednostruki dukati su imali na licu portret kralja Aleksandra I Karađorđevića, a na naličju državni grb. Osnovne karakteristike: sastav 96,61% Au i 1,39% Cu, prečnik 19,75 mm, masa 3,49g, obod nazupčen.

Četvorostruki dukat je imao na licu portrete kralja Aleksandra i kraljice Marije Karađorđević, a na naličju državni grb. Osnovne karakteristike su: sastav 98,61% Au i 1,39% Cu, prečnik 39,5mm, masa 13,96g, obod nazupčen.

Budući da dukati nisu novac već roba, na njih su stavljane državne oznake - žigovi koji garantuju čistoću zlata: klas, ptice i mač. Jednostruki dukati sa likom kralja Aleksandra iz 1931. godine imali su emisiju od 150 000 i 50 000 komada, iz 1932. godine od 70 000 komada, iz 1933. godine od 40 000 komada i iz 1934. godine od 4000 komada. Autori svih ovih dukata različitih godišta su: Richard Placht i Josept Prinz..

The Golden Coins from 1931

In 1931, as well as in the following years, commemorative golden coins were minted: single and quadruple ducats. However, these coins were not considered as national currency, since the monetary unit of the Kingdom of Yugoslavia was the dinar. In the Rulebook on the minting of ducats with the images of King Aleksandar and Queen Marija Karađorđević and their release in circulation, it is stipulated in Article 4 Paragraph 2 that "ducats are not money, but goods".

The single ducats feature the portrait of King Aleksandar I Karađorđević on the obverse, and the national coat of arms of the reverse. The main characteristics are: composition 98.61% Au and 1.39% Cu, diameter 39.5mm, mass 13.96g, grooved edge.

Seeing how the ducats were not currency, but goods, they featured state markings – marks guaranteeing the purity of gold: wheat, birds and a sword. The single ducats with the portrait of King Aleksandar from 1931 were emitted in series of 150,000 and 50,000 coins, the ducats from 1932 in 70,000 coins, the ducats from 1933 in 40,000 coins and those from 1934 had 4,000 coins emitted. The authors of all these ducats from different years were: Richard Placht and Josept Prinz.

Dvoglavi orao

Orao kao simbol snage, hrabrosti i pobede javlja se već od 6. veka stare ere na kovanicama Makedonije, Grčke i Rima, u provincijama i kolonijama, odnosno u čitavom antičkom svetu. Na njima je orao prikazan kao atribut vrhovnog boga grčko-rimskog panteona Zevsa ili Jupitera. Ova simbolika zadržala se kroz srednji vek, do modernih vremena, u obliku dvoglavog orla. Danas je on zastupljen u heraldici i numizmatici mnogih zemalja u svetu, kao simbol suverenosti i državnosti.

Već polovinom 8. veka dvoglavi orao se kod nas javlja pod vizantijskim uticajem na svečanoj odeći vladara iz dinastije Nemanjića. Osim na odeći, ovaj simbol nalazimo i na drugim predmetima: pečatima, prstenju, srebrnom posuđu, ali i na novcu. Prema podacima iz 10. i 12. veka dvoglavi orlovi su prihvaćeni kod nosilaca visokih titula, koje su nekim srpskim vladarima podelili vizantijski carevi. Orlovi su u Srbiji u prvo vreme prihvaćeni više kao oznaka pojedinog dvorskog dostojanstva i nisu označavali ničiji lični grb. U vreme cara Dušana često se pojavljuju na odeći, nakitu i ostalim predmetima. Verovatno je polovinom 14. veka Zapad smatrao da je dvoglavi orao grb Nemanjića. Dvoglavog orla koristili su brojni despoti na svojim kovanicama: Jovan Oliver, Jovan Uglješa, Stefan Lazarević i Đurađ Branković.

The Double-Headed Eagle

The eagle has appeared as a symbol of strength, courage and victory since the 6th century BC, on the coins from Macedonia, Greece and Rome, in the provinces and the colonies, i.e. throughout the ancient world. On those coins, the eagle is shown as a representation of the supreme god of the Greco-Roman pantheon Zeus or Jupiter. This symbolism persisted throughout the middle ages, until the modern times, in the form of the double-headed eagle. Today, this symbol is present in the heraldry and numismatics of many countries in the world, where it represents sovereignty and statehood.

In the mid-8th century, a double-headed eagle appeared in our, country under Byzantine influence, on the ceremonial clothing of rulers from the Nemanjić dynasty. In addition to clothing, this symbol is found on other items: seals, rings, silverware, but also on money. According to data from the 10th and 12th centuries, double -headed eagles were accepted by Serbian rulers who received high titles from Byzantine emperors. At first, eagles were accepted in Serbia more as a mark of individual court dignity and were not present on anyone's personal coat of arms. During the reign of Emperor Dušan, it often appeared on clothes, jewellery and other objects. Probably in the mid-14th century, the West considered the double-headed eagle to be the coat of arms of the Nemanjić dynasty. The double-headed eagle was used by numerous despots on their coins: Jovan Oliver, Jovan Uglješa, Stefan Lazarević and Đurađ Branković.

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BEOGRADSKA BERZA
BELGRADE STOCK EXCHANGE

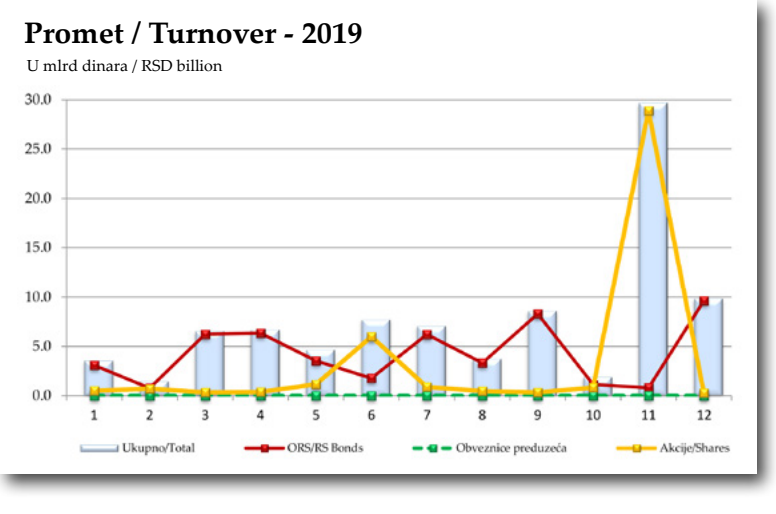
barometar
barometer

Januar 2019 - decembar 2019. / January 2019 - December 2019

Promet / Turnover

Mesec / Month	Listing	Open Market	Regulisano tržište / Regulated market	MTP / MTF	Ukupno / Total	Broj transakcija / Number of transactions
Decembar 2019. / December, 2019	9.839.474.538	23.568.588	9.863.043.126	43.301.493	9.906.344.619	2.222
Novembar 2019. / November, 2019	26.582.250.140	2.803.970.842	29.386.220.982	298.387.620	29.684.608.602	2.506
Oktobar 2019. / October, 2019	1.402.760.533	194.835.647	1.597.596.180	341.111.753	1.938.707.933	3.532
Septembar 2019. / September, 2019	8.504.327.210	101.386.268	8.605.713.478	36.937.388	8.642.650.866	2.135
Avgust 2019. / August, 2019	3.504.384.758	255.696.664	3.760.081.422	24.852.548	3.784.933.970	1.733
Jul 2019. / July, 2019	6.709.126.278	162.146.479	6.871.272.757	222.682.301	7.093.955.058	2.330
Jun 2019. / June, 2019	7.141.912.667	529.604.390	7.671.517.057	94.454.739	7.765.971.796	1.970
Maj 2019. / May, 2019	3.775.163.952	817.617.151	4.592.781.103	116.358.783	4.709.139.886	2.852
April 2019. / April, 2019	6.527.827.401	73.603.893	6.601.431.294	131.165.952	6.732.597.246	3.894
Mart 2019. / March, 2019	6.489.911.988	64.342.746	6.554.254.734	19.572.027	6.573.826.761	2.860
Februar 2019. / February, 2019	1.261.134.837	139.500.023	1.400.634.860	92.236.227	1.492.871.087	2.845
Januar 2019. / January, 2019	3.181.961.718	382.387.075	3.564.348.793	28.085.243	3.592.434.036	2.236
Ukupno 12 meseci / 12-Month Total*	84.920.236.020	5.548.659.766	90.468.895.786	1.449.146.074	91.918.041.860	31.115

* RSD

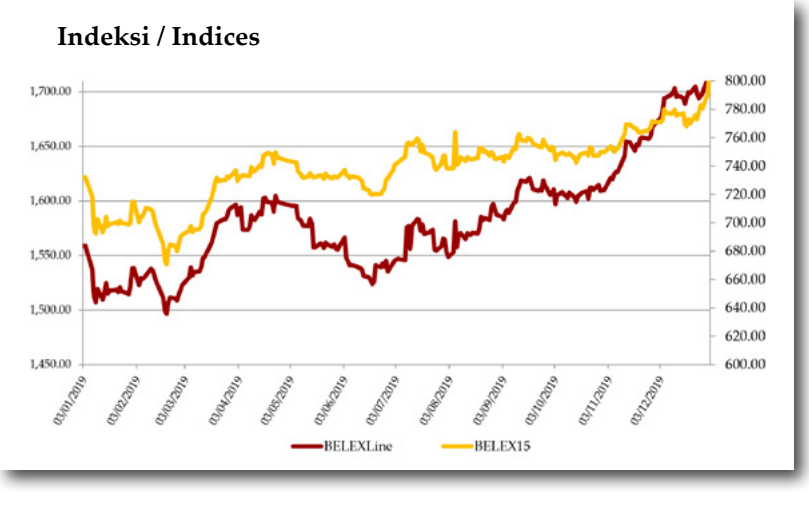


barometar
barometer

BEOGRADSKA BERZA
BELGRADE STOCK EXCHANGE

Indeksi / Indices

		BELEX15	BELEXline
Januar / decembar 2019. January / December 2019	Poslednja vrednost / Last value	801,69	1.726,82
	Promena (abs) / Change (abs)	40	137,47
	Promena (%) / Change (%)	5,25%	8,65%
	Najviša vrednost / Maximum value	802,66	1.726,82
	Najniža vrednost / Minimum value	667,94	1.496,74
	Istorijski max / History maximum value	3.335,2	5.007,34
	Istorijski min / History minimum value	347,46	841,99
	Vrednost prometa / Value of turnover	7.338.376.330	8.326.760.803



BEOGRADSKA BERZA
BELGRADE STOCK EXCHANGE

barometar
barometer

Tržišna kapitalizacija / Market Capitalisation

	Oktobar 2019. / October 2019*	Novembar 2019. / November 2019*	Decembar 2019. / December 2019*
Ukupna tržišna kapitalizacija / Total market capitalisation	558.999.142	560.158.796	569.647.459
Regulisano tržište / Regulated Market	299.679.607	313.705.251	323.075.775
Listing	221.873.351	231.422.901	243.444.524
Prime Listing - akcije / Prime Listing - shares	160.712.620	170.926.588	180.848.796
Standard Listing - akcije / Standard Listing - shares	61.160.731	60.496.313	62.595.728
Open Market	77.806.257	82.282.350	79.631.251
MTP / MTF	259.319.534	246.453.545	246.571.684
BELEX15	235.806.581	246.064.238	256.578.234
BELEXLine	276.160.589	288.370.458	301.000.137

* U hiljadama RSD / In RSD thousands

Učešće stranih investitora / Foreign Investors' Participation

Januar / decembar 2019. January / December 2019	Učešće stranih investitora / Foreign Investors' Participation		
	FIS	total	43,14%
		b-FIS	5,59%
		s-FIS	80,69%
	FIB		4,06%
	FIT		21,38%

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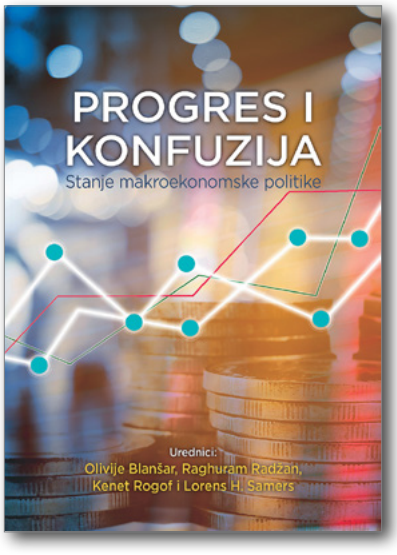


Urednici:
Olivije Blanšar, Raghuram Radžan,
Kenet Rogof i Lorens H. Samers

Progres i konfuzija (2018)

Cena: 800,00 din + PDV
Mek povez, 268 strana

Edited by:
Olivier J. Blanchard, Raghuram G. Rajan
Kenneth S. Rogoff and Lawrence H. Summers

Progress and Confusion (2018)

Price: RSD 800.00 + VAT
Paperback, 268 pages

Dvadeset sedam poglavlja ove knjige sadrže diskusije koje su vođene u aprilu 2015. godine na konferenciji Međunarodnog monetarnog fonda da bi se ocenilo kako globalna finansijska kriza i njene posledice treba da menjaju naše stavove o makroekonomskoj politici. Fokus je stavljen na okvir buduće politike, te tako poglavlja obrađuju sledećih sedam tema: „nova normalnost", sistemski rizik i finansijska regulativa, makroprudencijalna politika, monetarna politika u budućnosti, fiskalna politika u budućnosti, priliv kapitala i upravljanje deviznim kursem, kao i međunarodni monetarni sistem.

The twenty seven chapters of this book contain discussions held in April 2015 at a conference of the International Monetary Fund in order to assess how the global financial crisis and its consequences should change our attitudes towards macroeconomic policy. The focus is placed on the framework of future policy, and so the chapters address the following seven topics: "new normal", systemic risk and financial regulation, macro-prudential policy, monetary policy in the future, fiscal policy in the future, capital inflows and exchange rate management, as well as the international monetary system.

Urednici:
Alen N. Berger, Filip Molino i Džon O.S. Vilson

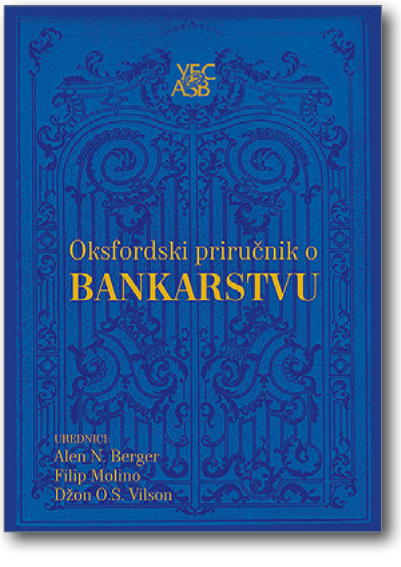
Oksfordski priručnik o bankarstvu (2015)

Cena: 2.500,00 din + PDV
Mek povez, 975 strana

Edited by:
Allen N. Berger, Philip Molyneux and John O.S. Wilson

The Oxford Handbook of Banking (2015)

Price: RSD 2.500.00 + VAT
Paperback, 975 pages



Ovaj priručnik sadrži 36 poglavlja grupisanih u 5 segmenata: Teorija bankarstva, Perspektive regulative i politike, Bankarska performansa, Makroekonomske perspektive u bankarstvu i Međunarodne razlike u bankarskim strukturama i okruženjima, kroz koje vodeći ekonomski teoretičari i kreatori politika u ovoj oblasti pružaju uvid u brojna relevantna pitanja i postavljaju osnove za buduća istraživanja i debatu. Knjiga uspostavlja ravnotežu između apstraktne teorije, empirijskog istraživanja, praktičnih analiza i materijala vezanog za politiku, stavljajući različit naglasak na svaki od ova četiri aspekta od poglavlja do poglavlja.

This Handbook contains 36 chapters grouped into 5 segments: The Theory of Banking, Regulatory and Policy Perspectives, Bank Performance, Macroeconomic Perspectives in Banking, International Differences in Banking Structures and Environments, through which the leading economic theoreticians and policymakers in this field provide insight into the numerous relevant questions, setting the basis for future research and debates. This book strikes a balance between abstract theory, empirical research, practitioner analysis and policy-related material, putting different emphases on these four segments in different chapters.

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Peter S. Rose, Milton H. Marquis

Finansijske institucije i tržišta (2012)

Cena: 2.600,00 din (uključen PDV)
Tvrd povez, 826 strana

Peter S. Rose, Milton H. Marquis

Financial Institutions and Markets (2012)

Price: RSD 2.600.00 (VAT included)
Hard copy, 826 pages

Ova knjiga pruža temeljan uvid u celokupan finansijski sistem, baveći se glavnim vrstama danas prisutnih finansijskih institucija i finansijskih instrumenata. Knjiga uspešno povezuje teorijski pristup sa konkretnim operativnim pristupima, pri čemu operativnost prikazane materije uključuje vredne instruktivne partije namenjene linijama poslovanja i organizovanju finansijskog poslovanja učesnika na finansijskim tržištima, kao i konkretnoj obuci zaposlenih. Osim toga, pruža duboku i iscrpnu analizu uzroka nastanka velike kreditne krize 2007. do 2009. godine, kao i osvrt na izglede i pravce budućeg razvoja finansijskog tržišta.

This book provides a detailed and comprehensive insight into the entire financial system, presenting all main types of today's financial institutions and financial instruments. The book successfully integrates theory and concrete operational approaches, the presented subject matter being practical thanks to the highly valuable instructive sections, dedicated to business lines and organisation of financial operations by financial market participants, but also to specific training and education of employees. Moreover, it provides a profound analysis of the causes that led to the big 2007-2009 credit crunch, along with a review of the prospects and directions of future development of the globalised financial market.

Lawrence S. Ritter, William L. Silber i Gregory F. Udell

Principi novca, bankarstva i finansijskih tržišta (2009)

Cena: 2.600,00 din (uključen PDV)
Tvrdi povez, 659 strana

Lawrence S. Ritter, William L. Silber and Gregory F. Udell

Principles of Money, Banking and Financial Markets (2009)

Price: RSD 2.600.00 (VAT included)
Hard copy, 659 pages

Osnovna svrha ove knjige jeste da se studentima približe sofisticirani koncepti kao što su formiranje cena aktive, finansijski ugovori i racionalna očekivanja. Jedanaesto izdanje nastavlja tradiciju koju čitaoci očekuju - usmerenost na savremene analitičke perspektive koje su prezentirane ležernim konverzacijskim stilom. Knjiga sadrži 29 poglavlja, Rečnik pojmova i Indeks, i podeljena je na 8 delova: Osnovni pojmovi, Finansijski instrumenti i tržišta, Banke i drugi posrednici, Arhitektura finansijskog sistema, Umetnost centralnog bankarstva, Monetarna teorija i Veliko finale. U knjizi su dati brojni slikoviti primeri iz života finansija kroz Novosti, Finansijske novosti, Hod po žici, brojne tabele pa čak i karikature.

The main purpose of this book is teaching students sophisticated concepts such as the asset price formation, financial contracts and rational expectations. The 11th edition continues the tradition which the readership expects - focusing on modern analytic perspectives which are presented with a conversational writing style. The book contains 29 chapters, a Glossary and an Index, and it is divided into 8 parts: The Basics, Financial Instruments and Markets, Banks and Other Intermediaries, Financial System Architecture, The Art of Central Banking, Monetary Theory and Grand Finale. The book features many creative examples from the everyday life of finances through its features In the News, Financial News and Going Out on a Limb, many tables and even caricatures.

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ASB publications

Dragana Gnjatović

Privilegovana agrarna banka (2013)

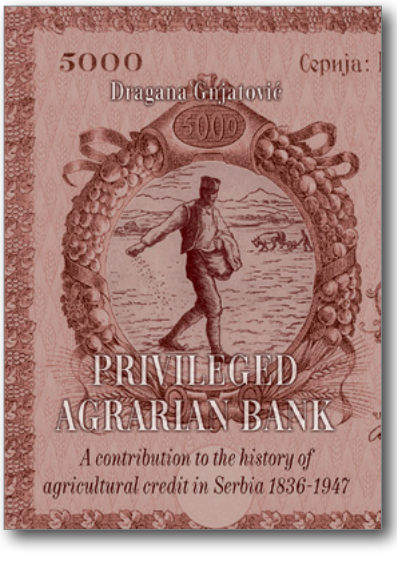
Cena: 600,00 din + PDV
Meki povez, 222 strane

Privilegovana agrarna banka - Prilog istoriji poljoprivrednog kredita Srbije 1836-1947 predstavlja na jednom mestu objedinjene rezultate višegodišnjeg autorkinog istraživanja o genezi pokušaja organizacije poljoprivrednog kredita u Srbiji tokom veka vladavine kapitalističkih odnosa svojine na zemlji, od ukidanja turskog feudalizma posle Drugog srpskog ustanka do uvođenja državnog socijalizma posle Drugog svetskog rata. U središtu pažnje je poslovanje Privilegovane agrarne banke pred koju su bili postavljeni ambiciozni zadaci rešavanja svih ranije nagomilanih, višedecenijskih problema u organizaciji poljoprivrednog kredita i svih ambicioznih planova finansiranja agrara.

Dragana Gnjatović

Privileged Agrarian Bank (2014)

Price: RSD 600.00 + VAT
Paperback, 246 pages



Privileged Agrarian Bank - A Contribution to the History of Agricultural Credit in Serbia 1836-1947 is a book which gathers into a meaningful whole the results of the several years of research about the genesis of the attempt to establish agricultural credit in Serbia during the century of prevailing capitalist relations concerning land tenure, starting from the abolishment of the Ottoman feudalism following the Second Serbian Uprising until the introduction of state socialism after the Second World War. In the focus of attention are the operations of the Privileged Agrarian Bank, which faced the rather ambitious tasks of solving all previous problems accumulated over several decades in respect of the establishment of agricultural credit, and all ambitious plans for the financing of agricultural sector.

Knjige možete naručiti
telefonom na: 011 30 20 778
ili na mejl: Jelena.Rasljanin@ubs-asb.com

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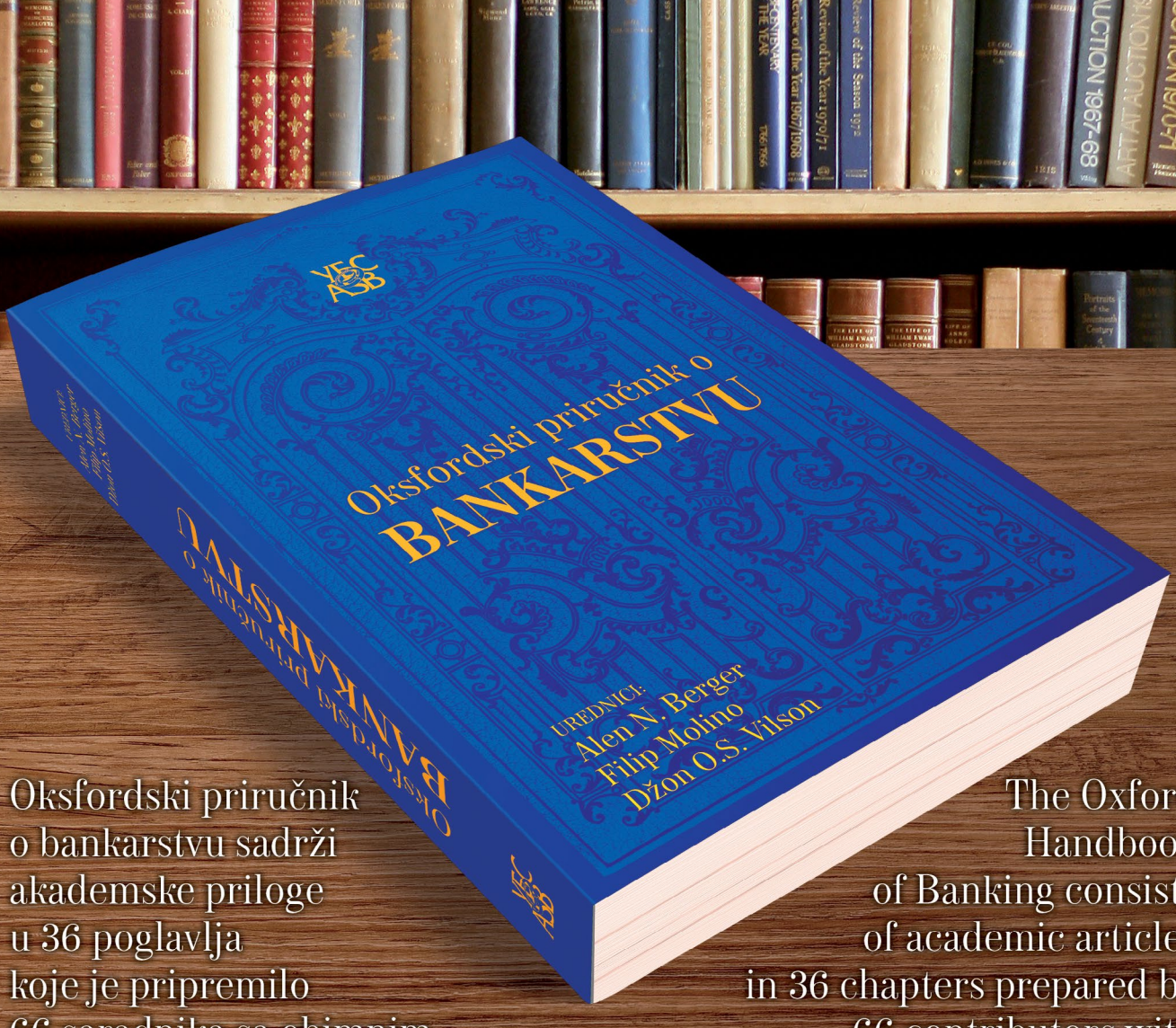

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