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Slaviša Kovačević,* Predrag Ćurić,** Drago Kurušić***

Analiza tržišne koncentracije u bankarskom sektoru Republike Srpske

Analysis of market concentration in the banking sector of the Republic of Srpska

Rezime

Analiza i mjerenje nivoa koncentracije bankarskog tržišta značajna je komponenta efikasnog funkcionisanja privrede, pokazatelj razvoja finansijskog i realnog sektora, kao i pokazatelj stepena konkurentnosti u bankarskom sektoru. U ovom radu fokus je na istraživanju i analizi nivoa koncentrisanosti bankarskog tržišta Republike Srpske. Osnovni zadatak i cilj ovog istraživanja odnosi se na analizu nivoa koncentracije na bankarskom tržištu Republike Srpske. U svrhu istraživanja korišćeni su sljedeći pokazatelji: Herfindal-Hiršmanov indeks, racio koncentracije, vrijednost mjere entropije, varijansa prirodnih logaritama, Lorencova kriva i Džinijev koeficijent. Sve izračunate mjere ukazuju na postepeni trend povećanja koncentracije u bankarstvu u Republici Srpskoj u posmatranom periodu, s tim da je mala vjerovatnoća da bi u budućem periodu moglo da dođe do narušavanja konkurencije.

Ključne riječi: indeksi koncentracije, koncentracija kredita, koncentracija depozita, bankarstvo, bankarski sektor.

Abstract

Analysis and measurement of the concentration level of the banking market is an important component of the efficient functioning of the economy, an indicator of the development of the financial and real sector, as well as a competitiveness degree indicator in the banking sector. This paper focuses on research and analysis of the concentration level of the banking market of the Republic of Srpska. The main task and goal of this research is to analyze the level of concentration in the banking market of the Republic of Srpska. For the purpose of the research, the following indicators were used: Herfindahl-Hirschman index, concentration ratio, value of entropy measure, variance of natural logarithms, Lorenz curve and Gini coefficient. All calculated measures indicate a gradual trend of increasing concentration in banking in the Republic of Srpska for the observed period, with a slight possibility that in the future there may be distortions in competition.

Keywords: concentration indices, credit concentration, deposit concentration, banking, banking sector

* Ekonomski fakultet Univerziteta u Banjoj Luci. e-mail: slavis.kovacevic@ef.unibl.org

** NLB Bank A.D. Banja Luka, BiH

*** BitLab d.o.o. Banja Luka, BiH

UVOD

Istraživanje načina funkcionisanja tržišta, kao i odnosa koji vladaju na pojedinim tržištima, predstavlja jednu od osnovnih oblasti koje istražuje mikroekonomija. Tržišta se često karakterišu prema nivou koncentracije prodavaca. Koncentracija tržišnih učesnika omogućava nam da sagledamo strukturu koja vlada na pojedinim tržištima. Struktura tržišta odnosi se na broj i distribuciju tržišnih učesnika (Besanko, 2016). Analiza broja tržišnih učesnika i njihove relativne snaga predstavlja polje mikroekonomije koje pruža mogućnost praktične primjene za pojedine tržišne učesnike. Razumijevanje tržišne strukture sa strane ponuđača daje nam odgovor na pitanje kakva je priroda posmatranog tržišta, odnosno posmatrane grane, te kakva konkurencija vlada na posmatranim tržištima. Informacije koje preduzeća u grani, ali i preduzeća koja pokušavaju da uđu u posmatranu granu dobijaju analiziranjem tržišne strukture ostalih učesnika na tržištu, kao i odnosa između samih učesnika, mogu da budu sredstvo njihove odluke o ulasku u posmatranu granu ili napuštanju grane. Koristi od analize koncentracije na pojedinim tržištima imaju i kreatori ekonomske politike, koji na taj način mogu da uređuju privredne grane u kojima postoji mogućnost nastanka monopola, te da djeluju antimonopolskom politikom.

Važnost analize koncentracije može da se posmatra sa aspekta njenog uticaja na cijenu koja se određuje u posmatranoj grani. Na bankarskom tržištu cijena pod kojom banka nudi svoje proizvode (kredite) jeste aktivna kamatna stopa, dok je cijena koju banka plaća klijentima na depozite pasivna kamatna stopa, koja predstavlja trošak za banku. U mnogim istraživanjima koncentracije u bankarskom sektoru analiziraju se upravo ove varijable i zavisnosti među njima. Međutim, Alihodžić (2019) istraživao je odnos između Bosne i Hercegovine (BiH) i Srbije, te uticaj na koncentrisanosti bankarskog sektora nezaposlenost u ove dvije zemlje u periodu od 2008. do 2018. primjenom dinamičkog modela. Kao nezavisne varijable u istraživanju navedene su: HHI indeks koncentracije, stopa rasta aktive, te stopa rasta likvidne aktive. Rezultati istraživanja pokazali su da rast koncentracije kredita i depozita ima negativan uticaj na kretanje stope nezaposlenosti, uz veliku značajnost koeficijenata modela, posebno za BiH (Alihodžić 2019).

Drugi autori istraživali su uticaj koncentracije u bankarskom sektoru na kretanje kamatnih stopa. Berger i Hannan (1989) istraživali su ovu vezu, te su pokazali da postoji negativan uticaj bankarske koncentracije na kamatne stope na depozite, pokazujući da stope na depozite padaju sa povećanjem koncentracije, odnosno pokazali su pozitivan uticaj na kretanje aktivnih kamatnih stopa (Cuestas et al., 2019).

1. PREGLED LITERATURE

1.1. Pokazatelji tržišne koncentracije

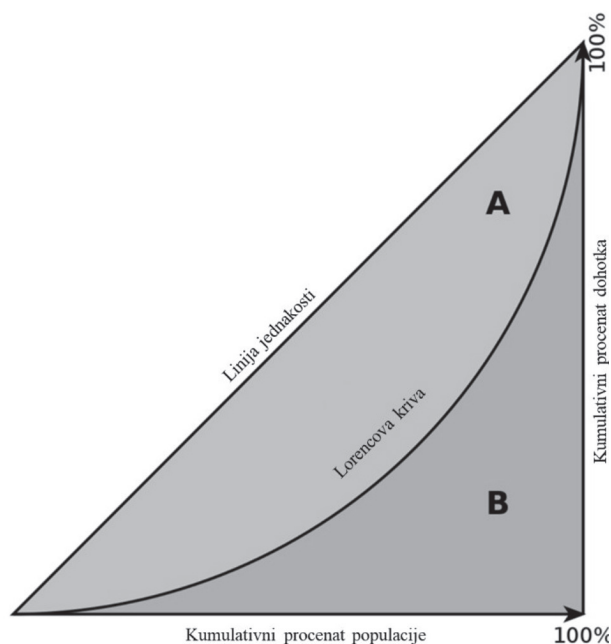
U ekonomskoj analizi, prvenstveno mikroekonomskoj analizi, postoji veliki broj alata kojima se mjeri tržišna koncentracija određene grane. Prilikom istraživanja koncentracije u bankarskom sektoru najviše se koriste Racio koncentracije (engl. Concentration Ratio – CR) i Herfindal-Hiršmanov indeks (engl. Herfindahl-Hirschman Index – HHI) koncentracije. Ove mjere koncentracije preporučuju se od strane Evropske centralne banke prilikom mjerenja koncentracije u bankarskom sektoru. Pored ovih pokazatelja korišćeni pokazatelji za datu analizu su i Tejlova mjera entropije (engl. Entropy Measure – E), Hol-Tajdmanov indeks (engl. Hall-Tideman index – HTI) koncentracije, kao i Rozenblutov indeks (engl. Rosenbluth index – RI) koncentracije, indeks obimnosti industrijske koncentracije (engl. Comprehensive

Industrial Concentration Index – CCI), Hausov multiplikativni indeks (engl. Haus multiplicative index – Hm), kao i Hausov aditivni indeks (engl. Haus additive index – Ha). Radi analiziranja tržišne koncentracije u bankarskom sektoru Republike Srpske koristimo samo neke od njih. Analizu koncentracije vršićemo pomoću Lorencove krive i Džinijevog koeficijenta, racija koncentracije, Herfindal-Hiršmanovog indeksa, Tejllove mjere entropije i varijanse prirodnih logaritama tržišnih učešća pojedinačnih učesnika na tržištu.

1.1.1. Lorencova kriva

Lorencova kriva jedna je od najčešće korišćenih mjera prilikom mjerenja koncentracije. Izvorno, ova kriva prvi put je primijenjena u istraživanju Maksa Lorenca 1905. godine prilikom analiziranja nejednakosti u raspodjeli bogatstva u SAD. Lorencova kriva je, u stvari, funkcija raspodjele $L(X)$ ukupnog bogatstva populacije koji kumulativno zarađuju ispod određenog procenta populacije (Jantzen, Volpert, 2012). Lorencova kriva predstavlja se grafički u drugom kvadrantu koordinatnog sistema na intervalu $[0,1]$ po x osi i istom intervalu po y osi. Na sljedećoj slici (slika 1) prikazan je primjer ove krive:

Slika 1. Lorencova kriva



Izvor: autorski prikaz

Na prethodnom grafičkom prikazu mogu se posmatrati dvije funkcije, tj. linije. Prva je linija jednakosti, odnosno potpune jednakosti svih, kumulativno posmatrano, učesnika populacije u raspodjeli prihoda. Može se vidjeti da je to funkcija $y = x$, odnosno to je linija od 45 stepeni. Osobine ove funkcije jesu da n % populacije raspolaže sa tačno n % dohotka, $n = 0, \dots, 100\%$ ili $n = 0, \dots, 1$, gdje je $n \in \mathbb{R}$. Druga kriva na prethodnom prikazu jeste Lorencova kriva, koja predstavlja realniju sliku raspodjele bogatstva, prihoda, tržišnog učešća i slično, prema kumulativnom procentu ukupne populacije.

Formalnije, ako pretpostavimo postojanje niza x_1, x_2, \dots, x_n sa sljedećim svojstvima (Kovačić, Opačić, Marohnić, 2012):

- (1) $x_i > 0$, za svaki $i \in [n]$;
- (2) postoji barem jedan $i \in [n]$ takav da je $x_i > 0$;

pretpostavljamo da je niz uzlazno uređen, budući da je svaki podskup skupa realnih brojeva moguće uzlazno odrediti, odnosno:

$$x_1 \leq x_2 \leq \dots \leq x_n.$$

INTRODUCTION

Research on the functioning of markets, as well as the relationships that prevail in individual markets is one of the basic areas explored by microeconomics. Markets are often characterized by the concentration level of sellers. The concentration of market participants allows us to see the structure that prevails in individual markets. Market structure refers to the number and distribution of market participants (Besanko 2016). Analysis of the number of market participants and their relative strengths is a field of microeconomics that provides the possibility of practical application for individual market participants. The understanding of the market structure on part of the bidder gives us the answer to the question of the observed market's nature, ie the observed branch, and the kind of competition that reigns in the observed markets. The information that companies in the branch, but also companies trying to enter the observed branch, obtain by analyzing the market structure of other market participants, as well as the relations between the participants themselves, can be a means of their decision to enter the observed branch or leave it. The creators of economic policies also benefit from the analysis of concentration in certain markets, and they can in this way regulate economic branches in which there is a possibility of monopolies, and can also act with an antitrust policy.

The importance of concentration analysis can be observed from the aspect of its impact on the price determined in the observed branch. The importance of concentration analysis can be observed from the aspect of its impact on the price determined in the observed branch. On the banking market, the price at which a bank offers its products (loans) is the lending interest rate, while the amount the bank pays to customers on deposits is the deposit interest rate, which is paid at the bank's expense. Competition in banking sector is factor that determines stability of financial system (Ljumović et al., 2014). Market concentration represents main factor and indicator of competition between banks (Vuković, 2006). Rose (1999) suggests that degree of concentration in a market is measured by proportion of assets or deposits controlled by the largest banks serving that market. Demircuc-Kunt and Levine measure concentration in banking sector via the fraction of bank loans controlled by three largest banks in system. Many studies of concentration in the banking sector analyze precisely these variables and the dependencies between them. However, from 2008 to 2018, using a dynamic model, Alihodžić (2019) investigated the relationship between the concentration of the banking sector and unemployment in Bosnia and Herzegovina (BiH) and Serbia, as well as the impact it has in these two countries in the period. The independent variables in the research are: HHI concentration index, asset growth rate, and liquid asset growth rate. The results of the research showed that a growing concentration of loans and deposits has a negative impact on the movement of the unemployment rate, while model coefficients are of great importance, especially for BiH (Alihodžić, 2019). Deidda and Fattouh (2002) examined the relationship between concentration and economic growth. Dumičić et al. (2012) conducted their research to investigate concentration in Croatian banking sector trough period from 2004 until 2011. based on several variables, such as deposits, loans, interest rates and non-interest revenue and profit after taxation. Begović (2012) investigated variables that affects market concentration of banking sector of Republic of Srpska.

Other authors have investigated the impact of concentration in the banking sector on interest rate movements (Naym, 2018., Hauge and Phan, 2010., Corvoisier and Gropp, 2001). Berger and Hannan (1989) looked into this relationship, and showed that banking concentration has a negative effect on deposit interest rates, revealing that interest rates on deposits fall with increasing concentration, or in other words they showed its positive impact on lending interest rates. Stojmenović (2021) suggests that lack of concentration on banking sector of Republic of Serbia and existing of trend (trought growth of market share of five largest banks) implicate possibility of reducing competition. Competitive pressure is heavier in the loan market than in deposit markets, so that banks compensate for their reduction in loan market income by lowering their deposit rates (Leuvesteij et al., 2008). Owen and Pereira (2018) investigated impact of degree of competition on financial inclusion. Tushaj (2016) suggests that increasing concentration in banking banking sector

of Albania weaknes bank lending channel, causing monetary policy to be less effective.

Aim of this paper is to investigate market concentration in banking sector of Republic of Srpska during COVID-19 crisis. This research is conducted for period since Q1 of 2019 until Q1 2021. Main objective of this research is to determine changes in market concentration using different indices for concentration trough these period based on quarterly data. This research examines assets, deposit and loan concentration between banks in banking sector of Republic of Srpska trough observed period.

1. LITERATURE REVIEW

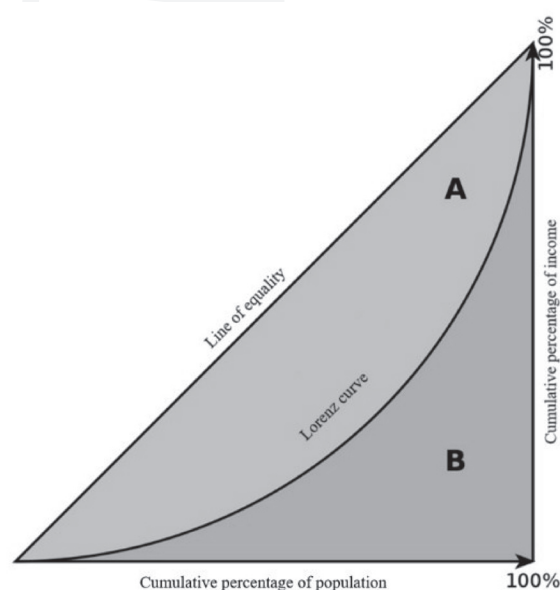
1.1. Market concentration indicators

In economic analysis, primarily microeconomic analysis, there are a large number of tools that measure the market concentration of a particular branch. Concentration Ratio (CR) and the Herfindahl-Hirschman Index (HHI) are the most widely used in the study of concentration in the banking sector. These concentration measures are recommended by the European Central Bank when measuring concentration in the banking sector. In addition to these, other available indicators used for this analysis are Entropy Measure (E), the Hall-Tideman index (HTI) of concentration, as well as the Rosenbluth index (RI) of concentration, the Comprehensive Industrial Concentration Index (CCI), the Haus multiplicative index (Hm) and the Haus additive index (Ha). In order to analyze the market concentration in the banking sector of the Republic of Srpska, we will use only some of them. We will perform the concentration analysis using the Lorenz curve, Gini coefficient, concentration ratio, the Herfindahl-Hirschman index, entropy measure and the variance of market shares' natural logarithms in individual market participants.

1.1.1. Lorenz curve

The Lorenz curve is one of the most commonly used measures in measuring concentration. Originally, this curve was first applied in Max Lorenz's 1905 study when analyzing the inequalities in the distribution of wealth in the United States. The Lorenz curve is in fact a function of the distribution of $L(X)$ the total wealth of a population that cumulatively earns below a certain percentage of the population (Jantzen & Volpert, 2012). The Lorenz curve is represented graphically in the second quadrant of the coordinate system on the interval $[0,1]$ along the x axis and the same interval along the y axis. The following figure (Figure 1) shows an example of this curve:

Figure 1: Lorenz curve



Source: Author's review

Tada za svaki formiramo sljedeće tri relacije:

$$p_i := \frac{i}{n} \tag{1}$$

$$S_i := \sum_{k=1}^i x_k \tag{2}$$

$$y_i := \frac{S_i}{S_n} \tag{3}$$

Relacija (1) dijeli segment [0,1] na jednakih dijelova, relacija (2) definiše i-ti djelimični zbir članova niza, pri čemu je S_n zbir svih članova niza, dok relacija (3) definiše udio k-tog parcijalnog zbira u ukupnom zbiru svih članova niza (Kovačić, Opačić, Marohnić, 2012). Lorencovu krivu formiramo u skladu sa prethodno definisanim svojstvima, te predstavljamo relacijama. Formiranje ove krive započinjemo određivanjem tačaka T_i , $i \in [n]_0$. Tačka T_0 ima koordinate (0,0), odnosno ona predstavlja ishodište koordinatnog sistema i označava početnu tačku Lorencove krive. Interpretacija ove tačke je da 0% populacije raspolaže sa 0% prihoda. Zadnja tačka Lorencove krive označava se sa T_n . Ova tačka ima koordinate po x i y (1, 1), njena interpretacija govori da ukupna populacija raspolaže sa 100% prihoda, ili, u našem slučaju, učešća u bankarskim kreditima. Sve ostale tačke T_i izračunavamo prema prethodne tri relacije, te na ovaj način konstruišemo izlomljenu poligonalnu krivu L, kako je prikazano na prethodnoj slici. Ova kriva se naziva Lorencova i ona je funkcija raspodjele. Na ovaj način sve kumulativne proporcije na x osi su korespondirane sa njihovim odgovarajućim proporcijama na y osi (Damgaard, Weiner, 2000). Sve tačke krive L nalaze se na pravcu $y=x$, ili ispod tog pravca.¹

Poenta kod tumačenja Lorencove krive jeste odstupanje krive raspodjele L od krive savršene jednakosti $y=x$. Ako je odstupanje ove

dvije krive veće, tada se površina A na prethodnoj slici povećava, pa se kriva L udaljava od linije od 45 stepeni. Shodno tome, površina A predstavlja mjeru odstupanja raspodjele od savršene jednakosti, ili mjeru disperzije, odnosno mjeru koncentracije. To dalje implicira povećanje površine A u ukupnoj površini pravouglog trougla koji je ograničen tačkama T_0 , T_n i $x=1$, čija je površina jednaka A+B. Stavljanjem u odnos površine A sa površinom pravouglog trougla dobijamo mjeru koncentracije. Što je ovaj omjer veći, to je veća površina odstupanja od savršene jednakosti, što dalje implicira veću tržišnu koncentraciju.

1.1.2. Džinijev koeficijent

Mjerenje površine A+B u ukupnoj površini pravouglog trougla vrši se izračunavanjem Džinijevog koeficijenta koncentracije. Džinijev koeficijent koncentracije predstavljen je od strane Korada Džinija 1912. godine. Neke ilustracije ovog koeficijenta mogu se pronaći kod Farisa (2010), dok detaljnu razradu prikazuju Ceriani i Verme (2012). Računanje Džinijevog koeficijenta bazirano je na Lorencovoj krivi. Površina trougla A+B ograničenog tačkama T_0 , T_n i tačkom $x=1$ predstavlja polovinu od ukupne površine kvadrata (1, 0) (0, 1), koja iznosi 1, ili drugačije zapisano:

$$A + B = \frac{1}{2} = 0,5 \tag{4}$$

Iz (4) možemo izraziti Džinijev koeficijent koncentracije kao mjeru odstupanja raspodjele od linije savršene jednakosti na osnovu:

$$G = 1 - 2B \tag{5}$$

Formalno, obrazac za računanje ovog koeficijenta dat je u sljedećem obliku:

$$G = \frac{2 \sum_{i=1}^n r_i * x_i}{n \sum_{i=1}^n x_i} - \frac{n + 1}{n} \tag{6}$$

gdje je r_i rang tržišnog učesnika. Ovaj koeficijent kreće se u intervalu od 0 do 1. Ako je vrijednost koeficijenta bliža jedinici, tada je raspodjela udaljenija od linije savršene jednakosti, dok vrijednost koeficijenta koja je bliža 0 govori o većoj jednakosti u raspodjeli. Kada bi vrijednost koeficijenta iznosila 0, tada bi svaki tržišni učesnik ostvarivao jednak tržišni udio.

1.1.3. Racio koncentracije

Racio koncentracije jedna je od najčešće korišćenih mjera tržišne koncentracije, prije svega u bankarskom sektoru. Razlog intenzivnog korišćenja ove mjere tržišne koncentracije jeste lakoća tumačenja iste. Računanje racija koncentracije reda u opštem slučaju računa se prema obrascu:

$$CR_r = \frac{\sum_{i=1}^r X_i}{\sum_{i=1}^n X_i} \tag{7}$$

Racio koncentracije reda r pokazuje koliko r učesnika sa najvećim tržišnim učešćem učestvuje u ukupnom tržištu od učesnika. Najčešće se analiza koncentracije vrši pomoću racija koncentracije četvrtog reda (CR_4), koji govori koliko četiri najveća tržišna učesnika učestvuju u ukupnoj tržišnoj ponudi. U našem slučaju, gdje imamo osam tržišnih učesnika, ovaj racio koncentracije će nam otkriti

koliko polovina najvećih banaka u Republici Srpskoj uzima ukupnog tržišnog učešća. Takođe, u radu ćemo računati i racio koncentracije drugog reda (CR_2), koji će nam otkriti koliko dvije najveće banke u Republici Srpskoj uzimaju od ukupnog tržišta.

Racio koncentracije izražava se u postocima, od 0 do 100 posto. Ukoliko je vrijednost ovog racija bliža nuli, tada su tržišni udjeli

¹ Vidjeti dokaz: Kovačić, B., Opačić, R., Marohnić, L. (2012). O Ginijevu koeficijentu koncentracije. *Hrvatski matematički elektronički časopis*, 22 (1), 22–36.

Two functions, i.e. lines, can be observed in the previous graphic display. The first one is the line of equality, that is complete equality of all, cumulatively observed participants in the distribution of income. It can be seen that this is a function of $y = x$, i.e. it is a line of 45 degrees. What's characteristic about this function is that $n\%$ of the population has exactly $n\%$ of income, $n = 0\%, \dots, 100\%$ or $n = 0, \dots, 1$, where $n \in \mathbb{R}$. The second curve in the previous presentation is the Lorenz curve, which represents a more realistic picture of the distribution of wealth, income, market share and the like, according to the cumulative percentage of the total population.

More formally, if we assume the existence of the sequence x_1, x_2, \dots, x_n with the following properties (Kovačić, Opačić, & Marohnić, 2012):

- (1) $x_i > 0$, then for every $i \in [n]$;
- (2) There exists at least $i \in [n]$ that is $x_i > 0$;
- (3) We assume that the sequence is arranged in ascending order, since each subset of the set of real numbers can be determined in ascending order, on other words:

$$x_1 \leq x_2 \leq \dots \leq x_n$$

Then for each the following three relations are formed:

$$p_i := \frac{i}{n} \tag{1}$$

$$S_i := \sum_{k=1}^i x_k \tag{2}$$

$$y_i := \frac{S_i}{S_n} \tag{3}$$

Relation (1) divides segment $[0,1]$ into n equal parts, relation (2) defines the i -th partial sum of sequence members, where S_n is the sum of all the members, while relation (3) defines the share of k -th partial sum in the total of all members of the series (Kovačić, Opačić, & Marohnić, 2012). We form the Lorenz curve in accordance with the previously defined properties and the presented relations. We begin the formation of this curve by determining the points T_i , $i \in [n]$. Point T_0 has coordinates $(0,0)$, i.e. it represents the point of origin for the coordinate system and it marks the starting point of the Lorenz curve, the interpretation of this point is that 0% of the population has 0% of income. The last point of the Lorenz curve is denoted by T_n , this point has coordinates by x and y $(1,1)$, its interpretation says that the total population has 100% of income, or in our case participation in bank loans. We calculate all other points T_i according to the previous three relations, and in this way we construct a broken polygonal curve L , as shown in the previous figure, this curve is called the Lorenz curve and it is a distribution function. In this way, all cumulative proportions on the x -axis match their corresponding proportions on the y -axis (Damgaard & Weiner, 2000). All points of the curve L are in the direction $y = x$, or below that direction.

The point in interpreting the Lorenz curve is the deviation of the distribution curve L from the perfect equality curve. If the deviation of these two curves is greater, then the area A in the previous figure increases, so the curve L moves away from the line of 45 degrees. Accordingly, surface A represents a measure of deviation of the distribution from perfect equality, or a measure of dispersion, or a measure of concentration. This further implies that the increase in area A in the total area of a right triangle bounded by the points T_0 and T_n , whose area is equal to $\frac{1}{2}$. By comparing area A with the surface of a right triangle, we obtain a measure of concentration. The higher this ratio, the larger the area of deviation from perfect equality, which further signifies greater market concentration.

1.1.2. Gini coefficient

Measurements of area in the total area of a right triangle are performed by calculating the Gini coefficient of concentration. The Gini coefficient of concentration was introduced by Korad Gini in 1912. Some illustrations of this coefficient can be found in Farris (2010). The calculation of the Gini coefficient is based on the Lorenz curve. The area of triangle bounded by points T_0 and point T_n represents half of the total area of the square $(1,0)$ $(0,1)$ which equals $\frac{1}{2}$; this can otherwise be written as:

$$A + B = \frac{1}{2} = 0,5 \tag{4}$$

From (4) we can express the Gini coefficient of concentration as a measure of deviation of the distribution from the line of perfect equality, on the basis of:

$$G = 1 - 2B \tag{5}$$

Formally, the form for calculating this coefficient is given as follows:

$$G = \frac{2 \sum_{i=1}^n r_i * x_i}{n \sum_{i=1}^n x_i} - \frac{n + 1}{n} \tag{6}$$

where r_i is the rank of the market participant. This coefficient ranges from 0 to 1. If the value of the coefficient is closer to one then the distribution is further from the line of perfect equality, while the value of the coefficient closer to 0 indicates greater equality in distribution. In the event that the value of the coefficient would be 0, each market participant would achieve an equal market share.

1.1.3. Concentration ratio

Concentration ratio is one of the most frequently used measures of market concentration, primarily in the banking sector. The reason for it being used so intensively is its ease of interpretation. The calculation of the concentration ratio by the order of r is generally done according to the formula:

više ujednačeni. S druge strane, ukoliko je vrijednost racija koncentracije bliža 100%, tada je tržište koncentrisano oko manjeg broja ponuđača, odnosno ako je vrijednost racija 100%, onda na tržištu postoji samo jedan prodavac, monopolista. Obično se uzima vrijednost koeficijenta od 50% kao granica za visoko koncentrisana tržišta. Ukoliko je vrijednost koeficijenta preko 50%, onda se tržište tretira kao visoko koncentrisano, dok vrijednost između 25% i 50% govori o umjerenoj koncentrisanosti tržišta.

$$HHI = \sum_{i=1}^n X_i^2 \quad (8)$$

Ovaj indeks, teorijski gledano, može da ima vrijednost od 0 do 10.000, odnosno između 0 i 1 ako u obzir uzimamo relativne vrijednosti učešća. U slučaju ujednačenog tržišnog učešća ponuđača, kada postoji ogroman broj proizvođača i kada ponuda svakog od njih teži 0, i vrijednost indeksa teži 0. Kod monopola, vrijednost indeksa iznosi 10.000, jer je ponuda monopolskog preduzeća jednaka ponudi cijele grane. Obično se ističe da vrijednost HHI indeksa od preko 2.600 znači veoma visoku koncentrisanost, dok vrijednost od 1.800 do 2.600 znači visoku koncentrisanost tržišta.

$$H = \sum_{i=1}^n p_i \log_2 \frac{1}{p_i} \quad (9)$$

gdje je n broj tržišnih učesnika u industriji, a p_i tržišni udjel i -tog tržišnog učesnika. Mjera entropije poprima vrijednosti od 0 do $\log_2 n$. Kada su tržišni udjeli svih tržišnih učesnika jednaki, tada je koncentracija najmanja i vrijednost mjere entropije u tom slučaju iznosi $\log_2 n$. U slučaju čistog monopola, vrijednost mjere entropije iznosi 0.

Pokazatelj entropije daje veću težinu manjim tržišnim učesnicima u industriji. Što je više tržišnih učesnika u industriji, pokazatelj entropije je manji, pa se može reći da je, po njemu, koncentracija direktno vezana s veoma malim brojem tržišnih učesnika i značajnom asimetrijom tržišnih udjela (Tipurić, Kolaković, Dumičić, 2002).

$$VL = \frac{\sum_{i=1}^n (\log x_i - \bar{X})^2}{n'} \quad (10)$$

gdje je:

$$\bar{X} = \frac{\sum_{i=1}^n \log x_i}{n'} \quad (11)$$

a x_i tržišno učešće i -tog privrednog subjekta izraženo u relativnim brojevima.

Ako su svi privredni subjekti identične veličine, VL će biti 0. Što je veća disperzija u veličini privrednih subjekata, veća je i koncentracija, a samim tim i vrijednost VL je veća. Ovaj pokazatelj, kao i Džini koeficijent, ima krupan nedostatak koji se ogleda u činjenici da se veći naglasak stavlja na nejednakost u veličini privrednih subjekata nego na njihov broj u jednoj grani (Lipczynski, Wilson, 2001, str. 112).

2. REZULTATI I DISKUSIJA ISTRAŽIVANJA TRŽIŠNE KONCENTRACIJE U BANKARSKOM SEKTORU REPUBLIKE SRPSKE

2.1. Bankarski sektor RS

Bankarski sektor Republike Srpske, na izvještajni datum 31. 12. 2020. godine, čini osam banaka i nije bilo promjene u odnosu na

1.1.4. Herfindal-Hiršmanov indeks

Ovaj indeks tržišne koncentracije najpoznatija je mjera za analizu koncentracije. Herfindal-Hiršmanov indeks, za razliku od racija koncentracije, uzima u obzir učešće svih preduzeća u okviru jedne grane, kao i odnose između njih. Računanje Herfindal-Hiršmanovog indeksa vršimo na osnovu sume kvadrata pojedinačnih učešća na tržištu svih tržišnih učesnika prema sljedećem obrascu:

1.1.5. Tejlva mjera entropije

Tejlva mjera entropije kao pokazatelj koncentrisanosti tržišnih učešća preuzeta je iz teorije sistema. Ovaj pokazatelj govori o raspršenosti, odnosno nestabilnosti tržišnih učešća pojedinačnih tržišnih učesnika. Izračunavanje koeficijenta entropije vrši se zbirom umnožaka tržišnog učešća svakog pojedinačnog učesnika i prirodnog logaritma recipročne vrijednosti tržišnih učešća. Formula za izračunavanje koeficijenta entropije data je izrazom:

1.1.6. Varijansa prirodnih logaritama tržišnih učešća

Brojne industrijske grane karakteriše to da distribucija veličina privrednih subjekata blisko korespondira \log normalnoj distribuciji, koja podrazumijeva postojanje velikog broja malih privrednih subjekata, manjeg broja privrednih subjekata srednje veličine i najmanjeg broja velikih privrednih subjekata. Kao posljedica toga, veliki broj istraživača koristi varijansu prirodnih logaritama tržišnih učešća, kako bi ukazali na postojanje nejednakosti u veličini pojedinačnih privrednih subjekata. Varijansa prirodnih logaritama tržišnih učešća može se prikazati na sledeći način (Lipczynski, Wilson, 2001, str. 112):

kraj 2019. godine. Organizacionu mrežu čine 284 organizacione jedinice banaka sa sjedištem u Republici Srpskoj i 52 organizacione jedinice banaka sa sjedištem u Federaciji BiH.

Vlasničku strukturu karakteriše većinsko privatno vlasništvo u svim bankama, sa većinskim učešćem domaćeg akcionarskog kapitala u tri banke i većinskim stranim akcionarskim kapitalom u pet banaka u Republici Srpskoj.

Ukupni akcionarski kapital iznosi 674,0 miliona KM, a sastoji se od 99,2% privatnog akcionarskog kapitala, 0,8% državnog kapitala i vrlo malog učešća zadružnog kapitala.

Jedan od indikatora uspjehnosti poslovanja bankarskog sektora i svake banke pojedinačno je efikasnost zaposlenih iskazana kao odnos broja zaposlenih i ukupne aktive, pri čemu je veći iznos, po pravilu, pokazatelj bolje efikasnosti poslovanja banke i ukupnog sektora. Tri banke imaju aktivu po zaposlenom iznad 3 miliona KM, četiri banke između 2 i 3 miliona KM i jedna banka ispod 2 miliona KM.

Ukupna aktiva bankarskog sektora sa stanjem na dan 31. 12. 2020. godine iznosi 9,7 milijardi KM i bilježi rast od 276,4 miliona KM ili 3% u odnosu na kraj 2019. godine.

$$CR_r = \frac{\sum_{i=1}^r X_i}{\sum_{i=1}^n X_i} \tag{7}$$

The concentration ratio of the series by the order of r shows how many participants (value of r) with the largest market share participate in the total market out of n participants. Concentration analysis is most often performed using a fourth-order concentration ratio (CR₄), which tells how many of the four largest market participants participate in the total market supply. In our case, where we have eight market participants, this concentration ratio will reveal to us how much of the total market share do half of the largest banks in the Republic of Srpska take. Also, in this paper, we will calculate the concentration ratio of the second order (CR₂), which will reveal how much the two largest banks in the Republic of Srpska take from the total market.

The concentration ratio is expressed as a percentage, from 0 to 100 percent. If the value of this ratio is closer to zero, the market shares are more uniform, on the other hand, if the value of the concentration

ratio is closer to 100%, then the market is concentrated around a smaller number of bidders, i.e. if the ratio is 100% then there is only one seller, or monopolist. The coefficient's value of 50% is usually taken as the limit for highly concentrated markets, if the value of the coefficient is over 50% then the market is treated as highly concentrated, while a value between 25% and 50% indicates moderate market concentration.

1.1.4. Herfindahl-Hirschman Index

This market concentration index is the best known measure for concentration analysis. The Herfindal-Hirschman index, in contrast to the concentration ratio, takes into account the participation of all companies within one branch, as well as the relations between them. We calculate the Herfindal-Hirschman index based on the sum of squares of individual market shares of all market participants based on the following formula:

$$HHI = \sum_{i=1}^n X_i^2 \tag{8}$$

This index, theoretically speaking, can have a value between 0 and 10,000, or between 0 and 1 if we take into account the relative values of participation. In the case of a uniform market share of bidders, where there is a huge number of producers and when each of their bids approaches 0, the value of the index amounts to 0 as well. In monopolies, the value of the index is 10000, because the bid of a monopoly company is equal to the bid of the whole industry. It is usually pointed out that the value of the HHI index of over 2,600 means very high concentration, while a value of 1,800 to 2,600 means high market concentration.

1.1.5. Entropy measure

Entropy measure as an indicator of the concentration of market shares is taken from the systems theory. This indicator speaks of dispersion, i.e. the instability of market shares of individual market participants. The calculation of the entropy coefficient is done by summing the products of the market share of each individual participant and the natural logarithm of the reciprocal value of the market shares. The formula for calculating the data entropy coefficient is the expression:

$$H = \sum_{i=1}^n p_i \log_2 \frac{1}{p_i} \tag{9}$$

where n is the number of market participants in the industry, and the market share of the i-th market participant. The measure of entropy takes values from 0 to 1. When the market shares of all participants are equal, then the concentration is the lowest and the value of the entropy measure in that case is 1. In case of a pure monopoly, the value of the entropy measure is 0.

The entropy indicator gives more weight to smaller market participants in the industry. The more market participants in the industry, the lower the entropy indicator, so it can be said that, according to him, concentration is directly related to a very small number of market participants and significant asymmetry of market shares (Tipurić, Kolaković and Dumičić, 2002).

1.1.6. Variance of natural logarithms of market shares

Numerous industries are characterized by the fact that the size distribution of economic entities closely corresponds log to the normal distribution, which implies the existence of a large number of small economic entities, a small number of medium-sized economic entities and the smallest number of large economic entities. As a consequence, many researchers use the variance of natural logarithms of market shares, in order to point out the existence of inequalities in the size of individual economic entities. The variance of market shares' natural logarithms can be represented as follows (Lipczynski and Wilson, 2001, p. 112):

$$VL = \frac{\sum_{i=1}^n (\log x_i - \bar{X})^2}{n'} \tag{10}$$

where:

$$\bar{X} = \frac{\sum_{i=1}^n \log x_i}{n'} \tag{11}$$

and x_i market share of the i-th business entity expressed in relative numbers.

If all economic entities were of identical size, the VL would be 0. The greater the dispersion in the size of economic entities, the

higher the concentration, and thus the higher the value of VL. This indicator, like the Gini coefficient, has a major shortcoming, which is reflected in the fact that more emphasis is placed on inequality in the size of economic entities than on their number in a branch (Lipczynski and Wilson, 2001, p. 112).

Banke u Republici Srpskoj možemo podijeliti u tri grupe prema veličini bruto bilansne aktive:

- grupi banaka sa bruto aktivom preko 1.400 miliona KM pripadaju tri banke koje imaju učešće od 64,6% u ukupnoj aktivni, 61,8% u ukupnim kreditima, 65,7% u ukupnim depozitima i 68,1% u ukupno zaposlenim u bankarskom sektoru;
- grupi banaka sa bruto aktivom od 700 do 1.400 miliona KM pripadaju dvije banke koje imaju učešće od 21,3% u ukupnoj

aktivni, 23,7% u ukupnim kreditima, 20,6% u ukupnim depozitima i 11,4% u ukupno zaposlenim u bankarskom sektoru;

- sa bruto aktivom ispod 700 miliona KM su tri banke koje imaju učešće u ukupnoj bruto aktivni bankarskog sektora 14,1%, ukupnim kreditima 14,5%, ukupnim depozitima 13,6%, te zapošljavaju 20,5% od ukupnog broja zaposlenih u bankarskom sektoru.

Detaljniji podaci o poslovanju pojedinih banaka prikazani su u sljedećoj tabeli:

Tabela 1. Podaci o poslovanju banaka

BANKA	Na dan 31. 12. 2020. godine				
	Neto aktiva	Ukupni kapital	Ukupni krediti	Depoziti	Broj zaposlenih
Nova banka a.d. Banja Luka	2.317,3	184,0	1.536,0	1.771,3	715
UniCredit Bank a.d. Banja Luka	1.662,2	254,6	980,7	1.274,7	436
NLB Banka a.d. Banja Luka	1.564,1	192,1	879,7	1.237,5	479
Sberbank a.d. Banja Luka	955,5	124,3	679,1	742,1	392
Addiko Bank a.d. Banja Luka	820,9	148,9	622,4	602,5	339
MF banka a.d. Banja Luka	519,7	69,1	383,8	384,8	247
Komercijalna banka a.d. Banja Luka	461,1	62,7	313,1	335,4	163
Naša banka a.d. Bijeljina	207,8	18,6	98,9	166,8	198
	8.508,6	1.054,3	5.493,8	6.515,2	2.969

Izvor: Agencija za bankarstvo Republike Srpske, Izvještaj o stanju u bankarskom sistemu Republike Srpske, april 2021, str. 87.

Istorijske vrijednosti tržišne koncentracije za period od 2009. do 2018. godine na bankarskom tržištu Republike Srpske mjerene Hiršman-Herfindalovim indeksom prikazane su u sljedećoj tabeli:

Tabela 2. Vrijednosti Hiršman-Herfindalovog indeksa u periodu 2008–2018.

Godina	Hiršman-Herfindalov indeks		
	Aktiva	Depoziti	Krediti
2009.	1,807	1,858	2,072
2010.	1,696	1,750	1,960
2011.	1,608	1,614	1,680
2012.	1,560	1,558	1,550
2013.	1,498	1,530	1,479
2014.	1,601	1,655	1,601
2015.	1,664	1,681	1,650
2016.	1,778	1,817	1,741
2017.	1,820	1,853	1,803
2018.	1,730	1,748	1,698

Izvor: Agencija za bankarstvo Republike Srpske, Izvještaj o stanju u bankarskom sistemu Republike Srpske, april 2021, str. 29.

Za tri osnovna segmenta poslovanja (kreditni, depoziti i aktiva), vrijednost HHI indeksa ukazuje na postojanje umjerene koncentracije kod sva tri segmenta poslovanja koji su blizu gornje granice koja dijeli umjerenu i visoku koncentraciju.

Istorijske vrijednosti koncentracijske stope (CR₃) za tri najveće banke tokom perioda od 2009. do 2018. godine u bankarskom sektoru Republike Srpske prikazane su u narednoj tabeli:

Tabela 3. Vrijednosti racija koncentracije CR₃ u periodu 2008–2018.

Godina	Racio koncentracije CR ₃		
	Aktiva	Depoziti	Krediti
2009.	66,4	66,9	67,8
2010.	63,9	64,5	65,8
2011.	62,1	62	61,7
2012.	60,1	59,7	58,5
2013.	58,2	58,8	55,8
2014.	58,7	60,6	57,1
2015.	62,2	63	59,7

2. RESULTS AND DISCUSSION OF THE RESEARCH ON MARKET CONCENTRATION IN THE BANKING SECTOR OF THE REPUBLIC OF SRPSKA

2.1. Banking sector of the Republic of Srpska

The banking sector of the Republic of Srpska, as of the reporting date 31.12.2020, consists of 8 banks and there were no changes to this in comparison to the end of 2019. The organizational network consists of 284 organizational units of banks based in the Republic of Srpska and 52 organizational units of banks based in the Federation of BiH.

The ownership structure is characterized by majorly private ownership in all banks, with the domestic share capital being predominant in three banks in the Republic of Srpska, and foreign share capital in the other five.

The total share capital amounts to BAM 674.0 million, and consists of 99.2% of private share capital, 0.8% state capital and a very small share of cooperative capital.

An indicator of the banking sector's and each bank's individual success is the efficiency of employees expressed as the ratio of the number of employees and total assets, where a higher amount is, as a rule, an indicator of better efficiency of the bank and the

overall sector. Three banks have assets per employee above BAM 3 million, four banks between 2 and 3 million and one bank has less than BAM 2 million.

Total assets of the banking sector as of 31.12.2020. amount to BAM 9.7 billion and record an increase of BAM 276.4 million or 3% compared to the end of 2019.

Banks in the Republic of Srpska can be divided into three groups according to the size of gross balance sheet assets:

- The group of banks with gross assets over BAM 1,400 million includes three banks with a share of 64.6% in total assets, 61.8% in total loans, 65.7% in total deposits and 68.1% in the total number of employees in the banking sector.
- The group of banks with gross assets of BAM 700 million to 1,400 million includes two banks with a share of 21.3% in total assets, 23.7% in total loans, 20.6% in total deposits and 11.4% in total employees in the banking sector.
- With gross assets below BAM 700 million are three banks that have a share of 14.1% in the total gross assets of the banking sector, 14.5% in total loans, 13.6% in total deposits, and employ 20.5% of the total number of employees in the banking sector.

More detailed data on the operations of individual banks are shown in the following table:

Table 1. Data on the financial performances of banks

BANK	As of 31.12.2020.				
	Net assets	Total capital	Total loans	Deposits	Number of employees
Nova banka a.d. Banja Luka	2.317,3	184,0	1.536,0	1.771,3	715
UniCredit Bank a.d. Banja Luka	1.662,2	254,6	980,7	1.274,7	436
NLB Banka a.d. Banja Luka	1.564,1	192,1	879,7	1.237,5	479
Sberbank a.d. Banja Luka	955,5	124,3	679,1	742,1	392
Addiko Bank a.d. Banja Luka	820,9	148,9	622,4	602,5	339
MF banka a.d. Banja Luka	519,7	69,1	383,8	384,8	247
Komercijalna banka a.d. Banja Luka	461,1	62,7	313,1	335,4	163
Naša banka a.d. Bijeljina	207,8	18,6	98,9	166,8	198
	8.508,6	1.054,3	5.493,8	6.515,2	2.969

Source: Banking Agency of the Republic of Srpska, Report on the situation in the banking system of the Republic of Srpska, April 2021, p. 87.

The historical values of market concentration for the period from 2009 to 2018 on the banking market of the Republic of Srpska measured by the Hirschmann-Herfindahl index are shown in the following table:

Table 2. Hirschmann-Herfindahl index values in the period 2008-2018.

Year	Hirschmann-Herfindahl index		
	Assets	Deposits	Loans
2009	1,807	1,858	2,072
2010	1,696	1,750	1,960
2011	1,608	1,614	1,680
2012	1,560	1,558	1,550
2013	1,498	1,530	1,479
2014	1,601	1,655	1,601
2015	1,664	1,681	1,650
2016	1,778	1,817	1,741
2017	1,820	1,853	1,803
2018	1,730	1,748	1,698

Source: Banking Agency of the Republic of Srpska, Report on the situation in the banking system of the Republic of Srpska, April 2021, p. 29.

For the three main business segments (loans, deposits and assets), the value of the HHI index indicates the existence of moderate concentration in all three business segments that are close to the upper limit that separates moderate and high concentration.

The historical values of the concentration rate (CR_3) for the three largest banks during the period from 2009 to 2018 in the banking sector of the Republic of Srpska are shown in the following table:

2016.	65,7	67,1	62,3
2017.	66,5	68	62,6
2018.	64,9	65,8	62,1

Izvor: Agencija za bankarstvo Republike Srpske, Izvještaj o stanju u bankarskom sistemu Republike Srpske, april 2021, str. 29.

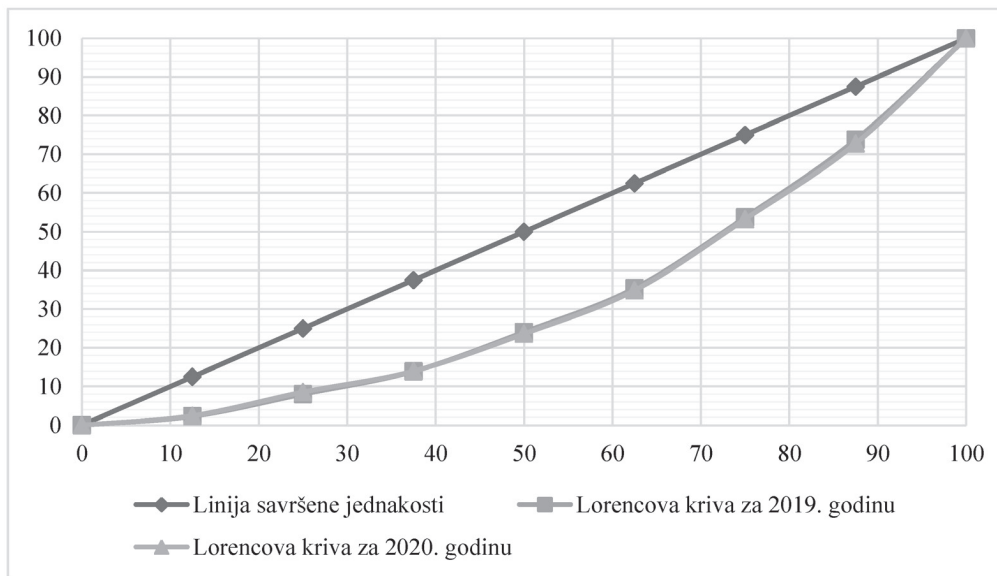
Slično kao i u slučaju mjerenja nivoa koncentracije Hiršman-Herfindal indeksom, vrijednosti koncentracijske stope (CR3) za tri najveće banke ukazuju na postojanje umjerene koncentracije.

2.2. Koncentracija aktive sektora u RS

Analizu koncentracije u bankarskom sektoru Republike Srpske

u ovom radu počinjemo analizom koncentracije aktive osam banaka sa sjedištem u Republici Srpskoj. Prva mjera kojom ćemo prikazati koncentraciju aktive jeste Lorencova kriva. Na sljedećem grafikonu dat je prikaz Lorencove krive za kraj 2019. i kraj 2020. godine:

Grafikon 1. Lorencova kriva koncentracije aktive u 2019. i 2020. godini



Izvor: kalkulacije autora na osnovu podataka Agencije za bankarstvo Republike Srpske

Kako broj učesnika na bankarskom tržištu Republike Srpske nije mijenjan u posmatranim godinama, to opravdava mogućnost upoređivanja površina između krive savršene jednakosti i Lorencove krive koncentracije. Međutim, kako vidimo sa prethodnog grafikona, površina koja mjeri odstupanje od krive savršene jednakosti tržišne koncentracije u 2019. i 2020. godini nije se mijenjala, tj. dvije posmatrane krive gotovo se poklapaju.

Tabela 4. Indeksi koncentracije aktive banaka u RS

Kvartal	2019Q1	2019Q2	2019Q3	2019Q4	2020Q1	2020Q2	2020Q3	2020Q4	2021Q1
HHI	0,171	0,171	0,173	0,173	0,173	0,177	0,174	0,175	0,172
CR4	0,761	0,759	0,760	0,759	0,759	0,767	0,764	0,764	0,758
CR2	0,451	0,454	0,459	0,463	0,462	0,471	0,465	0,468	0,455
H	1,884	1,886	1,880	1,880	1,880	1,868	1,877	1,875	1,884
VL	2,327	2,277	2,323	2,333	2,298	2,374	2,294	2,267	2,216
GINI	0,345	0,344	0,349	0,350	0,349	0,360	0,353	0,355	0,345

Izvor: kalkulacije autora na osnovu podataka Agencije za bankarstvo Republike Srpske

Iz prethodne tabele posmatramo različite koeficijente koncentracije aktive banaka u Republici Srpskoj. Vidimo da je vrijednost najpoznatijeg indeksa prilikom analize koncentracije u bankarskom sektoru (HHI) kroz posmatrani period u rasponu od 0,17 do 0,18. Tumačenje ovog indeksa najčešće govori da su koncentrisane industrije one koje imaju HHI veći od 0,18 i nekoncentrisane one koje imaju vrijednost HHI manju od 0,1. Na osnovu ovoga zaključujemo da je tržište aktive bankarskog sektora Srpske srednje koncentrisano, s tim da je kroz posmatrani period vidljiva težnja ovog indeksa da

U narednom dijelu analize koncentracije aktive banaka uzimaće se prethodno predstavljene pokazatelji koncentracije. Sljedeća tabela daje prikaz različitih pokazatelja koncentracije bankarskog tržišta za period od početka 2019. godine do prvog kvartala 2021. godine:

raste prema nivou od 0,18. Takođe, od trećeg kvartala 2020. godine može se uočiti opadanje HHI koncentracije aktive.

Posmatranjem indeksa koncentracije za učešće dvije najveće banke na bankarskom tržištu vidimo da su na početku perioda „Nova banka“ i „UniCredit Bank“ uzimale oko 45% od ukupne aktive na cjelokupnom tržištu. Takođe, kroz posmatrani period poredak između banaka na tržištu nije se mijenjao, tako da su dvije prethodno pomenute banke kroz čitav period zauzimale pozicije dvije najveće. Maksimalna vrijednost CR za učešće ove dvije banke bila

Table 3. Values of the CR_3 concentration ratio in the period 2008-2018.

Year	Concentration ratio CR_3		
	Assets	Deposits	Loans
2009	66.4	66.9	67.8
2010	63.9	64.5	65.8
2011	62.1	62	61.7
2012	60.1	59.7	58.5
2013	58.2	58.8	55.8
2014	58.7	60.6	57.1
2015	62.2	63	59.7
2016	65.7	67.1	62.3
2017	66.5	68	62.6
2018	64.9	65.8	62.1

Source: Banking Agency of the Republic of Srpska, Report on the situation in the banking system of the Republic of Srpska, April 2021, p. 29.

Similar to the measurement of the Hirschmann-Herfindahl concentration level, the concentration rate values (CR_3) for the three largest banks show the existence of a moderate concentration.

2.2. Concentration of sector assets in the Republic of Srpska

In this paper, we begin the analysis of the concentration in the ban-

king sector of the Republic of Srpska by analyzing the concentration of assets of eight banks based in the Republic of Srpska. The first measure by which we will show the concentration of assets is the Lorenz curve. The following chart shows the Lorenz curve for the end of 2019 and the end of 2020:

Chart 1. Lorenz asset concentration curve in 2019 and 2020

Source: Author's calculations based on data from the Banking Agency of the Republic of Srpska

As the number of participants in the banking market of the Republic of Srpska has not changed in the observed years, the possibility of comparing the areas between the perfect equality curve and the Lorenz concentration curve is justified. However, as we can see from the previous chart, the area measuring the deviation from the perfect market concentration equality curve in 2019 and 2020 did not change,

ie the two observed curves almost coincide. In the next part of the analysis of the concentration of banks' assets, the previously presented concentration indicators will be used. The following table shows the various indicators of banking market concentration for the period from the beginning of 2019 to the first quarter of 2021:

Table 1. Indices of bank assets concentration in the Republic of Srpska

Quarter	2019Q1	2019Q2	2019Q3	2019Q4	2020Q1	2020Q2	2020Q3	2020Q4	2021Q1
HHI	0,171	0,171	0,173	0,173	0,173	0,177	0,174	0,175	0,172
CR4	0,761	0,759	0,760	0,759	0,759	0,767	0,764	0,764	0,758
CR2	0,451	0,454	0,459	0,463	0,462	0,471	0,465	0,468	0,455
H	1,884	1,886	1,880	1,880	1,880	1,868	1,877	1,875	1,884
VL	2,327	2,277	2,323	2,333	2,298	2,374	2,294	2,267	2,216
GINI	0,345	0,344	0,349	0,350	0,349	0,360	0,353	0,355	0,345

Source: Author's calculations based on data from the Banking Agency of the Republic of Srpska

je u drugom kvartalu 2020. godine, kada je njihovo zajedničko učešće u ukupnoj aktivni bankarskog sektora iznosilo oko 47%, dok se nakon ovog kvartala njihovo učešće smanjuje na nivo od 45,5% na početku 2021. godine. CR za četiri najveće banke po učešću u aktivni ostao je stabilan kroz čitav posmatrani period i iznosio je oko 76%, uz neznatne oscilacije.

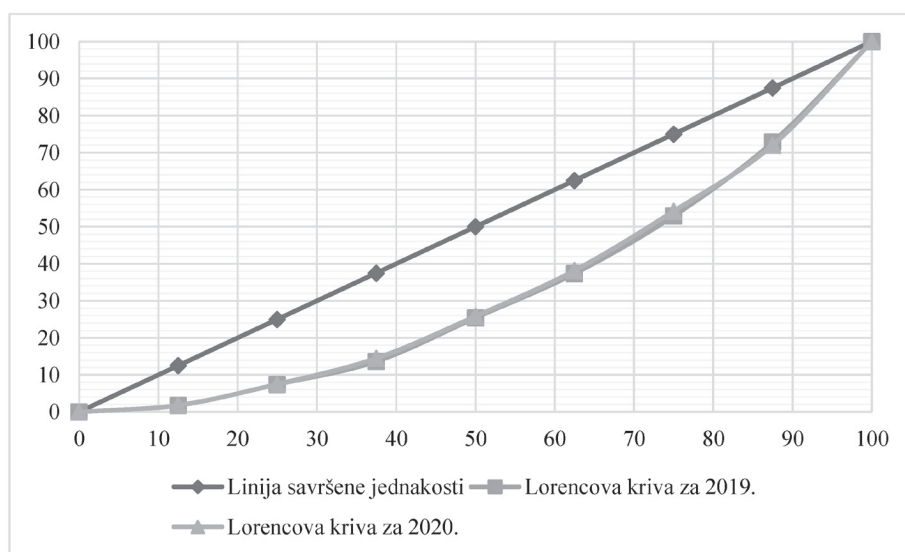
Iz posmatrane tabele imamo uvid i u ostale pokazatelje tržišne koncentracije. Vidimo da je vrijednost mjere entropije (H) kroz posmatrani period na nivou od 1,8. Budući da se vrijednost ovog koeficijenta kreće između 0 i prirodnog logaritma ukupnog broja banaka (2,079), može se reći da je, prema ovom pokazatelju koncentracije, tržište aktive banaka u Srpskoj ostalo stabilno. Takođe,

vidimo da je varijansa prirodnih logaritama kroz posmatrani period uzimala vrijednost između 2,2 i 2,3. Kao i kod mjere entropije, što je varijansa veća, to je veća i disperzija učešća, pa što je koncentracija veća, ovaj pokazatelj je manji. Iz prethodne tabele može se uočiti da je vrijednost u posljednja tri kvartala blago opala. Vrijednost Džinijevog koeficijenta, kao interpretacije Lorencove krive, kreće se u intervalu od 0,345 do 0,360. Takođe, u posljednja tri kvartala vrijednost ovog koeficijenta blago se smanjuje.

2.3. Koncentracija kredita

Na sljedećem grafikonu prikazana je Lorencova kriva kao mjera koncentracije na tržištu kredita u Republici Srpskoj na kraju 2019. i 2020. godine:

Grafikon 2. Lorencova kriva koncentracije kredita u 2019. i 2020. godini



Izvor: kalkulacije autora na osnovu podataka Agencije za bankarstvo Republike Srpske

Sa prethodnog grafikona ne može se uočiti značajno odstupanje između koncentracije u 2019. i 2020. godini, iako se vizuelno uočava blago smanjenje površine između dvije krive u 2020. godini u odnosu na prethodnu godinu.

Prikaz ostalih pokazatelja koncentracije na tržištu kredita kroz posmatrani period predstavljen je u sljedećoj tabeli:

Tabela 5. Indeksi koncentracije kredita banaka u RS

Kvartal	2019Q1	2019Q2	2019Q3	2019Q4	2020Q1	2020Q2	2020Q3	2020Q4	2021Q1
HHI	0,170	0,170	0,174	0,173	0,172	0,173	0,173	0,172	0,172
CR4	0,744	0,741	0,749	0,746	0,746	0,746	0,743	0,742	0,744
CR2	0,464	0,462	0,471	0,471	0,467	0,467	0,462	0,458	0,458
H	1,889	1,889	1,874	1,877	1,881	1,881	1,882	1,884	1,884
VL	2,373	2,451	2,636	2,687	2,621	2,519	2,555	2,575	2,532
GINI	0,341	0,339	0,352	0,349	0,346	0,347	0,345	0,342	0,343

Izvor: kalkulacije autora na osnovu podataka Agencije za bankarstvo Republike Srpske

HHI indeks, kako se može vidjeti u prethodnoj tabeli, uzima vrijednost nešto veću od 0,17, ali manju od 0,18, što ukazuje na to da tržište kredita na osnovu ovog pokazatelja spada u srednje koncentrisana tržišta. Vrijednost HHI pokazatelja dostiže najveću vrijednost od 0,174 u trećem kvartalu 2019. godine, dok je u prvom kvartalu 2021. godine vrijednost ovog indeksa 0,172.

CR za dvije najveće banke po učešću u kreditima („Nova banka“ i „UniCredit Bank“) govori da je njihovo učešće u ukupno plasiranim kreditima kroz posmatrani period bilo stabilno, na nivou od oko 46%, dok je u trećem i četvrtom kvartalu 2019. godine učešće ove dvije banke u ukupno plasiranim kreditima bilo preko 47%, što je ne previše značajan rast. S druge strane, CR za četiri najveće banke

na bankarskom tržištu Republike Srpske prema učešću u ukupno plasiranim kreditima iznosi oko 74% kroz posmatrani period.

Kako se može vidjeti iz prethodno prikazane tabele, koeficijent mjere entropije ostaje na stabilnom nivou od oko 1,8 kroz čitav posmatrani period koncentracije kredita, dok varijansa prirodnih logaritama tržišnih učešća pokazuje određene promjene u koncentraciji tržišnih učešća u ukupno plasiranim kreditima, tj. varijansa se kreće u rasponu od 2,3 do 2,7. Do drugog kvartala 2020. godine vidljivo je smanjenje koncentracije, dok je nakon ovog kvartala primjetno smanjenje raspršenosti, odnosno povećanje koncentracije. Vrijednost Džinijevog koeficijenta kreće se na nivou od oko 0,34, što opet ovo tržište svrstava u srednje koncentrisana tržišta.

From the previous table, we observe different coefficients of concentration of bank assets in the Republic of Srpska. We see that the value of the most well-known index when analyzing the concentration in the banking sector (HHI) over the observed period ranges from 0.17 to 0.18. Interpretation of this index most often shows that concentrated industries are those with an HHI greater than 0.18 and non-concentrated ones are those whose HHI values come up to less than 0.1. Based on this, we conclude that the assets market of the banking sector of the Republic of Srpska is moderately concentrated, with a visible tendency in the observed period for this index to grow towards the level of 0.18. Also, from the third quarter of 2020, a decline in the HHI concentration of assets can be observed.

Looking at the concentration index for the participation of the two largest banks in the banking market, we see that at the beginning of the period, “Nova banka” and “UniCredit Bank” took about 45% of total assets on the market. Also, during the observed period, the order between the banks on the market did not change, so the two previously mentioned banks occupied the positions of the two largest participants throughout the period. The maximum value of CR for the participation of these two banks was in the second quarter of 2020, when their joint share in the total assets of the banking sector was about 47%, while after this quarter their share decreased to 45.5%

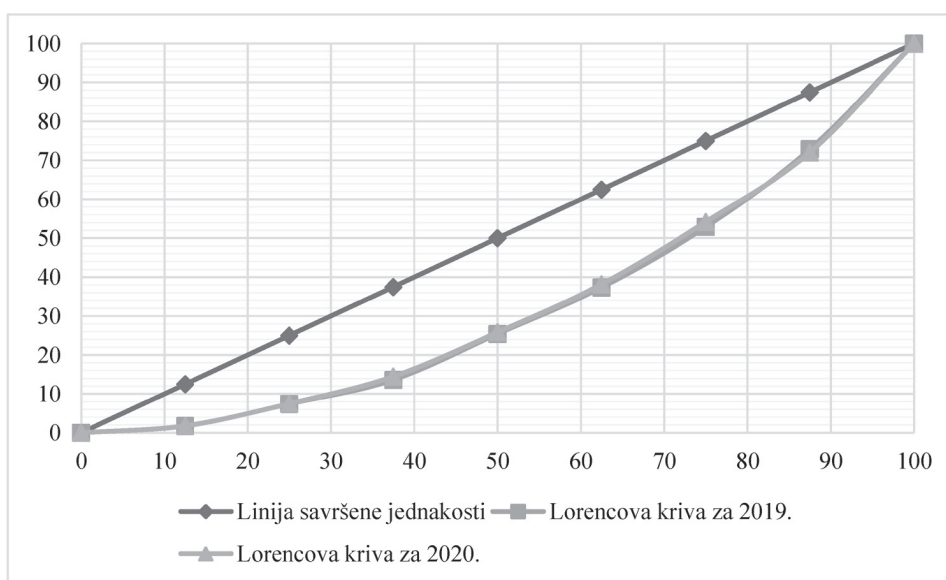
at the beginning of 2021. The CR for the four largest banks in terms of shares in assets remained stable throughout the observed period and amounted to about 76% with slight oscillations.

From the observed table, we have an insight into other indicators of market concentration. We see that the value of the measure of entropy (H) during the observed period is at the level of 1.8. Since the value of this coefficient ranges between 0 and the natural logarithm of the total number of banks (2,079), it can be said that according to this indicator of concentration, the market of bank assets in the Republic of Srpska remained stable. Also, we see that the variance of natural logarithms during the observed period took a value between 2.2 and 2.3. As with the entropy measure, the greater the variance, the greater the dispersion of participation, so the higher the concentration, the lower this indicator. From the table it can be noticed that the value has slightly decreased in the last three quarters. The value of the Gini coefficient, as an interpretation of the Lorenz curve, ranges from 0.345 to 0.360. Additionally, in the last three quarters, the value of this coefficient has slightly decreased.

2.3. Loan concentration

The following chart shows the Lorenz curve as a measure of concentration in the loan market in the Republic of Srpska at the end of 2019 and 2020:

Chart 2. Lorenz curve of loan concentration in 2019 and 2020



Source: Author's calculations based on data from the Banking Agency of the Republic of Srpska

The previous chart does not show a significant deviation between the concentration in 2019 and 2020, although visually there is a slight decrease in the area between the two curves in 2020 compared to the previous year.

The overview of other indicators of concentration on the credit market during the observed period is presented in the following table:

Table 2. Indices of concentration of bank loans in the Republic of Srpska

Quarter	2019Q1	2019Q2	2019Q3	2019Q4	2020Q1	2020Q2	2020Q3	2020Q4	2021Q1
HHI	0,170	0,170	0,174	0,173	0,172	0,173	0,173	0,172	0,172
CR4	0,744	0,741	0,749	0,746	0,746	0,746	0,743	0,742	0,744
CR2	0,464	0,462	0,471	0,471	0,467	0,467	0,462	0,458	0,458
H	1,889	1,889	1,874	1,877	1,881	1,881	1,882	1,884	1,884
VL	2,373	2,451	2,636	2,687	2,621	2,519	2,555	2,575	2,532
GINI	0,341	0,339	0,352	0,349	0,346	0,347	0,345	0,342	0,343

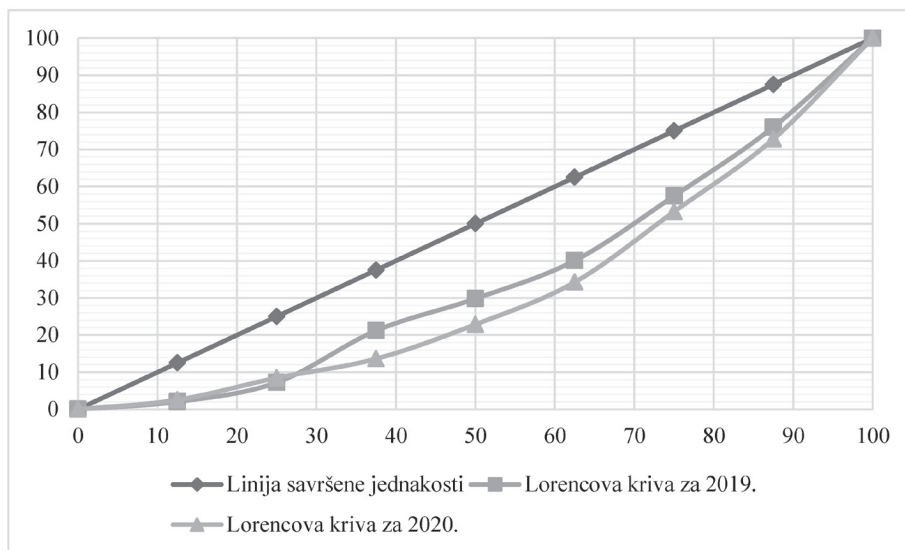
Source: Author's calculations based on data from the Banking Agency of the Republic of Srpska

2.4. Koncentracija depozita

Analizu koncentracije na bankarskom tržištu Republike Srpske zaključujemo analizom koncentracije depozita kroz posmatrani

period. Na naredom grafikonu dat je prikaz Lorencovih krivih za kraj 2019. i kraj 2020. godine:

Grafikon 3. Lorencova kriva koncentracije depozita u 2019. i 2020. godini



Izvor: kalkulacije autora na osnovu podataka Agencije za bankarstvo Republike Srpske

Prethodno prikazane Lorencove krive svjedoče o povećanoj koncentraciji depozita banaka na kraju 2020. godine u odnosu na posljednji kvartal 2019. godine. Vizuelno se može uočiti udaljšavanje krive u 2020. godini od krive savršene jednakosti, što svjedoči o povećanoj koncentraciji depozita u 2020. godini. Posmatranjem drugih koe-

ficijentata koncentracije u narednom dijelu može se i kvantitativno izraziti ovaj odnos koncentracije.

Prikaz ostalih kvantitativnih pokazatelja kojima smo mjerili koncentraciju u bankarskom sektoru u ovom radu dat je u narednoj tabeli:

Tabela 6. Indeksi koncentracije depozita banaka u RS

Kvartal	2019Q1	2019Q2	2019Q3	2019Q4	2020Q1	2020Q2	2020Q3	2020Q4	2021Q1
HHI	0,173	0,173	0,175	0,163	0,175	0,180	0,176	0,177	0,173
CR4	0,768	0,765	0,767	0,702	0,767	0,780	0,772	0,771	0,763
CR2	0,453	0,457	0,464	0,425	0,463	0,476	0,464	0,468	0,450
H	1,878	1,882	1,873	1,912	1,874	1,855	1,871	1,870	1,882
VL	2,334	2,258	2,377	2,319	2,296	2,444	2,297	2,275	2,204
GINI	0,349	0,348	0,355	0,293	0,354	0,370	0,357	0,359	0,346

Izvor: kalkulacije autora na osnovu podataka Agencije za bankarstvo Republike Srpske

HHI pokazuje da je kroz posmatrani period koncentracija mjerena indeksom od 0,17 do 0,18. U posljednjem kvartalu 2019. godine iznosio je 0,163, što je minimalna vrijednost ovog indeksa u posmatranom periodu, dok je u drugom kvartalu 2020. godine vrijednost HHI jednaka 0,180. Ostali kvartali, posmatrano kroz ovaj pokazatelj, relativno su stabilni kada se posmatra koncentracija depozita. Može se uočiti da bankarsko tržište Republike Srpske, i kada se posmatraju depoziti, spada u srednje koncentrisana tržišta kada se koncentracija posmatra kroz HHI, dok je vidljiva tendencija rasta koncentracije prema ovom pokazatelju.

Racio koncentracije kada se posmatraju dvije najveće banke prema učešću u depozitima kreće se u rasponu od 42,5% u prvom kvartalu 2019. godine do 47,6% u drugom kvartalu 2020. godine. Takođe, nakon drugog kvartala 2020. godine vidi se smanjenje učešća dvije najveće banke („Nova banka“ i „UniCredit Bank“) u ukupnim depozitima. Racio koncentracije za četiri najveće banke prema učešću u ukupnim depozitima kreće se u rasponu od 70,2% na kraju 2019. godine do 78% u drugom kvartalu 2020. godine.

Mjera entropije pokazuje relativno stabilan nivo od 1,8, izuzev posljednjeg kvartala 2019. godine, kada se entropija mjerila nivoom od

1,912. Kao i kod prethodnih pokazatelja, može se uočiti povećanje raspršenosti, tj. smanjenje koncentracije u posljednjem kvartalu 2019. godine. Posmatranjem varijanse prirodnih logaritama može se uočiti povećanje koncentracije nakon drugog kvartala 2020. godine, kada je prema ovom pokazatelju bilježena najveća raspršenost prema učešću u depozitima. Džinijev koeficijent kreće se u rasponu od 0,293 u posljednjem kvartalu 2019. godine, kada je bilježena najmanja koncentracija, do nivoa od 0,370 u drugom kvartalu.

ZAKLJUČAK

Istorijske vrijednosti tržišne koncentracije za period od 2009. do 2018. godine na bankarskom tržištu Republike Srpske mjerene su Hiršman-Herfindalovim indeksom. Za tri osnovna segmenta poslovanja (kredit, depoziti i aktiva) vrijednosti HHI indeksa ukazali su na postojanje umjerene koncentracije kod sva tri segmenta poslovanja koji su blizu gornje granice koja dijeli umjerenu i visoku koncentraciju. Slično tome, istorijske vrijednosti koncentracijske stope (CR3) za tri najveće banke, tokom perioda od 2009. do 2018. godine, u

The HHI index, as can be seen in the previous table, takes a value slightly higher than 0.17 but less than 0.18, which indicates that the loan market belongs to the moderately concentrated markets. The value of the HHI indicator reaches the highest value of 0.174 in the third quarter of 2019, while in the first quarter of 2021 the value of this index is 0.172.

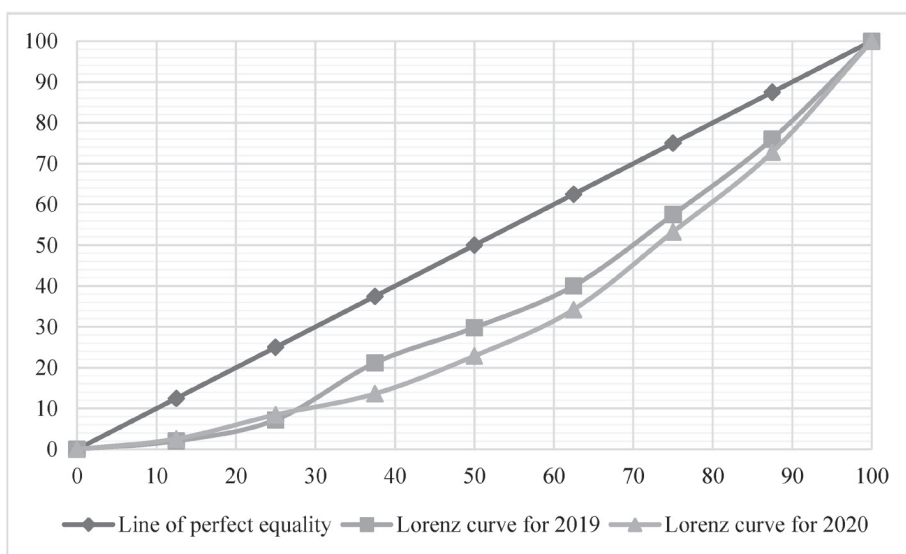
The CR for the two largest banks in terms of participation in loans (“Nova banka” and “UniCredit Bank”) says that their share in total loans was stable over the observed period, at around 46%, while in the third and fourth quarters of 2019 The share of these two banks in total loans took over 47%, which is not too significant of a growth trend. On the other hand, the CR for the four largest banks on the banking market of the Republic of Srpska, according to the share in the total placed loans, amounts to about 74% during the observed period.

As is shown in the table above, the entropy coefficient remains at a stable level of about 1.8 throughout the observed period of loan concentration. While the variance of natural logarithms of market shares shows certain changes in the concentration of market shares in total loans, or in other words the variance ranges from 2.3 to 2.7. Until the second quarter of 2020, a decrease in concentration is visible, while after this quarter there is a noticeable decrease in dispersion, an increase in concentration that is. The value of the Gini coefficient is around 0.34, which again classifies this market as a moderately concentrated market.

2.4. Deposit concentration

We conclude the analysis of the concentration on the banking market of the Republic of Srpska through an analysis of the concentration of deposits over the observed period. The following chart shows the Lorenz curves for the end of 2019 and the end of 2020:

Chart 3. Lorenz deposit concentration curve in 2019 and 2020



Source: Author’s calculations based on data from the Banking Agency of the Republic of Srpska

The previously presented Lorenz curves testify to the increased concentration of bank deposits at the end of 2020 compared to the last quarter of 2019. The deviation of the curve in 2020 from the perfect equality curve can be seen visually, which testifies to the increased concentration of deposits in 2020. By observing other

concentration coefficients in the following section, this concentration ratio can be presented quantitatively.

An overview of other quantitative indicators by which we measured the concentration in the banking sector in this paper is given in the following table:

Table 3. Concentration indices of bank deposits in the Republic of Srpska

Quarter	2019Q1	2019Q2	2019Q3	2019Q4	2020Q1	2020Q2	2020Q3	2020Q4	2021Q1
HHI	0,173	0,173	0,175	0,163	0,175	0,180	0,176	0,177	0,173
CR4	0,768	0,765	0,767	0,702	0,767	0,780	0,772	0,771	0,763
CR2	0,453	0,457	0,464	0,425	0,463	0,476	0,464	0,468	0,450
H	1,878	1,882	1,873	1,912	1,874	1,855	1,871	1,870	1,882
VL	2,334	2,258	2,377	2,319	2,296	2,444	2,297	2,275	2,204
GINI	0,349	0,348	0,355	0,293	0,354	0,370	0,357	0,359	0,346

Source: Author’s calculations based on data from the Banking Agency of the Republic of Srpska

HHI shows that during the observed period the concentration ranged from 0.17 to 0.18. The last quarter of 2019 was 0.163, which is the minimum value of this index in the observed period, while the second quarter of 2020, the value of HHI is equal to 0.180. Other quarters observed through this indicator are relatively stable when the concentration of deposits is observed. It can be noticed that the banking market of the Republic of Srpska, even when deposits are observed, belongs to the markets with medium concentration while

a tendency of a concentration increase according to this indicator is visible when it is observed through HHI.

Looking at the two largest banks according to their share in deposits, the concentration ratio ranges from 42.5% in the first quarter of 2019 to 47.6% in the second quarter of 2020. Also, after the second quarter of 2020, there is a decrease in the share of the two largest banks (“Nova banka” and “UniCredit Bank”) in total deposits. The concentration ratio for the four largest banks according to the share

bankarskom sektoru Republike Srpske, ukazale su na postojanje umjerene koncentracije.

Kako broj učesnika na bankarskom tržištu Republike Srpske nije mijenjan u posmatranim godinama, to je opravdalo mogućnost upoređivanja površina između krive savršene jednakosti i Loren-cove krive koncentracije. Površina koja mjeri odstupanje od krive savršene jednakosti tržišne koncentracije u 2019. i 2020. godini nije se mijenjala, tj. dvije posmatrane krive gotovo su se poklapale. Na osnovu ovoga zaključujemo da je tržište aktive bankarskog sektora Republike Srpske srednje koncentrisano, s tim da je kroz posmatrani period vidljiva težnja ovog indeksa da raste prema nivou od 0,18, odnosno prema više koncentrisanom tržištu.

Posmatranjem indeksa koncentracije za učešće dvije najveće banke na bankarskom tržištu vidimo da su na početku perioda „Nova banka“ i „UniCredit Bank“ uzimale oko 45% od ukupne aktive na cjelokupnom tržištu. Takođe, kroz posmatrani period poredak između banaka na tržištu nije se mijenjao, tako da su dvije prethodno pomenute banke kroz čitav period zauzimale pozicije dvije najveće.

Ukoliko posmatramo tržište kredita bankarskog sektora Republike Srpske, ne može se uočiti značajno odstupanje između koncentracije u 2019. i 2020. godini. Kada uzmemo u obzir i druge pokazatelje koncentracije, tržište kredita možemo svrstati u srednje koncentrisana tržišta.

U slučaju koncentracije depozita, vrijednosti Loren-cove krive svjedoče o povećanoj koncentraciji depozita banaka na kraju 2020. godine u odnosu na posljednji kvartal 2019. godine. Može se zaključiti da bankarsko tržište Republike Srpske, i kada se posmatraju depoziti, spada u srednje koncentrisana tržišta kada se koncentracija posmatra kroz HHI, s tim da je primjetna tendencija rasta koncentracije.

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in total deposits ranges from 70.2% at the end of 2019 to 78% in the second quarter of 2020.

The measure of entropy shows a relatively stable level of 1.8 except for the last quarter of 2019 when entropy was measured at the level of 1.912. As with the previous indicators, an increase in dispersion can be observed, and as such a decrease in concentration in the last quarter of 2019 as well. Observing the variance of natural logarithms, we can see an increase in concentration after the second quarter of 2020, when, according to this indicator, the greatest dispersion was recorded in terms of participation in deposits. The Gini coefficient ranges from 0.293 in the last quarter of 2019, when the lowest concentration was recorded, up to the level of 0.370 in the second quarter.

CONCLUSION

Historical values of market concentration for the period from 2009 to 2018 on the banking market of the Republic of Srpska were measured by the Hirschmann-Herfindahl index. For the three main business segments (loans, deposits and assets), the values of the HHI index indicated the existence of moderate concentration; in all three business segments that are close to the upper limit between moderate and high concentration. Similarly, the historical values of the concentration rate (CR_3) for the three largest banks, during the period from 2009 to 2018 in the banking sector of the Republic of Srpska, showed moderate concentration too.

As the number of participants in the banking market of the Republic of Srpska has not changed in the observed years, this has justified the possibility of comparing the areas between the perfect equality curve and the Lorenz concentration curve. The area measuring the deviation from the perfect market concentration equality curve in 2019 and 2020 did not change, so the two observed curves almost coincided. Based on this, we conclude that the assets market of the banking sector of the Republic of Srpska is moderately concentrated, with the tendency of this index to grow towards the level of 0.18, that is to say towards a more concentrated market, visible during the observed period.

Looking at the concentration index for the participation of the two largest banks in the banking market, we see that at the beginning of the observed period, "Nova banka" and "UniCredit Bank" took about 45% of total assets in the overall market. Also, during this period, the order between the banks on the market did not change, so that the two previously mentioned banks occupied the positions of the two major participants throughout the period.

If we look at the loan market of the banking sector of the Republic of Srpska, we cannot see a significant deviation between the concentration in 2019 and 2020. When we take into account other indicators of concentration, the loan market can be classified as a medium-concentrated market.

In the case of the concentration of deposits, the values of the Lorenz curve testify to the increased concentration of bank deposits at the end of 2020 compared to the last quarter of 2019. It can be concluded that the banking market of the Republic of Srpska, even when deposits are observed, belongs to markets that have

medium concentration, with the observations from the HHI, revealing a noticeable tendency of a concentration increase.

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