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UTICAJ DIVERSIFIKACIJE IZVORA PRIHODA NA VOLATILNOST PROFITABILNOSTI BANAKA

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Rezime

Uprkos iscrpnim istraživanjima koja proučavaju uticaj diversifikacije poslovnih aktivnosti banke na njene performanse, još uvijek nije postignut konsenzus po pitanju toga da li je ovaj uticaj pozitivan ili negativan. U radu se identifikuju prednosti i nedostaci diversifikacije poslovnih aktivnosti i izvora prihoda u bankarstvu, a iskazani stavovi se potkrijepljuju ekonometrijskim dokazima. Istraživanje se sprovodi na uzorku od 20 sistemski važnih banaka čije se bilansne performanse prate za period od 2005-2014 godine. Uz primjenu linearnog regresionog modela ispituje se da li nivo učešća nekamatnog prihoda u ukupnim prihodima banke direktno utiče na volatilnost njene profitabilnosti. Istraživanje pruža praktične dokaze i doprinosi debati o prednostima i nedostacima primjene modela univerzalnog bankarstva.

Ključne riječi: univerzalne banke, komercijalne banke, diversifikacija prihoda, volatilnost profitabilnosti, nekamatni prihod

JEL: G21, L25

THE EFFECTS OF INCOME SOURCE DIVERSIFICATION ON THE VOLATILITY OF BANKS' PROFITABILITY

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Summary

Despite exhaustive research that investigates the impact of diversification of the bank's business activities on its performance, there is still no consensus on whether this impact is positive or negative. This paper identifies the advantages and disadvantages of diversification of business activities and sources of income in banking, supported by econometric evidence. The research was conducted on a sample of 20 systemically important banks whose financial performance was monitored in the period 2005-2014. Using the linear regression model, we examined whether the share of non-interest income in total income of the bank directly affects the volatility of its profitability. The research provides practical evidence and contributes to the debate on the advantages and disadvantages of applying the universal banking model.

Keywords: universal banks, commercial banks, income diversification, volatility of profitability, non-interest income

JEL: G21, L25

Strateški izbor banke: diversifikacija vs. specijalizacija

Stalne promjene na finansijskom tržištu otežale su donošenje strateških odluka banaka, uključujući i onu odluku koja se tiče izbora između diversifikacije i specijalizacije poslovanja. Dok neke biraju usku specijalizaciju, pokušavajući da klijentima ponude konkretan, ograničen spektar usluga, veliki broj banaka se odlučuje za univerzalno bankarstvo i počinje nuditi nove usluge koje su rezultat njihovog sve većeg prisustva na tržištu kapitala.

Literatura ukazuje na brojne prednosti koje univerzalno bankarstvo sa sobom donosi. Primjena ovog modela poslovanja omogućava bankama da diversifikuju rizike i povećaju prihode. Činjenica da mogu zadovoljiti gotovo sve finansijske potrebe svojih klijenata povećava pregovaračku moć banke i doprinosi većem vezivanju klijenata za banku. Univerzalno bankarstvo širi poslovne mogućnosti banaka. Međutim, upravo taj širi spektar poslovnih mogućnosti dovodi do širenja spektra rizika kojima su ove banke izložene. U literaturi se univerzalne banke često definišu kao osnovni problem globalnog finansijskog sistema, koji je omogućio da se rizik investicionog bankarstva ugradi u komercijalne banke, a sve na štetu poreskih obveznika koji su na kraju snosili posljedice rizičnih poteza ovih banaka.

Dok se komercijalne banke dominantno oslanjaju na kamatni prihod, univerzalne banke se znatno oslanjaju i na neamatne izvore prihoda, što sa sobom donosi nove rizike. Sa deregulacijom bankarskog sektora i sa širenjem bankarskih aktivnosti u različite vrste poslova, vremenom neamatni prihod počinje imati sve veće učešće u ukupnom prihodu banaka. Nakon krize počinju se sve više preispitivati prednosti i nedostaci koji proizilaze iz uključivanja univerzalnih banaka u vlasničku trgovinu i ostale aktivnosti na tržištu hartija od vrijednosti.

Uticaj koji neamatni prihod ima na stabilnost bankarskog poslovanja, prije svega na stabilnost njenih ukupnih prihoda i profitabilnosti, postala je sve češća tema. U vezi sa tim u ovom radu se istražuje da li postoji pozitivan odnos između učešća neamatnog prihoda u ukupnim prihodima banke i volatilnosti njene profitabilnosti. Kroz mjerenje

efekata diversifikacije prihoda na rizik banke se indirektno želi utvrditi da li uključivanje komercijalnih banaka u poslove investicionog bankarstva dovodi do ispoljavanja benefita diversifikacije, ili se na taj način povećava njihov rizik.

Pregled literature

Brojni su autori koji su proučavali univerzalno bankarstvo i pokušali da utvrde da li takav model poslovanja banke povećava rizike kojim je institucija izložena. Uticaj diversifikacije prihoda na performanse banke se u literaturi najčešće posmatra sa tri različita aspekta. Prvi podrazumijeva sagledavanje toga da li diversifikacija prihoda dovodi do ekonomije obima, drugi podrazumijeva sagledavanje veze između diversifikacije prihoda i operativnih performansi banke, dok treći podrazumijeva proučavanje veze između diversifikacije prihoda i rizika banke (Zhou, 2014).

Uprkos brojnim radovima koji proučavaju uticaj diversifikacije poslovnih aktivnosti banke, a time i prihoda, na njen rizik, još uvijek nije postignut konsenzus po pitanju toga da li je ovaj uticaj pozitivan ili negativan, jer postoje argumenti koji potkrepljuju stavove i jedne i druge strane (Gambacorta i Rixtel, 2013). Dok jedni tvrde da se na ovaj način smanjuje rizik banke, jer banke sve više diversifikuju svoje izvore prihoda i postaju manje zavisne od kamatnog prihoda, drugi tvrde da se tako povećava rizik jer se povećava oslanjanje banaka na volatilan izvor prihoda za razliku od relativno stabilnijeg kamatnog prihoda. Neamatni prihod banci može donijeti nove operativne, kreditne, pravne i tržišne rizike, kao i rizik likvidnosti (Zhou, 2014). Zagovornici stava da diversifikacija pozitivno utiče na performanse banke takođe tvrde da unakrsna prodaja različitih proizvoda povećava prihode a samim tim i profit banke. Portfolio teorija ističe da neamatni prihod može diversifikovati i smanjiti rizike ako nije perfektno korelisan sa tradicionalnim kamatnim prihodom banke. Naime, ako bi neamatni i kamatni prihod banke zaista bili negativno ili makar slabo korelisani, neamatni prihod bi mogao diversifikovati prihode banke i pozitivno uticati na balans koji postoji između rizika i profitabilnosti (Stiroh, 2002).

Strategic Choice of the Bank: Diversification vs. Specialization

Constant changes at the financial market have made it difficult for the banks to make strategic decisions, including the decision related to the choice between diversification and specialisation in banking. While some banks choose narrow specialization, trying to offer a specific, limited range of services to their customers, a large number of banks opt for universal banking and begin to offer new services as a result of their growing presence at the capital market.

Reference literature points to the numerous advantages that universal banking brings. The implementation of this business model allows banks to diversify risks and increase revenues. The fact that they can satisfy almost all financial needs of their clients increases the negotiating power of the bank and contributes to the greater customer loyalty. Universal banking expands the range of business opportunities of banks. However, a wider range of business opportunities also means a wider spectrum of risks that these banks are exposed to. Universal banks are often defined as the fundamental problem of the global financial system, which allowed the incorporation of the investment banks' risk into commercial banks, all at the expense of taxpayers who paid for the risky moves of these banks.

While commercial banks mainly rely on interest income, universal banks rely on non-interest income as well, which entails new risks. With the deregulation of the banking sector and the expansion of banking activities into various types of businesses, the share of non-interest income in total income of banks increases. After the crisis, the research has been increasingly focusing on the advantages and disadvantages arising from the involvement of universal banks in proprietary trading and other activities at the securities market.

The impact that non-interest income has on the stability of banks' performance, primarily on the stability of their total revenues and profitability, has become an increasingly common topic. Accordingly, this paper examines whether there is a positive relationship between the level of share of non-interest income in

the bank's total income and the volatility of its profitability. The objective is to determine whether the level of non-interest income share in the bank's total income directly affects the volatility of its profitability. This way it can be indirectly determined whether the involvement of commercial banks in the investment banking business leads to diversification benefits, or whether banks thereby increase their risk.

Literature Review

Numerous authors have studied universal banking and tried to determine whether such a business model of the bank increases the risks that the institution is exposed to. The impact of income diversification on the banks' performance has been mainly researched from three different aspects. The first considers whether the diversification of revenue leads to economies of scale, the second one examines the link between income diversification and operational performance of the bank, while the third explores the relationship between diversification of income and banks' risk (Zhou, 2014).

Despite the exhaustive research investigating the impact of the diversification of a bank's business activities on its performance, there is still no consensus on whether this impact is positive or negative, because there are arguments that confirm the opinions of both sides (Gambacorta and Rixtel, 2013). While one argues that this reduces the banks' risk, because banks increasingly diversify their sources of income and become less dependent on the interest income, others argue that this increases the risk, because the banks' reliance on a volatile income source increases (in comparison with a relatively more stable interest income). Non-interest income can bring new operational, credit, legal and market risks, as well as liquidity risk (Zhou, 2014). The proponents of the opinion that diversification positively affects the bank's performance also argue that cross-selling of various products increases revenues and, therefore, the bank's profit. Portfolio theory points out that non-interest income can diversify and reduce risks if it is not perfectly correlated with the traditional interest income of a bank. Namely, if the non-interest

Među autorima koji su proučavali ovu problematiku su Saunders i Volter (1994). Razmotrivši 18 studija koje istražuju da li nebankarske aktivnosti smanjuju rizik bankarskih holding kompanija oni dolaze do zaključka da 9 studija dokazuje da smanjuju rizik, 6 studija dokazuje da ne smanjuju rizik, dok 3 studije obezbjeđuju mješovite rezultate. Templeton i Severiens (1992) izučavaju tržišne podatke koji se odnose na 54 bankarske holding kompanije za period od 1979. do 1986. i zaključuju da je diversifikacija (mjerena kao učešće tržišne vrijednosti koja se ne odnosi na bankarsku aktivu) povezana sa manjom varijansom akcionarskih prinosa. Slično, De Young i Roland (2001) razmatraju vezu između bankarske profitabilnosti, volatilnosti i učešća različitih vrsta prihoda za 472 velike komercijalne banke za period od 1988 do 1995. Oni zaključuju da one aktivnosti banke koje se zasnivaju na naknadama (prihod iz svih izvora izuzev kamate, investicija, depozita i trgovačkih aktivnosti) povećava volatilnost bankarskih prihoda i zarada.

Fiordelisi i Ibanez (2011) analiziraju uzorak koji se sastoji od 709 evropskih banaka za period od 1997. do 2007. godine i dolaze do zaključka da sa rastom diversifikacije (to jest sa rastom nekamatnog u ukupnim prihodima banke) raste i rizik, kako rizik koji se odnosi na tu banku, tako i sistemski rizik odnosno rizik cjelokupnog finansijskog sistema. Van Ewijk i Arnold (2013) analiziraju uzorak od 16.000 američkih banaka osiguranih kod Fonda za osiguranje depozita, a period uzorka je 1992-2010. Na taj način dolaze do zaključka da su one banke koje su uključene u tradicionalne aktivnosti bolje pripremljene za finansijsku krizu od banaka koje diversifikuju poslovne aktivnosti.

Stiroh (2002) analizira podatke za 14.503 banke za period od 1978-2000. sa ciljem da istraži vezu između rastućeg oslanjanja na nekamatni prihod i volatilnosti bankarskog prihoda i profita. Rezultati rada pružaju jako malo dokaza da diversifikacija dovodi do stabilnijih profita ili prihoda. Na agregatnom nivou, nekamatni prihod ima mnogo veću volatilnost nego kamatni prihod. Na nivou pojedinačnih banaka, nekamatni prihod pokazuje rastuću korelaciju sa kamatnim prihodom. Samim tim, kako raste korelacija kamatnog sa nekamatnim prihodom,

posljedično opadaju i benefiti diversifikacije. Na primjer, administrativne naknade i provizije su visoko korelisane sa kamatnim prihodom. Sa aspekta rizika i prinosa, postoji jasna negativna veza između učešća nekamatnog prihoda i profita po jedinici rizika. Isti autor prati dosadašnje nalaze literature i zaključuje da postoji jako malo dokaza o benefitima diversifikacije.

Martel i saradnici (2013) proučavaju poslovne modele koje su međunarodne banke primjenjivale za vrijeme krize 2007-2009. Oni dolaze do zaključka da su se komercijalne banke pokazale otpornijim od univerzalnih banaka, jer su imale skromne izloženosti trgovačkim aktivnostima i derivatima, a uz to su se i više oslanjale na stabilan izvor finansiranja. Suprotno tome, banke koje su se više uključivale u poslove investicionog bankarstva, posebno univerzalne banke orjentisane na investiciono bankarstvo, iskusile su značajne promjene u strukturi bilansa tokom vremena. Prateći prinos na sopstveni kapital na uzorku od 10 sistemski važnih finansijskih institucija za period od 2006-2010, autori uočavaju da je većina banaka doživjela snažan pad profitabilnosti u 2008. godini. Međutim, komercijalno orjentisane banke su imale stabilniji prinos na sopstveni kapital i uspjele da ga održe na visokom nivou u periodu od 2006-2010, što se ne može reći za investiciono orjentisane univerzane banke.

Lepetit i saradnici (2008) proučavaju uzorak od 734 evropske banke za period od 1996-2002. kako bi ispitali odnos između proizvodne diversifikacije i rizika banke, i dolaze do zaključka da sa većim uključivanjem banaka u aktivnosti koje donose nekamatni prihod raste operativni rizik banke. Takođe, zaključuju da je ovaj rizik izraženiji kod banaka sa aktivom većom od 1 milijardu GBP. Dok se većina empirijskih dokaza zasniva na linearnim modelima, Gambacorta i Rixtel (2013) koriste nelinearni model i dokazuju da postoji snažna veza između racija diversifikacije banke (mjenog učešćem nekamatnog prihoda u ukupnim prihodima) i koeficijenta varijacije prinosa na sopstveni kapital. Naime, ovi autori koriste uzorak od 108 međunarodnih banaka iz 14 razvijenih zemalja za period od 2000-2011. Njihov zaključak je da diversifikacija ima pozitivan i rastući efekat na prinos na sopstveni kapital do nivoa racija diversifikacije

and interest income of a bank were negative or at least poorly correlated, non-interest income could diversify the bank's income and could have positive impact on the trade-off between risk and profitability (Stiroh, 2002).

Saunders and Walter (1994) are among the authors who studied this issue. Considering 18 studies that investigate whether non-banking activities reduce the risk of bank holding companies, they conclude that 9 studies prove that this reduces risk, 6 studies prove that this does not reduce risk, while 3 studies provide mixed results. Templeton and Severiens (1992) researched the market data related to 54 banking holding companies for the period 1979-1986 and concluded that diversification (measured as a share of market value which is related to nonbank assets) is associated with a lower variance of shareholder returns. Similarly, De Young and Roland (2001) considered the relationship between banking profitability, volatility and participation of different types of income for 472 large commercial banks for the period 1988-1995. They concluded that all activities based on fees (income from all sources except interest, investments, deposits and trading activities) increase the volatility of banks' income and earnings.

Fiordelisi and Ibanez (2011) analyzed a sample of 709 European banks for the period 1997-2007 and concluded that with the growth of diversification (measured as a share of non-interest income in total income), the risk grows as well, including not only the risk which refers to that particular bank, but systemic risk or the risk of the entire financial system as well. Van Ewijk and Arnold (2013) analyzed a sample of 16,000 FDIC-insured banks in the US for the sample period 1992-2010. This way, they concluded that the banks involved in traditional activities are better prepared for a financial crisis than the banks that diversify their business activities.

Stiroh (2002) analyzed the data for 14,503 banks for the period 1978-2000, with the aim of exploring the link between the growing reliance on non-interest income and the volatility of banking income and profit. The results of the work provide very little evidence that diversification leads to more stable profits or income. At the aggregate level, non-interest

income has higher volatility than interest income. At the level of individual banks, non-interest income shows a rising correlation with interest income. Therefore, as the interest income correlation with non-interest income increases, diversification benefits declines. For example, administrative fees and commissions are highly correlated with interest income. From the aspect of risk and return, there is a clear negative link between the share of non-interest income and profit per unit of risk. Based on the reference literature so far, the same author concluded that there is very little evidence of diversification benefits.

Martel et al. (2013) examined the business models applied by international banks during the 2007-2009 crisis. They concluded that commercial banks were more resilient than universal banks, due to the fact that they had modest exposures to trading activities and derivatives, and therefore dominantly relied on a stable source of financing. In contrast, banks that were more involved in investment banking, especially investment banking-oriented universal banks, experienced significant changes in the balance sheet structure over time. Following the return on equity on the sample of 10 systemically important financial institutions for the period 2006-2010, the authors noted that majority of banks experienced a strong decline in profitability in 2008. However, commercial banking-oriented universal banks had a more stable return on equity and managed to maintain it at a high level in the period 2006-2010, which cannot be said for investment-oriented universal banks.

Lepetit et al. (2008) analyzed a sample of 734 European banks for the period 1996-2002 in order to examine the relationship between product diversification and the banks' risk. They concluded that with a stronger involvement of banks in the activities resulting in non-interest income, the banks' operational risk is growing. They also concluded that this risk is higher for the banks with assets above GBP 1 billion. While the majority of empirical evidence is based on linear models, Gambacorta and Rixtel (2013) used a non-linear model and proved that there is a strong link between the bank's diversification rate (measured as the share of non-interest income in total revenues) and coefficient of

od oko 50%, dok veći nivoi diversifikacije smanjuju profitabilnost. Pošto prinos na sopstveni kapital nije mjera profitabilnosti banke koja je usklađena sa rizikom, autori mjere i kako diversifikacija prihoda utiče na volatilnost prinosa na sopstveni kapital. U tu svrhu je korišćena regresija uporednih podataka za koeficijent varijacije prinosa na sopstveni kapital. Zaključak do kojeg dolaze je da diversifikacija prihoda ima pozitivan efekat na volatilnost prinosa na sopstveni kapital do nivoa od oko 70%.

Proučavajući uticaj diversifikacije prihoda na rizik banke Zhou (2014) analizira uzorak koji se sastoji od 62 kineske banke za period od 1997-2002. Ovaj autor koristi standardnu devijaciju prinosa na ukupnu aktivu kao mjeru rizika, dok je učešće nekamatnog prihoda u ukupnim prihodima odabrana mjera diversifikacije prihoda banke. Zaključak do kojeg dolazi je da diversifikacija prihoda ne dovodi do značajnog smanjenja rizika banke. Objašnjenje koje autor navodi je da nekamatni prihod donosi sa sobom dodatne rizike i da korelacija između kamatnog i nekamatnog prihoda slabi efekte diversifikacije.

Podaci i metodologija istraživanja

Postavljenom hipotezom se tvrdi da postoji pozitivan odnos između učešća nekamatnog prihoda u ukupnim prihodima banke i volatilnosti njene profitabilnosti. Kroz mjerenje efekata diversifikacije prihoda na rizik banke se indirektno želi dokazati da uključivanje komercijalnih banaka u poslove investicionog bankarstva ne dovodi do ispoljavanja benefita diversifikacije, već naprotiv, da se na taj način povećava njihov rizik. U svrhu testiranja hipoteze koristi se linearni regresioni model koji mjeri uticaj nivoa učešća nekamatnog u ukupnim prihodima banke na volatilnost njene profitabilnosti. Za testiranje ove veze koristi se ekonometrijski metod - metod najmanjih kvadrata. Za ocjenu linearnog regresionog modela u radu korišćen je ekonometrijski i statistički softverski alat pod nazivom *EViews*, verzija 7.

Empirijsko istraživanje sprovedeno je na uzorku od 20 banaka: Citigroup, Wells Fargo, JP Morgan Chase, Bank of America, Credit

Suisse, ING bank, Morgan Stanley, Standard Chartered, Santander, Unicredit Group, Group Credit Agricole, HSBC, BNP Paribas, Barclays, Deutsche Bank, Societe Generale, State Street, Bank of NY Mellon i Goldman Sachs. Svaka od banaka iz uzorka se nalazi na Listi globalnih sistemski važnih banaka objavljenoj od strane Odbora za finansijsku stabilnost (*Financial Stability Board*) 2014. godine. U analizi se koristi panel podataka prikupljenih iz godišnjih finansijskih izvještaja odabranih banaka za period od 2005-2014 godine. Inicijalna ideja empirijske analize je bila da se banke prate za period od 15 godina, međutim nedostupnost podataka za neke od njih je razlog zbog kojeg je period praćenja performansi skraćen na 10 godina. Ovaj vremenski okvir je odabran kako bi bile obuhvaćene i godine krize, kada su banke pokazale svoje najveće slabosti. Dostupni podaci su prikupljeni za svaku banku ponaosob i preuzeti iz godišnjih finansijskih izvještaja koje banke dostavljaju svojim akcionarima neposredno pred godišnju skupštinu akcionara.

Uzorak sačinjavaju isključivo sistemski važne banke, zbog snažnog uticaja koje mogu imati na stabilnost cjelokupnog sistema i privrede. Nekoliko autora koji su proučavali ovu temu, odlučuje se za sličan uzorak banaka, koji se oslanja na listu Odbora za finansijsku stabilnost. Masciantonio i Tiseno (2013) kao razlog odabira najvećih banaka navode to što su one iskusile radikalnije promjene u odnosu na male banke i bile dovoljno velike da konkurišu u rastućem, globalnom i integrisanom finansijskom sistemu. Ove banke su istovremeno imale i odgovarajuću strukturu da brzo reaguju na regulatorne promjene i finansijske inovacije i da konkurišu bankama sa različitim poslovnim modelima.

Jedan od najčešće korišćenih indikatora performansi banke je prinos na sopstveni kapital (*return on equity*, ROE). Pošto prinos na sopstveni kapital nije mjera profitabilnosti banke koja je usklađena sa rizikom, u ovom radu će se analizirati kako diversifikacija prihoda utiče na volatilnost prinosa na sopstveni kapital. Kao mjera volatilnosti prinosa na sopstveni kapital koristi se koeficijent varijacije ROE. U istraživanju se koristi panel podataka. Međutim, pošto je za zavisnu varijablu odabran koeficijent varijacije prinosa na sopstveni

variation of ROE. Namely, these authors used a sample of 108 international banks from 14 developed countries for the period 2000-2011. Their first conclusion is that diversification has a positive and growing effect on ROE up to the diversification level of about 50%, while higher levels of diversification reduce profitability. Since ROE is not a profitability measure compliant with risk, the authors also measure how the diversification of revenues affects volatility of ROE. For this purpose, they used the cross-sectional regression for the coefficient of variation of ROE. They concluded that diversification has a positive and increasing impact on ROE volatility up to a level of roughly 70%.

In order to study the impact of income diversification on the banks' risk, Zhou (2014) analyzed a sample of 62 Chinese banks for the period 1997-2002. The author used standard deviation of return on assets as a measure of risk, while the share of non-interest revenue in total revenues was the measure of income diversification. It was concluded that income diversification does not lead to a significant reduction in the banks' risk. The author explained that non-interest income brings additional risks and that the correlation between interest and non-interest income weakens the effects of diversification.

Data and Research Metodology

The established hypothesis claims that there is a positive relationship between the share of non-interest income in the total income of a bank and the volatility of its profitability. This way it can be indirectly determined whether the involvement of commercial banks in investment banking business leads to the manifestation of diversification benefits, or whether this way the banks increase their risk. In order to test the hypothesis, we used the linear regression model that measures the impact of non-interest income share in total income on the volatility of the banks' profitability. To test this link we used the econometric method - i.e. the least squares method. In order to evaluate the linear regression model, we resorted to the econometric and statistical software tool EViews version 7.

The empirical research was conducted on a sample of 20 banks: Citigroup, Wells Fargo, JP Morgan Chase, Bank of America, Credit Suisse, ING Bank, Morgan Steanly, Standard Chartered, Santander, Unicredit Group, Group Credit Agricole, HSBC, BNP Paribas, Barclays, Deutsche Bank, Societe Generale, State Street, Bank of NY Mellon and Goldman Sachs. Each of the mentioned banks was on the List of Global Systemically Important Banks published by the Financial Stability Board in 2014. The analysis uses the panel data collected from the annual financial reports of selected banks for the period 2005-2014. The planned sample period was 15 years, but the lack of data for some of banks is the reason why the monitoring period is shortened to 10 years. This time frame has been selected in order to include the years of the crisis, when the banks demonstrated their greatest weaknesses. The available data were collected for each bank separately and were taken over from the annual financial reports that the banks submit to their shareholders before the Annual Shareholders' Meeting.

The sample consists only of systemically important banks, due to the strong impact they can have on the stability of the whole system and economy. Several authors who studied this topic opted for a similar sample of banks, relying on the list of the Financial Stability Board. Masciantonio and Tiseno (2013) suggest that these banks experienced more radical changes than the small banks and were large enough to compete in a growing, global and integrated financial system. At the same time, these banks had the appropriate structure to react quickly to regulatory changes and financial innovations and to compete with the banks with different business models.

One of the most frequently used indicators of the banks' performance is return on equity (ROE). Since ROE is not a risk-adjusted measure of profitability, this paper analyses the impact of income diversification on volatility of ROE. The coefficient of variation of ROE was used as a measure of volatility of ROE. The survey uses panel data. Since the coefficient of variation of ROE has been chosen for a dependent variable, there is only one coefficient of variation for each bank in the period. Namely, for each of the twenty selected banks from the sample,

kapital, postoji samo jedan koeficijent varijacije za svaku banku u periodu. Naime, za svaku od dvadeset odabranih banaka koje čine uzorak je izračunat odnos standardne devijacije njene profitabilnosti (mjerene prinosom na sopstveni kapital) i aritmetičke sredine, u periodu od 2005-2014. Dobijeni količnik, koeficijent varijacije ROE (CV_ROE), je zavisna varijabla u modelu. Nezavisna varijabla je racio diversifikacije (RD), mjenen kao prosječno učešće nekamatnog prihoda u ukupnim prihodima banke za dati period. Osim racija diversifikacije, uvedene su i tri kontrolne varijable: prosječan racio primarnog kapitala koji mjeri odnos kapitala i rizikom ponderisane aktive (TIER), koeficijent varijacije zarade po akciji za dati period (CV_EPS) i koeficijent varijacije profita prije poreza za dati period (CV_BD).

Inicijalno definisan model se na samom početku suočio sa ograničenjem. Naime, koeficijent varijacije kao mjera nije normalnog rasporeda, već je asimetričan na desnu stranu. Samim tim nije bila ispunjena pretpostavka normalnosti zavisne varijable niti se mogao primjeniti metod najmanjih kvadrata za ocjenu ovog modela. To se može uočiti iz grafika 1, ali i odgovarajuće *Jarque-Bera* test statistike i njene pripadajuće vjerovatnoće.

Kako bi postigla normalnost reziduala koja je pretpostavka primjene klasičnog linearnog regresionog modela, izvršena je logaritamska transformacija koeficijenta varijacije prinosa na sopstveni kapital, nakon čega raspored, *Jarque-Bera* statistika i njena pripadajuća vjerovatnoća izgledaju kao na grafiku 2.

Grafik 2: Histogram logaritamske transformacije prinosa na sopstveni kapital

Izvor: Kalkulacija autora uz pomoć softverskog alata EViews

Kao što se vidi sa grafika 2, logaritamskom transformacijom postignuto je da varijabla prati normalan raspored kako bi se ispunio neophodan uslov za primjenu linearne regresije. Po istom principu je izvršena logaritamska transformacija kontrolnih varijabli, koeficijenta varijacije zarade po akciji i koeficijenta varijacije profita prije odbitka poreza. Pregled varijabli korišćenih u istraživanju prikazan je u Tabeli 1.

Grafik 1: Histogram koeficijenta varijacije prinosa na sopstveni kapital

Izvor: Kalkulacija autora uz pomoć softverskog alata EViews

we calculated the ratio of standard deviation of its profitability (measured by ROE) and the arithmetic mean, for the period 2005-2014. The resulting coefficient of variation of ROE (CV_ROE) is the dependent variable in the model. The independent variable is the diversification ratio (RD), measured as the average share of non-interest income in total bank income for the chosen period. In addition to the diversification ratio, three control variables have been introduced: the average Tier 1 capital ratio which measures the banks' core equity capital to its total risk-weighted assets (TIER), the coefficient of variation of earnings per share for the chosen period (CV_EPS) and the coefficient of variation of profit before tax for the chosen period (CV_BD).

The initially defined model was confronted with a certain limitation at the very beginning. Namely, the coefficient of variation as a measure does not have a normal distribution, instead being skewed right. Consequently, the assumption of the normality of the dependent variable was not fulfilled, nor was it possible to apply the least squares method for the purpose of this model's evaluation. This can be seen from Chart 1, but also from Jarque-Bera test statistics.

In order to achieve the normality of the residuals, which is the assumption for the use of the classical linear regression model, we conducted a logarithmic transformation of coefficient of variation of ROE, followed by the distribution and Jacques-Bera statistics, as presented in Chart 2.

As can be seen from Chart 2, the logarithmic transformation resulted in the normal distribution of the variable, with a view to meeting the required precondition for the application of linear regression. According to the same principle, we calculated the logarithmic transformation of the control variables, the coefficient of variation of earnings per share and the coefficient of variation of the profit before the tax. An overview of the variables used in the research is shown in Table 1.

Tabela 1: Pregled varijabli korišćenih u istraživanju

Vrsta varijable	Oznaka varijable	Naziv i značenje varijable
Zavisna varijabla	log(CV_ROE)	Logaritamska transformacija koeficijenta varijacije prinosa na sopstveni kapital. Prinos na sopstveni kapital mjeri odnos neto prihoda i ukupnog sopstvenog kapitala banke na kraju izvještajnog perioda.
Nezavisna varijabla	RD	Racio diversifikacije, koji mjeri prosječno učešće nekamatnog prihoda u ukupnim prihodima banke za dati period.
Kontrolne varijable	TIER	Racio primarnog kapitala, koji mjeri prosječan odnos kapitala i rizikom ponderisane aktive za dati period.
	log(CV_EPS)	Logaritamska transformacija koeficijenta varijacije zarade po akciji za dati period. Zarada po akciji mjeri odnos neto dobiti i ukupnog broja emitovanih akcija.
	log(CV_BD)	Logaritamska transformacija koeficijenta varijacije bruto dobiti za dati period. Bruto dobit mjeri profit banke prije poreza na kraju izvještajnog perioda.

Izvor: Formulacija autora

Regresiona analiza

Nakon izvršenih logaritamskih transformacija testiranje hipoteze je sprovedeno primjenom metode najmanjih kvadrata za ocjenjivanje sljedećeg modela:

$$\text{Log(CV_ROE)} = c + \text{RD} + \text{TIER} + \text{log(CV_EPS)} + \text{log(CV_BD)}$$

Rezultati regresije predstavljeni su u Tabeli 2.

Svi parametri izuzev TIER (proječan racio primarnog kapitala) su pozitivno korelisani sa zavisnom varijablom, što je u skladu sa zahtjevima ekonomske teorije. Racio primarnog kapitala je negativno korelisani. To se objašnjava činjenicom da što je banka bolje kapitalizovana, veća je i averzija menadžera pema riziku, pa se može očekivati i manji koeficijent varijacije prinosa na sopstveni kapital. Svaki od parametara je statistički značajan, pri čemu je

varijabla RD značajna na nivou značajnosti od 10%, log(CV_BD) na nivou značajnosti od 5%, a ostali na nivou značajnosti od 1%. S obzirom na to da je model rađen sa malim brojem podataka, kao i to da jedna varijabla samo neznatno prelazi nivo značajnosti od 5% (RD), testovi će se raditi sa nivom značajnosti od 5%.

Primjenom F testa utvrđeno je da je ocijenjeni model statistički značajan. Regresija je visoko značajna, jer parametri korišćeni u modelu objašnjavaju čak 87%

Tabela 2: Rezultati regresije

Metod Najmanjih kvadrata					
Uzorak: 20 opservacija					
Zavisna varijabla: log(CV_ROE)					
Varijable	Koeficijent (parametar)	Standardna greška	t-statistika	Vjerovatnoća	
C	1.890.887	0.504711	3.746.471	0.0019	*
RD	0.010899	0.005172	2.107.368	0.0523	***
TIER	-0.151361	0.046315	-3.268.099	0.0052	*
log(CV_EPS)	0.610660	0.128936	4.736.159	0.0003	*
log (CV_BD)	0.197510	0.076825	2.570.910	0.0213	**
	Koeficijent determinacije		0.874533		
	Prilagođeni koeficijent determinacije		0.841075		
	F-statistika		2.613.831		
	Vjerovatnoća (F-statistike)		0.000001		
Nivo značajnosti: ***p<0,01 **p<0,05 *p<0,1					

Izvor: Kalkulacija autora uz pomoć softverskog alata EViews

Table 1: Overview of variables

Type of variable	Label of variable	The name and the meaning of variable
Dependent variable	log(CV_ROE)	Logarithmic transformation of coefficient of variation of return on equity. Return on equity measures the ratio of net income to shareholders equity at the end of the reporting period.
Independent variable	RD	The diversification rate, which measures the average share of non-interest income in the bank's total income.
Control variables	TIER	Tier 1 capital ratio which measures the bank's core equity capital to its total risk-weighted assets.
	log(CV_EPS)	Logarithmic transformation of the coefficient of variation of earnings per share.
	log(CV_BD)	Logarithmic transformation of the coefficient of variation of profit before tax.

Source: Author's formulation

Regression Analysis

The hypothesis testing was carried out using the least squares method for evaluating the following model:

$$\text{Log(CV_ROE)} = c + \text{RD} + \text{TIER} + \text{log(CV_EPS)} + \text{log (CV_BD)}$$

The results of the regression analysis are presented in Table 2.

Table 2: Results of regression analysis

Method: Least Squares					
Sample: 20					
Dependent variable: log(CV_ROE)					
Variable	Coefficient	Std. Error	t-Statistic	Prob.	
C	1.890.887	0.504711	3.746.471	0.0019	*
RD	0.010899	0.005172	2.107.368	0.0523	***
TIER	-0.151361	0.046315	-3.268.099	0.0052	*
log(CV_EPS)	0.610660	0.128936	4.736.159	0.0003	*
log (CV_BD)	0.197510	0.076825	2.570.910	0.0213	**
R-squared			0.874533		
Adjusted R-squared			0.841075		
F-statistic			2.613.831		
Prob (F-statistic)			0.000001		
Significance level: ***p<0,01 **p<0,05 *p<0,1					

Source: Author's calculation using software package EViews

All parameters except TIER are positively correlated with the dependent variable, which is in line with the requirements of economic

theory. TIER is negatively correlated. This is explained by the fact that the better the bank is capitalized, the greater is the managers' aversion to risk, hence a lower coefficient of variation of ROE can be expected. Each parameter is statistically significant, with the RD variable being statistically significant at the significance level of 10%, log (CV_BD) at the significance level of 5%, and other variables at the significance level of 1%. Bearing in mind that the model is made on a small sample, and that one variable only slightly exceeds the level of significance of 5% (RD), the tests were done at the significance level of 5%.

Using the F test, it was proven that the model is statistically significant. Regression is highly significant because the parameters used in the model explain 87% of the variations of the dependent variable. In order to examine the quality of the model, several tests were conducted. Using Durbin-Watson and Breusch-Godfrey serial correlation test, we concluded that there is no autocorrelation in the model. By applying the White test, we concluded that the variance of random error is constant across the observations. The same conclusion can be obtained by looking at Chart 3.

varijacija zavisne varijable. Kako bi se provjerio kvalitet modela, sprovedeno je nekoliko testova. Primjenom *Durbin-Watson* i *Breusch-Godfrey* testiranja serijske korelacije zaključeno je da u modelu ne postoji autokorelacija. Primjenom *Whit* testa je zaključeno da u modelu ne postoji zavisnost između varijanse slučajne greške i objašnjavajuće promjenjive. Do istog zaključka se može doći posmatranjem grafika 3.

Grafik 3: Dijagnoza regresionog modela

Izvor: Kalkulacija autora uz pomoć softverskog alata EViews

Kako bi se testirala normalnost reziduala sprovedeni su dodatni testovi. *Jarque-Bera* statistika i njena pripadajuća vjerovatnoća ukazuju da je testirana distribucija normalna. Grafik 4 prikazuje histogram slučajnih grešaka kao i najvažnije statističke podatke o greškama. Posljednji sproveden test jeste test multikolinearnosti. Faktori inflacije varijanse prikazani su u tabeli 3.

Grafik 4: Histogram slučajnih grešaka

Izvor: Kalkulacija autora uz pomoć softverskog alata EViews

Tabela 3: Faktori inflacije varijanse

Varijabla	VIF
C	NA
RD	1.938953
TIER	1.957790
log(CV_EPS)	2.294270
log (CV_BD)	2.246711

Izvor: Kalkulacija autora

Nakon sprovedenog testa multikolonearnosti utvrđeno je da je vrijednost fakotra inflacije varijanse (VIF) za sve koeficijente ispod granične vrijednosti 5. Na ovaj način je dokazano da nezavisne varijable nisu međusobno perfektno ili značajno korelisane.

Analiza rezultata istraživanja:
zaključak

Rezultati regresije su pokazali da ratio diversifikacije pozitivno utiče na koeficijent varijacije prinosa na sopstveni kapital. Ocijenjeni koeficijent koji stoji uz nezavisnu varijablu iznosi 0,010899. To zapravo ukazuje da, ukoliko bi se ratio diversifikacije povećao za 1% (to jest kad bi banka povećala učešće nekamatnih u ukupnim prihodima za jedan procenat), logaritamska jedinica koeficijenta varijacije prinosa na sopstveni kapital bi se povećala za 0,010899%. Već je objašnjeno da koeficijent varijacije kao mjera nije normalnog rasporeda, već je asimetričan na desnu stranu. Stoga je izvršena

Chart 3: Regression model diagnostics

Source: Author's calculation using software package EViews

In order to test residual normality, we conducted some additional tests. Jacques-Bera statistics indicated that distribution is normal. Chart 4 presents the histogram of random errors as well as the most important statistical data related to the errors.

After the multicollinearity test has been conducted, it was established that the value of the variance inflation factor (VIF) for all coefficients was below the limit value 5. Thereby, it was proven that the independent variables are not perfectly or significantly correlated with each other.

Analysis of Research Results:
Conclusion

The regression results showed that the diversification ratio has a positive impact on the coefficient of variation of ROE. The estimated coefficient of the independent variable is 0.010899. This actually indicates that, if the diversification ratio increases by 1% (i.e. if the bank increases the share of non-interest income in total revenues by one percent), the logarithmic coefficient of

Chart 4: Random errors histogram

Source: Author's calculation using software package EViews

The final test was the multicollinearity test. The variance inflation factors were presented in Table 3.

Table 3: Variance inflation factors

Variable	VIF
C	NA
RD	1.938953
TIER	1.957790
log(CV_EPS)	2.294270
log (CV_BD)	2.246711

Source: Author's calculation using software package EViews

variation of ROE will increase by 0.010899%. It has already been explained that the coefficient of variation as a measure does not have a normal distribution, instead being skewed right. Therefore, we conducted the logarithmic transformation of the coefficient of variation of ROE. Consequently, the interpretation of this model is more complicated (it can be said that there is a trade-off between the complexity of the model and the easiness of the coefficients' interpretation). Namely, for each individual value of the coefficient of variation of ROE it

logaritamska transformacija koeficijenta varijacije prinosa na sopstveni kapital. To za posljedicu ima otežanu interpretaciju modela (može se reći da postoji *trade off* između složenosti modela i lakoće interpretacije koeficijenata). Naime, za svaku pojedinačnu vrijednost koeficijenta varijacije prinosa na sopstveni kapital, moguće je izračunati procenat njenog povećanja u slučaju kada se logaritam te vrijednosti poveća za 0,010899% (to jest u slučaju rasta racija diversifikacije za 1%).

Znak dobijenog koeficijenta je u skladu sa rezultatima do kojih su došli i neki drugi, već navedeni autori. Drugim riječima, znak koeficijenta ukazuje da postoji pozitivan odnos između učešća nekamatnog prihoda u ukupnim prihodima banke i volatilnosti njene profitabilnosti. Zaključuje se da uključivanje komercijalnih banaka u poslove investicionog bankarstva ne dovodi do ispoljavanja benefita diversifikacije, već naprotiv, da se na taj način povećava njihov rizik. Time je prihvaćena hipoteza rada koja tvrdi da postoji pozitivan odnos između učešća nekamatnog prihoda u ukupnim prihodima banke i volatilnosti njene profitabilnosti.

Potrebno je ukazati i na određena ograničenja ovog istraživanja. Prvo ograničenje je veličina uzorka. Iako se banke prate u periodu od 2005-2014, uzorak se sastoji od 20 banaka, pa je stoga uticaj koji jedna opservacija može imati na uzorak velika. Drugo ograničenje ogleda se u tome što različite banke obuhvaćene uzorkom objavljuju izvještaje u različitim valutama (EUR, USD, GBP i CHF). Kako bi se prevazišao taj problem, u radu su korišćene isključivo relativne veličine. Treće ograničenje se ogleda u činjenici da koeficijent varijacije kao mjera nije normalnog rasporeda, već je asimetričan na desnu stranu. Stoga je izvršena njena logaritamska transformacija. Međutim, ovo može ukazivati na to da postoji i nelinearna veza između nezavisne i zavisne varijable.

Činjenica da su se banke počele uključivati u širok spektar različitih aktivnosti nudeći kompleksne proizvode i usluge uticala je na slabljenje tržišne discipline. Snažna umreženost investicionih i komercijalnih banaka po mnogim mišljenima jedan je od glavnih razloga masovnih gubitaka banaka koje su morali pokriti poreski obveznici. Mnoge banke, koristeći situaciju neadekvatne regulacije, novih proizvoda, tržišta i mogućnosti da djeluju na globalnom nivou, su tokom krize uživale podršku poreskih obveznika samo zato što su bile suviše velike da bi propale. Kada su u pitanju velike, kompleksne, univerzalne banke, koje kombinuju usluge komercijalnog, investicionog bankarstva i osiguranja u okviru jednog entiteta, problem postaje još veći.

Nakon krize se u akademskoj i stručnoj javnosti javio veliki broj pristalica uvođenja novog zakona koji bi odvojio aktivnosti komercijalnih i investicionih banaka, poput Glas-Stigelovog zakona (*Glass-Steagall Act*). Do ovih inicijativa dolazi ne samo u Sjedinjenim Američkim Državama, već i u Evropi, gdje je model univerzalnog bankarstva oduvijek bio dominantan. To ukazuje na negativan stav javnosti prema univerzalnom bankarstvu uopšte, onakvom kakvo je stvoreno i evoluiralo u prethodnim godinama. Nove predložene i usvojene mjere imaju za cilj da omoguće snažniju regulaciju finansijskog sektora. Imajući u vidu da je i prije krize bankarstvo bila najregulisanija industrija na svijetu, može se zaključiti da je kriza veliki regulatorni neuspjeh koji se ne ogleda u deregulaciji, već u neadekvatnoj regulaciji. Izbor između specijalizovanog i univerzalnog bankarstva nije jednostavan kao što na prvi pogled djeluje: univerzalno bankarstvo podrazumijeva kompleksnu mrežu odnosa, te nije uvijek lako utvrditi da li je ono najpogodniji model organizacije za jednu banku.

is possible to calculate the percentage of its increase in the case when the logarithm of that value increases by 0.010899% (i.e. in the scenario when diversification ratio increases by 1%).

The sign of the calculated coefficient is in line with the results obtained by some other, already mentioned authors. The sign of the coefficient indicates that there is a positive correlation between the share of non-interest income in the bank's total income and the volatility of its profitability. It is concluded that the engagement of commercial banks in investment banking does not lead to diversification benefits, but on the contrary, that the banks are thereby increasing their risks. Therefore, the hypothesis that claims that there is a positive connection between the share of non-interest income in the bank's total income and the volatility of its profitability is accepted.

It is important to underline certain limitations of this research. The first limitation is the sample size. Although the banks are monitored in the period from 2005 to 2014, the sample consists of 20 banks, and, therefore, the impact that one observation can have on the sample is high. The second limitation is the fact that the banks from the sample prepared their annual financial statements in different currencies (EUR, USD, GBP and CHF). In order to overcome this problem, only the relative measures were used in the paper. The third limitation is reflected in the fact that the coefficient of variation does not have normal distribution, instead being skewed right. Therefore, we conducted its logarithmic transformation. However, this may indicate that there is a non-linear correlation between an independent and a dependent variable.

The banks began to engage in a wide range of different activities by offering complex products

and services. That weakened the market discipline. The strong and multiple connection between investment and commercial banks is one of the main reasons for the massive losses of banks that the taxpayers have had to cover. Many banks, using the situation of inadequate regulation, new products, new markets and opportunities for operating globally, enjoyed the support of taxpayers during the crisis only because they were too big to fail. When it comes to the large, complex, universal banks, which combine the services of commercial banking, investment banking and insurance within a single entity, the problem becomes even more prominent.

After the crisis there has been a large number of advocates for the introduction of a new law that would separate the activities of commercial and investment banks, such as the Glass-Steagall Act. Such initiatives have been launched not only in the United States, but also in Europe, where the universal banking model has always been dominant. This points out to the generally negative public opinion regarding universal banking. The new proposed and adopted measures aim to provide the stronger regulation of the financial sector. Bearing in mind that even before the crisis banking was the most regulated activity in the world, it can be concluded that the crisis is a regulatory failure which is not reflected in deregulation, but in inadequate regulation. The choice between specialized and universal banking is not as simple as it seems at the first glance: universal banking implies a complex network of relationships, and it is not always easy to determine whether it is the most suitable model for the organization of a single bank.

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