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Comparative analysis of efficiency performance in different banking systems in the post financial crisis period - the case of Germany and Ukraine

Analisi comparativa delle performance di efficienza in diversi sistemi bancari nel periodo post crisi finanziaria - il caso di Germania e Ucraina

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ABSTRACT

In the globalized world, it is interesting to compare how different banking systems are efficient after such big macroeconomic catastrophe as the Great Recession in 2008-2009. In my thesis, I compare the banking efficiency evolution after the 2008-2009 financial crisis of two banks from different countries, representatives of their national banking systems. PrivatBank was chosen to reflect the Ukrainian banking system, while Deutsche Bank – as the one representing German banking system.

The aim of the thesis is to compare the banking efficiency between a bank representing a developed economy (Deutsche Bank) and another bank activating in the framework of a transition economy (PrivatBank), by employing the ratio analysis methodology.

Time span of the given research covers the period from 2009 to 2020 and the performance indicators are calculated and analyzed quarterly. The data were retrieved from the financial statements of each bank, and it comprised the required data to calculate ROA, ROE, ROD, NIM, OIA, AT, CTD and CTA ratios, which I choose to illustrate the overall banking efficiency.

The results indicate that despite of higher average values of all indicators in case of the Ukrainian bank, the transition banking system is inclined to instability,

whereas the German banking, whose results were not so outstanding, keep low but stable results of analyzed indicators.

SINTESI

Nel mondo globalizzato, è interessante confrontare quanto efficienti siano i diversi sistemi bancari dopo una grande catastrofe macroeconomica, come la Grande Recessione del 2008-2009. Nella mia tesi, ho deciso di confrontare l'evoluzione dell'efficienza bancaria dopo la crisi finanziaria del 2008-2009 di due banche di differenti paesi, rappresentativi dei loro sistemi bancari nazionali dopo la suddetta crisi. PrivatBank è stata scelta per rappresentare il sistema bancario ucraino, mentre Deutsche Bank, come rappresentante del sistema bancario tedesco. L'obiettivo era quello di confrontare l'efficienza bancaria, grazie agli indicatori di performance, della banca di un'economia sviluppata (Deutsche Bank) con quella di un'economia di transizione (PrivatBank), utilizzando la metodologia dell'analisi del rapporto.

L'arco temporale della ricerca copre il periodo dal 2009 al 2020 e gli indicatori di performance sono calcolati e analizzati trimestralmente. I dati sono stati recuperati dai rendiconti finanziari di ciascuna banca e comprendevano i dati necessari per calcolare i rapporti ROA, ROE, ROD, NIM, OIA, AT, CTD e CTA, che ho scelto per illustrare l'efficienza bancaria complessiva.

I risultati hanno indicato che, nonostante i valori medi più elevati di tutti gli indicatori nel caso della banca ucraina, il sistema bancario in transizione è incline

all'instabilità, mentre il sistema bancario tedesco, i cui risultati non sono stati così eccezionali, presenta valori degli indicatori analizzati bassi ma stabili nel tempo

INTRODUCTION

Despite of the fact, that nowadays all economies function in highly globalized world, there are still banking systems characterized by specific ways of performing business activities. This leads to quite diversified results, even if the final general goal to reach maximum level of efficiency in all performed fields are nearly the same among market economies. It is also logical to consider that different types of applied policies, micro- and macroeconomic conditions are other main reasons of severely distinguishing results in each of the financial systems. Therefore, I find it largely appealing to compare representatives of different banking frameworks, which should, at the first sight, obey the same market mechanisms, but in practice they give varied output results.

The above-mentioned diversification in policies used and economic conditions is undoubtedly due to specific historical background of the separate banking systems. Most of the economies which started to apply rules and policies of market nature not so long ago are still in process of system transformation and catching up with the “traditional” players. That is why it is possible to observe mentioned before distinguished results of business activities cross the systems. And, more important, that is why such enormous

and global process of exogenous character as the financial crisis (2007-2009) impacted on different banking systems' evolution not in the same way.

In my research, to perform comparative analysis, I used the most representative bank of two different banking systems, from the point of view of total assets criterion. One of them represents solidly "traditional" banking system (German bank - Deutsche Bank) and another one – the banking system from a developing market economy – Ukrainian bank PrivatBank. Thereby, my objective is to compare the efficiency performance of both banking systems' representatives during the period after global financial crisis. As for the developing market representative, I chose Ukrainian banking system due to its former existence as a part of Soviet command economy and the poor amount of research performed in the field of this country's financial system.

To perform this task, I calculated main profitability, liquidity and efficiency indicators using financial statements' data from both banks, to compare the indicators' evolution from the perspective of each from the analyzed cases. This helped to obtain the picture of both banking performances during the analyzed period of time representing 2009-2020.

The scope of this research is to learn what are the efficiency performance of both banks and what ratios' components influence this performance in both cases at most.

As for the limitation of my research, I have to list a certain number of aspects. The period from 2009 till 2020 included, was chosen due to two reasons – the main interest of this research in analyzing exactly post-crisis time span, and the problem of gathering data on earlier period in case of Ukraine, as the financial statements of Ukrainian banks conforming international standards have been started to be published since 2008.

The applied indicators were chosen according to the combination of their importance in measuring banking performance and availability of data used in calculations of the above-mentioned indicators.

The given research is organized as follow. After the introduction, the first chapter represents the literature review on banking efficiency, chapter 2 is aimed to describe the main and frequently used methods analyzing efficiency performance in banking, the third chapter covers banking evolution in Germany and Ukraine and it includes a description of historical background for each of the analyzed banking systems before and after the financial crisis, as well the evolution of banking structure during the observed period for both systems. The fourth chapter of my research contains empirical analysis of above-mentioned representatives from both banking systems. This chapter consists of two subsections. In the first one, the data used in the analysis are explained. The next subsection includes indicators' analysis for both banks during the observed period. As the last part of the thesis, I have the conclusion

summing up the analysis made before, and generated ideas derived from the performed research.

CHAPTER 1 BANKING EFFICIENCY IN THE FINANCIAL LITERATURE

As the core of my work methodology, the article “Islamic financial system and conventional banking: A comparison” by A. Salman and H. Nawaz, published, in the *Arab Economic and Business Journal*, was used. The aim of the research was to learn the difference between the two types of banking - which are Islamic and conventional banking systems - due to efficiency, profitability, and liquidity. Meezan Bank Pakistan and Bank Islami, two big Islamic banks, were analyzed in the study to be compared with Standard Chartered Bank Pakistan and MCB Bank, two large commercial banks of Pakistan. This comparison was done in terms of performance during the years 2013–2017. The financial statements of the above-mentioned banks were used to collect the data. The official websites of the banks served as the sources, which most of the statements were taken from. As for the methodology, in order to determine the characteristics of studied entities the ratio analysis and one sample t-test were used, and to estimate the difference in terms of significant factors that influence customer trust of Islamic banks and commercial banks, authors applied regression analysis. The results of the study opposing many previous findings, showed that the significant difference between both banking systems for the variables under study exists. To addition, during the

observed period (2013–2017) impact of return on asset is stronger on customer trust for the Islamic banking comparing to the conventional one.

Regarding the newest research in the field of banking efficiency, we should mention “The impact of resource curse on banking efficiency: Evidence from twelve oil producing countries” by M. Umar, X. Ji, N. Mirza, B. Rahat, published in the Resources Policy. The researchers aimed to estimate the resource curse influence on the banking sector’s efficiency of the countries depending significantly on oil production. The data contained sample spans from first quarter of 2001 till fourth quarter of 2019. It included commercial banks of twelve countries, which produce oil with an oil rent (% of the GDP) equal to twenty percent or higher. As the methodology, regression model analysis was used. The results of this research showed that during periods of the price boom, there is a decrease of banking efficiency, credit infection becomes worse, and the default probability would rise. These findings corroborated the resources curse presence and confirmed the reasons of why countries relying on natural resources excessively have a propensity to develop financially of lower level.

The next valuable research of our analyzed field is “Does fintech innovation improve bank efficiency? Evidence from China’s banking industry” by C. Lee, X. Li, C. Yu, J. Zhao, also published, but in the International Review of Economics and Finance. This article was aimed to examine whether the financial technology (fintech) industry’s development has an effect on the technologies applied and

cost efficiency in the banking industry of China during the period from 2003 till 2017. All banking accounting data from the Bank Focus database of BVD-IBCA were used as the source for the analysis. 12 JSCBs , 69 CCBs, and 5 SOCBs with 590 firm-annual observations over a 15-year period from 2003 to 2017 were the core of sample. Stochastic Frontier Analysis Model was applied as the method of given research. The results demonstrated that the lowest cost efficiency is prevailing in state-owned commercial banks, that use inferior technology in their banking activities. Moreover, considering the impact of fintech development, the role of fintech innovations, apart from the improvement of cost efficiency in banks, is also to strengthen the already used banking technologies. The significance of this beneficial effect of double nature is even higher in case of service innovations in the field of market support.

Other interesting research of banking efficiency in the Asian countries is “Does bond market development enhance the banking sector’s efficiency in resource allocation? Industry-level evidence from Korea” by D. Park, K. Shin, S. Tian, published in the North American Journal of Economics and Finance. The aim of this research was to find out whether the development of bond market improves the resource allocation efficiency of the Korean bank lending. The sample period is from 2002 till 2016. Annual data on the bank loans, outstanding at the industry level bonds were gathered from the Korea Productivity Center (KPC), the Korea Fund Ratings, and the Bank of Korea (BOK). Regression model analysis was

used. It was found that bond financing in resources' allocation across industries is more efficient than bank loans. Moreover, particular inefficiency of banks is being observed in resource allocation in industries relying more on bond financing. Deriving from this, the suggestion arose that the allocative efficiency of bank loans is not improved by competition from bond financing.

The next banking efficiency research, which is worth to be mentioned, is "Banking reforms and bank efficiency: Evidence for the collapse of Spanish savings banks" by A. Blanco-Oliver, published in the International Review of Economics and Finance. Authors analyzed the influence of the reform in banking system, which was implemented through the banking consolidation (mergers and acquisitions) done in Spain to deal with the savings banks' collapse. Eighteen lending organizations of Spain with the 216 observations during a twelve-year period (2005-2016) composed the sample of given research. The Spanish Banking Association of Private Banks (AEB), Spanish Confederation of Savings Banks (CECA), World Bank databases were used as data sources. A two-stage analysis was performed. Firstly, the DEA method was applied to estimate the efficiency scores. Secondly, a set of regressions with the dependent variable containing the efficiency scores obtained in the previous DEA model, was run by authors in order to assess influence of the Spanish financial reforms on the banking system's efficiency. Findings showed that in the period of global financial crisis, from the bank efficiency and bank solvency perspectives, these reforms impacted on the

banking performance positively. As the result, the unviable banks were driven out by the reform via M&A, which validated the fact of such alternative's feasibility minimizing the government interventions' negative effects on the Spanish financial system.

The impact of microfinance institutions on banking efficiency was explored in "Finance-growth nexus and banking efficiency: The impact of microfinance institutions" by A. Abrar, I. Hasan, R. Kabir, published in the Journal of Economics and Business. The research aim was to estimate the microfinance institutions' (MFIs) relative importance at the levels of micro (efficiency of traditional commercial banks) and macro (economic growth, poverty, financial development, and income inequality). Different microfinance institutions such as banks, cooperatives, village banks, credit unions, non-governmental organizations, and non-banking financial institutions from 35 countries of East Asia, Eastern Europe, Central Asia, Latin America, Caribbean, Africa and South Asia composed the sample to be analyzed during the period of 2001− 2014. The Mix Market was the source on the MFIs data and Bankscope datasets were the source of commercial bank data. Authors used regression model analysis as the main method. The results showed that credit allocation (loans to private sector) and overall savings (total bank deposits) in the economy were increased by the involvement of MFIs. Income inequality and poverty were reduced by the enhanced economic welfare due to MFIs' participation. Furthermore, the higher

efficiency of the traditional commercial banks was triggered by intensive competition, which was the result of the presence of MFIs'.

Regarding the combination of DEA and SFA methods, there is the research "Dynamic network DEA and SFA models for accounting and financial indicators with an analysis of super-efficiency in stochastic frontiers: An efficiency comparison in OECD banking" by P. Wanke, M. G. Tsionas, Z. Chen, J. J. Moreira Antunes, published in the International Review of Economics and Finance. This research was aimed to investigate the business-related and socio-economic variables' influence on different financial and accounting indicators of OECD banking sector, taking into account the OECD countries' barriers of underlying regulatory and cultural character. An estimation of 124 OECD banks in the period of 2004–2013 was applied. To deal with the basal relationships among major financial and accounting indicators, authors developed the combination method - DEA and SFA Dynamic Network Super-efficiency models. The understandings regarding the dichotomy between DEA and SFA adequacy were corroborated by the final results. While it would be appropriate to use DEA in the managerial decision-making in the banking industry, SFA is more business or country oriented. Therefore, it was revealed that the socio-economic and business-related variables interact in the different ways with the results obtained from the proposed models.

As for the research in the field of banking efficiency's assessing in the post-crisis period, it is worth to mention "Assessing banking sectors' efficiency of financially troubled Eurozone countries" by A. G. Christopoulosa, I. G. Dokasb, S. Katsimardoub, E. Spyromitros, from the Research in International Business and Finance published. The aim of this research was to estimate the relative banking efficiency of the so called PIIGS countries: Portugal, Ireland, Italy, Greece, and Spain - during the period after the outbreak of the financial crisis. The accounting figures from financial statements of commercial banks from Ireland, Portugal, Spain, Italy, Greece, and macroeconomic variables are core parts of the data under assessment covering the period 2009-2015. Bloomberg was the source of annual financial data and the IMF's World Economic Outlook Database served to gather annual data on GDP growth, inflation, and General Government Debt to GDP ratio. The methodological approach consists of three-steps analysis. In the first step, the DEA usage established a classification grouping of the banks of PIIGS. Authors based this grouping on accounting figures, making emphasis on revenues. Also, they adopted the CCR (output oriented) version of DEA. The bootstrap methodology was applied making possible to assess bias-fixed DEA efficiency results, in order to consider the sensitivity of efficiency measures. In the second step, authors applied Malmquist Productivity Index (MPI) to evaluate the change of total factor productivity in the framework of revenue efficiency. Finally, researchers made implementation of a truncated regression, where the bootstrap

results put in the position of dependent variable to estimate the effect of macroeconomic and financial factors on the efficiency level of banking. In most of the examined banks, results showed the statistical evidence of a high inefficiency level.

Regarding the estimation of banking efficiency in MENA sector, there is “Market structure, performance, and efficiency: Evidence from the MENA banking sector” by L. Gonzalez, A. Razia, M. V. Búa, R. Sestayo, published in the International Review of Economics and Finance. In this research, authors wanted to assess the market structure, efficiency, and profitability relationships in banking. Data for 201 banks in Middle East and North Africa (MENA) countries were formed in the dynamic panel covering the 2005–2012 period. SFA was used as the method of given research. The result of this research demonstrated that the financial sector's performance can be reached under efficient and competitive conditions with no high levels of concentration. It was also confirmed that the relative market power hypothesis, which suggests that banks getting higher profits with higher market share obtain this via setting prices of higher level. Furthermore, it was found that a significant effect of cost efficiency on banking profitability exists, but also highly concentrated markets with less profitable and inefficient banks are in presence, which affects the competitiveness of the banking system in a negative way.

There is also another research on banking efficiency in MENA, which is “How far away is the MENA banking system? Efficiency comparisons with international banks” by M. Chaffaia, P. Coccorese, published in the North American Journal of Economics and Finance. The aim was to compare a big group of international banking systems’ efficiency with the MENA banks’ efficiency. The data consists of an unbalanced sample that includes 52 countries covering the period 2000–2012, both revenue and cost efficiency were compared. SFA method was used to perform given research. It was not found any improvement of the MENA banking inefficiency over time. Authors also explored the connection between technology efficiency and managerial efficiency. A two-way relationship was confirmed, but managerial efficiency has the long-term impact. This could be the incentive for the MENA banking in order to improve technology efficiency over the region. A possible positive result is conditioned by the high qualified human capital availability in the given banking sector.

As for the governance effect on banking efficiency, it is worth to mention “Goodness of governance effect on European banking efficiency” by M. Perez-Carceles, J. Gomez-García, J. Gallego, published in the International Review of Economics and Finance. The aim of research was determination of the scope limitations for the banking efficiency improvement, which European goodness of government caused during the post-crisis period. The financial statements of commercial banks functioning in 21 EU member countries were the source to

construct the dataset on each individual bank using the BankScope database of Bureau van Dijk. The period after 2007 crisis, specifically 2011-2014, was the main focus in the given research. The DEA was used as the methodology of the work. The final results showed that a significant and positive impact on European banking efficiency is really caused by the goodness of government, structured into selection process, stakeholders' respect and policies' formulation and implementation.

Interesting comparative analysis of banking efficiency is performed in "Efficiency in Islamic vs. conventional banking: The role of capital and liquidity" by M. Bitara, K. Pukthuanthong, T. Walker, published, in the Global Finance Journal. Authors wanted to find out the presence of difference in the efficiency of conventional versus Islamic banks affected by capital and liquidity ratios. The sample of given research covered the following countries: Indonesia, Iran, Iraq, Jordan, Bahrain, Bangladesh, Brunei, Egypt, Algeria, Gambia, Kuwait, Lebanon, Malaysia, Mauritania, the Maldives, Pakistan, the Palestinian Territories, the Philippines, Qatar, Saudi Arabia, Singapore, Syria, Sudan, Tunisia, Turkey, the United Arab Emirates, Yemen, and the United Kingdom. An unbalanced sample of 4123 yearly observations from Bankscope database (743 annual observations for Islamic banks and 3380 annual observations for conventional banks) was constructed by authors applying bank-level financial characteristics. The observed period covered the years from 2005 to 2012. Methodology contained The DEA

method. It was showed that the efficiency of conventional and Islamic banks is being increased by higher capital and liquidity ratios. Moreover, it was demonstrated that for small, highly liquid, efficient, and highly capitalized conventional banks, the effect is even stronger. Authors also investigated that during the 2008-2009 financial crisis and the Arab Spring more liquid and capitalized banks were more efficient. The view that the efficiency gap between the two bank types can be broadened by the limitations imposed by Shari'a law, at the cost of Islamic banks, was confirmed by findings.

Another valuable research in the chosen field is “Decomposing banking performance into economic and credit risk efficiencies” by J. Boussemart, H. Leleub , Z. Shenc, M. Vardanyane , N. Zhu, published in the European Journal of Operational Research. This research was performed in order to measure credit risk and economic efficiency of banks using a non-parametric approach of a banking production technology decomposing performance into credit risk and economic efficiencies. The Chinese financial data covered thirty banks from 2005 till 2012 were used. A nonparametric Data Envelopment Analysis (DEA) model of total banking efficiency was applied. The results indicated that there could be an income increase by an 16 % average rate, whereas non-performing loans could be reduced by an 33% average rate. Due to the results, a balance between credit risk management and economic performance could be struck by banking managers applying better decisions due to their preferences.

Practical case of banking efficiency in the chosen country was researched in "Efficiency in the Brazilian banking system using data envelopment analysis" by I. Henriquesa, V. Sobreiroa , Ню Kimuraa , E. Mariano, published in the Future Business Journal. The aim was to simply evaluate banking efficiency in Brazil. The observed period covered the years from 2012 till 2016. A dataset of 37 Brazilian banks was used and provided by the Brazilian Central Bank. Authors applied DEA method in their research. The results showed that the most efficient banks are not necessarily the largest ones. In case of adopted policies to increase the involvement of the smallest banks in the banking sector, which is currently largely concentrated in the largest ten banks, the overall efficiency of the sector would rise. Government could develop this through fostering mergers and acquisitions and fiscal stimuli among small banks.

There is also other older research of banking efficiency analyzing Brazilian sector "Banking efficiency in Brazil" by C. P. Barros, P. Wanke, published in the Journal of International Financial Markets, Institutions & Money. The aim was to assess the role of public banks, merger and acquisitions, foreign banks, big banks, deregulation, and stressed banks in their impact on the Brazilian banks' efficiency. The data on Brazilian banking was gathered from Economatica for the period 1998–2010. A dynamic stochastic cost frontier model with panel data was applied in this article. On average, the dynamic frontier results indicated that there was an improvement of Brazilian banking efficiency over time. Also, it was found

that big banks and deregulation were the only variables reducing costs in the Brazilian market.

It is also worth to mention the practical case of banking efficiency research in India, which is "Efficiency and technology gaps in Indian banking sector: Application of meta-frontier directional distance function DEA approach" by J. Goyal, M. Singh, R. Singh, A. Aggarwal, published in the Journal of Finance and Data Science. The aim of research was to explore the overall Indian banking sector's efficiency levels and those levels among different ownership types (i.e., private, foreign, and public). The endeavor was made to assess the Indian banking intra-sector's efficiency using the 66 banks' cross-sectional data during the period of 2015-2016. The authors employed directional distance function based meta-frontier DEA approach. The results revealed that the Indian banking sector is efficient per 73.44%. The presence of different production functions across different industry ownership types was also confirmed. Among these ownership types, the group frontier of foreign banks matched with the meta-frontier, which makes this group of banks most efficient. The second closest group frontier to the meta-frontier is the group of private banks. Eventually, the last efficient group of banks in the industry was found to be public ones.

The article "Efficiency evaluation for banking systems under uncertainty: A multi-period three-stage DEA model" by X. Zhou, Z. Xu, J. Chai, L. Yao, S. Wang, B. Lev published in Omega can be also considered as the productive

research in the field of banking efficiency. The aim of research was to learn an internal structure of bank identifying the specific reasons of any types of inefficiencies. Thereby, banking systems' three stages needed for examination: profitability, organization of capital, and allocation of capital. To perform a case study evaluating the efficiencies of the Chinese commercial banks from 2014 to 2016, the DEA model was adopted. In conclusion, it was found that to improve the overall banking efficiency, reasonable business scale is required to adopt with a three-steps analytical framework, that can better identify inefficiencies in bank's performance.

Another research performed in the field of banking efficiency is "Two-stage DEA-Truncated Regression: Application in banking efficiency and financial development" by F. Fernandes, C. Stasinakis, V. Bardarova, published in the Expert Systems with Applications. Authors evaluated the peripheral European domestic banks' efficiency and examined the bank-risk determinants' effects on their performance during 2007–2014. The data for the study was obtained from different sources including the Bankscope database, World Bank and World Development Indicators (WDI). The data covered 64 banks of five Euro area periphery countries: Greece, Italy, Ireland, Spain, and Portugal. Two-stage DEA-Truncated Regression was used. The results demonstrated that banking productivity in the analyzed countries was negatively affected by credit risk and liquidity, while capital and profit risk impacted positively on the productivity. It

was also found that these effects becomes stronger during the crisis period, whereas banks' efficiency was affected more by bank-risk variables during lower levels of financial development.

In the article "Efficiency in BRICS banking under data vagueness: A two-stage fuzzy approach" by P. Wanke, Md. A. Azad, A. Emrouznejad, published in the Global Finance Journal, authors analyzed the banking industry's efficiency levels in the BRICS countries. The data on BRICS (Brazil, Russia, India, China, and South Africa) banking were obtained from different datasets, such as the Bankscope and World Bank databases, and covered the period from 2010 to 2014. In this research, as the first step, the fuzzy TOPSIS was used in capturing the relative efficiency vagueness of BRICS banking over time. At the second step, for the banking efficiency prediction, authors adopted fuzzy regressions with the different rule-based systems to intensify the power of significant regulatory, demographic, and socioeconomic variables. The results revealed that the GINI index ratio and country gross savings are positively associated with the banking industry efficiency, while relatively high inflation ratios are associated with the efficiency in a negative way.

As for the research of banking efficiency in the specific region, there is "Determinants of efficiency in the Malaysian banking sector: Does bank origins matter?" by F. Sufiana, F. Kamarudin, A. Nassir, published in the Intellectual Economics. Annual banking data of all Malaysian commercial banks during the

period 1999 – 2008 were applied in order to estimate the Malaysian banking sector's efficiency. The data on variables were gathered from the published annual reports with balance sheet information on each individual bank. Two-stage procedure was used. In the first stage, authors employed the bootstrap DEA method to compute the efficiency of individual banks. Then, to assess the influence of origins on banking efficiency, researchers applied bootstrap regression. The results showed that during the sample period there was a significant increase in efficiency of Malaysian banking sector. It was found that the Asian countries' banks are relatively more efficient, in comparison to foreign banks from other regions.

Regarding researches of banking efficiency in other Asian countries, there is "Efficiency in the Vietnamese banking system: A DEA double bootstrap approach" by C. Stewart, R. Matousek, T. N. Nguyen, published in the Research in International Business and Finance. The aim of research was to analyze banking efficiency in Vietnam. The dataset included 48 Vietnamese commercial banks during the period from 1999 to 2009. A DEA double bootstrap approach was applied in the given analysis. The results showed that large and very large banks have higher efficiency than small and medium sized banks, while small banks are the least efficient in the sector. Considering overall efficiency, state owned commercial banks are less efficient than non-state-owned commercial banks.

The other interesting finding related to the Asian banking performance in terms of efficiency is “Operating performance of banks among Asian economies: An international and time series comparison” by Simon H. Kwan, which was published in Journal of Banking & Finance. The aim of the article was to empirically evaluate the banking industry’s operating costs per unit in seven Asian countries for measurement of the operating efficiency in different Asian banking systems. The financial statements from the sample of commercial banks in Hong Kong, Indonesia, Malaysia, Philippines, Singapore, South Korea, and Thailand listed in the IBCA bank credit rating agencies Bankscope database were the core for data gathering. The observed period is from 1992 to 1999. As for the methodology, at first the relative efficiency of the banking field among these Asian systems was evaluated through the cross-country comparison providing valuable insights. The regression model was applied to perform such comparison. Secondly, the time series analysis was used to reveal the evolution of banking production over time. In order to measure this, authors applied the regression model too. The final results showed the high level of correlation between the country ranking of labor cost per unit and the country ranking of physical capital cost per unit, which suggests that Asian countries with higher labor cost in their banking operations meet higher capital cost at the same time. Thereby, considering operating cost per unit as an efficiency measurement, authors suggest that systematic differences in bank operating efficiency across these Asian

countries exist. Although, it was found that this operating efficiency measure unrelated with the banking sectors' degree of openness. Moreover, authors found that banks' operating costs among these Asian countries were decreasing during the observed period. This indicated that banks averagely improved their operating performance. But the most important founding was that the country's financial services wage rate is highly positively related with the labor cost shares' variations across countries. This provided evidence that banks apply relatively more labor in a certain country due to the fact that country's banking labor force is more productive rather than it is cheaper.

As for the more general research of banking performance, the article "Efficiency of financial institutions: International survey and directions for future research" by A. N. Berger, D. B.Humphrey, published in European journal of operational research, can be reviewed. The aim was to sum up and review estimates of the efficiency of financial institution trying to reach a consensus view and to design the efficiency results' implications for financial institutions in the fields of governmental policy and managerial performance. The results of 130 financial institution efficiency findings across the world were surveyed and studied. As for the methodology, authors combined parametric and non-parametric frontier models. In the results, it was demonstrated that depository financial institutions such as credit unions and banks have an average efficiency of around 77% (median 82%). The average efficiency values' similarity of financial entities

through different frontier models were not strongly carrying over to the individual firms' groupings by their across models' efficiency values. This showed that the mean efficiency's estimates of an industry may be a more appropriate policy guide in terms of reliability rather than the assessed efficiency groupings of individual firms.

The similar to the previous one research of the generalizing character is "What is going on with studies on banking efficiency?" by E. Sousa de Abreu, H. Kimura, V. Amorim Sobreiro, published in the Research in International Business and Finance. In this research, via estimating recent articles from major financial journals, authors analyzed and presented the current mainstream research on banking efficiency. The sample consisted of 87 papers published between 2011 and 2017. Clusters and citation networks were used to identify the studies' evolution. It was found that low productivity was the main characteristic of the field of banking efficiency, without a large number of productive specialized institutions or authors.

Regarding the Ukrainian banking efficiency research, there is a little number of studies in banks' performance evaluation of transition economies, which the studied banking system of Ukraine was be included to. But unfortunately, there is no separate research fully dedicated to the banking efficiency of Ukraine.

One of the researches including Ukrainian data in the sample is "Bank regulation and efficiency: Evidence from transition countries" written by K. Djalilov,

J.Piesse and published by the International Review of Economics and Finance. The aim of this research was to estimate the regulation's effects on the banking efficiency of economies in transition. The sample comprised 319 commercial banks from 21 transition economies among which Ukrainian banks were present. The data included financial statements' indices, GDP growth, GDP per capita, inflation, regulation and economic freedom indices and they were taken from Bankscope, World Bank World Development Indicators, World Bank Regulation, Supervision surveys and the Heritage Foundation. All these data were presented in form of an unbalanced panel. The studied period was 2002–2014. The methodology consisted of the dynamic quantile regression application in order to explore the heterogeneous efficiency effects of above-mentioned indices. The final results showed that the bank activity restrictions are the only regulation that improves banking efficiency in the studied countries. To addition, the results demonstrated that the banking regulations like market discipline, capital requirements, and supervisory power does not sufficiently affect the banking efficiency of the countries in transition.

As for the transition economies in the South-East Europe, there is "Banking efficiency in South-East Europe: Evidence for financial crises and the gap between new EU members and candidate countries" by B. Nurbojaa, M. Košak, published in the Economic Systems. In this study, the banking cost efficiency of ten South-East European countries were compared to find how efficiency

differences were related to the EU membership. Data used covered eleven SEE countries: Croatia, Kosovo, Macedonia, Albania, Bosnia and Herzegovina, Bulgaria, Montenegro, Serbia, Slovenia, and Romania. Data was gathered from the Bankscope database, and it covered the period 1999–2013. The database consisted of information for 157 banks from non-EU countries and 82 banks from EU member countries. In this study, SFA was used. The results indicated that the non-EU members were on average less cost efficient than the EU members. Despite the global financial crisis's negative outcomes, there was cost efficiency improvements in non-EU countries caused by the crisis pressure on banking management.

Other research to be reviewed is also related to the banking systems of transition economies and it is "Investigating bank efficiency in transition economies: A window-based weight assurance region approach" written by M.Degl'Inncenti, S. A. Kourtzidis, Z. Sevic and N. G. Tzeremes and published in "Economic Modelling". This article evaluates the inefficiency sources of banking systems of nine new EU members from the CEE countries during the period 2004-2015. The data consists of 116 commercial banks of nine transition economies of Central and Eastern Europe and its financial statements' data were collected from Bankscope. A two-stage DEA model was used as the methodological tool. The final results indicated that The Eastern European and Balkan countries had lower efficiency level in comparison with the Central European countries in the observed period.

Another valuable research in the area of banking performance in the post-soviet countries is “Cost efficiency of banks in transition: Evidence from 289 banks in 15 post-communist countries” by S. Fries, A.Taci, published in “Journal of Banking & Finance”. The aim of this article was to explore the banking transformation in the post-communist transition by the cost efficiency estimation. A sample of 289 banks from fifteen East European countries was selected to be analyzed during the period of 1994–2001. To calculate variation of banking conditions related to macroeconomic, institutional, and structural factors of a country, authors used country-level and bank-level variables. The adopted SFA models were applied as the methodology to estimate cost efficiency of chosen countries. In the conclusion, it was found that lower costs are more typical for banking systems with a larger share of foreign-owned banks in the total assets. Also, authors discovered that cost level increases during the post-reform period, while at the very beginning of reforms’ implication costs tend to reduce. Moreover, it was proved that private banks have higher efficiency level than state-owned banks.

Regarding the German banking efficiency researches, there are also no separate works completely dedicated to this banking system’s efficiency. However, the very close to our field of research is “How resilient is the German banking system to macroeconomic shocks?” by J. Dovern , C. Meier, J. Vilsmeier, published in the Journal of Banking & Finance. The aim was to explore the influence of

macroeconomic shocks on the German banking system's soundness. The Data covered German banks' income and loss statements during the period 1970-2009. The VAR approach was applied as methodology of work. The results indicated that the monetary policy shocks highly affected the level of stress in the banking sector. The results also rationalized the central bank's active behavior during the financial crisis periods.

CHAPTER 2. METHODS USED TO ANALYZE EFFICIENCY PERFORMANCE IN BANKING

There are a lot of different methods and techniques to measure the banking efficiency. The more method is reasonably complex and well-structured, the higher possibility to obtain the most objective and exact results.

In this chapter, I will describe the methods, which are frequently used in the research of the banking efficiency field. First two of them were applied in our analysis. As for the others, they are worth to be mentioned because of their reverence and popularity among researchers.

2.1.RATIO ANALYSIS

The method, which was applied in my work is the ratio analysis. It is widely applied and very popular tool to perform financial analysis.

This analytical tool serves as the expression of mathematical relation between two values. Whereas to compute such ratio, we need only to perform simple operation of arithmetic nature, the interpretation can be much more complex. To have meaning, a ratio should be related to an important relation of economic character, such as total income to total assets and so forth.

There are different types of financial ratios, the most frequently used analyze profitability (Return on Assets, Return on Equity, Return on Deposit, Operating

Profit Margin, Net Income Margin etc.), efficiency (Asset Turnover, Operating Income to Assets etc.), liquidity (Cash to Assets, Cash to Deposits etc.), and regulation (Tier 1 Capital Ratio, Risk weighted assets to total assets etc.)[1].

2.2 REGRESSION ANALYSIS

The regression analysis is a statistical technique, which helps to study the relationships among two variables (simple regression) or multiple amounts of variables (multiple regression). Researchers frequently conduct it because of different reasons, such as: to find out whether there is any relationship between chosen variables at all; to explore and understand the essence of such relationship between variables; and for the prediction of how certain variable will change given the others variables' value.

To perform regression analysis, there is a need for specific type of data, which vary depending on the analysis' objectives. In general, researchers apply three data types: time series (a set of observations taken by variable at varied points of time, such as weekly, monthly, quarterly etc.), cross-sectional (one or more variables' data gathered for the same time point), and panel (combining time series and cross-section's elements of data i.e., for several variables we may have data over certain time period) data.

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[1] p.132-137, "Financial Ratio Analysis of Firms: A Tool for Decision Making", Y. A. Babalola, F. R. Abiola; 2013, International Journal of Management Sciences

The linear regression model generally can be constructed as:

$$Y(i)=B1+B2X3(i)+B3X3(i)+\ldots+u(i).$$

"Y(i)" variable is noted as the dependent one, or the so-called regressand, and "X(i)" variables are noted as the regressors, independent, or explanatory variables. Error, or a random, term is denoted as "u(i)". The number of observations are represented by "i".

The above-written equation is called the population or true model. Two main components comprise it, which are a deterministic component (set of BX), and a random or nonsystematic component (u(i)). From the below equation, we can interpret "BX" as the conditional mean of Y(i). This leads us to the fact, deriving from the given model, that it can be well-stated an individual unit of Y(i) is identical to the population mean value, which this unit belongs to, plus or minus an error term. The population concept has a general character referring to a strictly defined units (companies, cities, people, counties and so forth), which are the objects of an econometric or statistical analysis.

As for the instance, let we assume that "Y" is a representative variable of company expenditure on marketing and "X" gives representation of company income. Thereby, the regression equation tells us that the individual company expenditure on marketing is identical to the company expenditure mean of all companies with the equal level of income, plus or minus an error term varying

from individual unit to another individual unit, which depends on the specific factors.

In the regression model, the intercept is B1 and the slope coefficients are values from B2 to Bk, they are also known as regression parameters or regression coefficients. This regards to the primary objective of the regression analysis, which is to study the average behavior of Y in connection to these regressors. In other words, the aim of regression model's usage is to explain the response of average Y to the values' changes of the X variables. An individual value of Y will float near its average value. Also, the causal relationship between Y and Xs, if it is in presence, should have a base of the relevant theoretical background.

Each regression parameter measure the change rate in the Y mean value for a change of unit in the regressor's value, under the condition of holding all other regressors' values constant. The number of regressors applied in the model will depend on the specific aspects of a studied problem and, of course, will be different in specific cases.

The generalization for all variables that are not introduced in the model because of different specific reasons, is an error term "u(i)". Nonetheless, the mean impact of these missed variables on the dependent one is considered to be small (p.2-8, "Econometrics by Example", D.Gujarati, 2011, Palgrave Macmillan).

2.3. DATA ENVELOPMENT ANALYSIS -DEA

A quite known method to measure the level of efficiency among decision-making units (DMUs) is Data Envelopment Analysis. It was designed around forty years ago in a work “Measuring the efficiency of decision-making units” by Charnes, Cooper and Rhodes, in which group of authors represented the CCR model, where DEA was firstly applied. Using this model, authors succeeded in obtaining the linear programming model via transforming the fractional linear measurement of an efficiency. Since then, the DEA’s unique quality of measuring efficiency of the DMUs’ multiple-output and multiple-input with no need to allocate earlier weight to the output and input, appealed to many researchers. Such characteristic led to a lot of modification proposals of the initial DEA from various researchers. It is not difficult to understand such interest, as the DEA is applied not only in the banking, but also in a large number of other fields, such as sectors of manufacturing, healthcare, logistics, education and so forth (A. Aldamak, S. Zolfaghari).

The fact, that the DEA does not search for the universal connections among the units in a sample under estimation, makes this method an analytical tool for various sectors, where research are conducted. The principle behind DEA is that each unit of dataset has its individual production function, which serves as a basis

for the efficiency evaluation of the unit via comparison of it with the efficiency results of the other dataset units. This sustains the DEA to categorize the overall number of units into two blocks – units with the 100% of efficiency and those, which efficiency result is less than the maximum – the inefficient units. Such categorization represents the advantage and, at the same time, disadvantage of the classic model of DEA, as it makes possible to estimate any type of dataset, but whole number of units cannot be categorized due to a lack of power. As the example, the categorization according to the criterion which separates units into the inefficient and efficient could be not only one decision makers' (DMs') interest of grouping in the practical fields of application. Thus, researchers needed the improved approaches to classify all units under estimation to omit the above-described problem of the DEA.

Because of the DEA researchers' examination of possible solutions, new different classification methods consisting of various approaches and techniques have emerged. The post-analysis to classic DEA model have been provided to develop an improved final classification by these new methods. According to the review research done by A. Aldamak and S. Zolfaghari, there were a lot of methods up to 2015 aimed to modify the standard DEA model in order to increase analytical value of applied techniques. Due to the structure, all these methods were grouped into ten classes by above-mentioned authors.

The cross-efficiency method is the first class. It is characterized by the even and self-evaluation of all units. The base for this method is the concept without any complications, which consists of self-estimation and equal evaluation of each units. This means that every DMU's efficiency is gained through the "n" times calculation in relation to the other dataset units. As the result, an "n x n" cross-efficiency matrix is obtained, in which via the direct implementation of CCR model the diagonal components represents the results of self-efficiency.

As for the second class, we have the super-efficiency method, in which in order to make the categorization of units better, the unit under estimation is not included. The first authors who introduced such approach in 1993 were Andersen and Petersen (P. Andersen, "A Procedure for Ranking Efficient Units in Data Envelopment Analysis"). They designed this method simply by modification of the CCR model not including the DMU under assessment in the constraints set. This made possible any efficient unit to reach a result higher than one omitting the exclusion of units with scores lower than one from the efficient group in the original DEA model. The distance between frontier and efficient DMUs after their exclusion is measured by the super efficiency model, namely we consider as efficient those units, which are able to reduce its outputs and staying efficient at the same time. This characteristic to get efficiency results higher than one helped Andersen and Petersen to deal with the disadvantage of CCR model of being unable to categorize efficient units when all of them reach one.

The so-called benchmarking methods are included to the third class. Their specification laid in the fact, that the relative importance of the efficient DMUs to the inefficient ones is the main criterion according to which units are grouped. Thus, this approach estimates the inner-group value of efficient units in comparison with those considered as inefficient. More precisely, it tests frequency of efficient DMU's usage in relation to the inefficient units. One of the most important methods belonging to the approach was introduced in the paper "Slack-adjusted efficiency measures and ranking of efficient units" by Torgersen et al., where a two-phase DEA was applied for benchmarking the efficient DMUs due to the level of their importance within the sample.

Different statistical techniques used after the DEA model performance are parts of the fourth class. The reason why these techniques applied after the model running is that usual statistical methods does not match with the DEA, because of the different nature of data characteristics applied to process both the DEA and the statistical tools. Whilst traditional statistics are aimed to test an average tendency of the selected data, the DEA estimates a frontier efficiency due to the optimal summing of weighted inputs to the optimal summing of weighted outputs. Thereby, to combine both of methods in sequence, some approaches are used applying better categorization of efficient and inefficient units with usage of statistics after the DEA model running.

Fifth class covers not a big number of researches, in which categorization of DMUs shifts to the inefficient units rather than efficient DMUs. Usually, the DEA methods does not perform grouping within units considered as inefficient. This problem was described in the paper “Models and measures for efficiency dominance in DEA” by Bardhan et al., in which also the new method to rank inefficient DMUs had been introduced. The authors based the method on the measurement of the so-called efficiency dominance, which estimate values of units’ outputs and inputs. The same principle was applied in the paper to construct the symmetric measurement of inefficiency dominance instead of the efficiency one.

As for the sixth class of methods, the main difference of it comparing to others is application of Multiple Criteria Decision-Making analysis (MCDM) in order to categorize units within the DEA. The previous classes usually comprise one-level models dealing with the situations of one-level nature. Solving this problem, many papers with the DEA usage have applied it in cases, in which multiple-level analysis was required. Such cases include, for instance, supply chain assessment and different types of networking. Hence, the MCDM analysis has been used developing DEA model, which made possible to apply the model in cases of multiple-level character. The usage of such analysis improved the categorization of the DMUs in standard model of DEA (According to Aldamak et al.).

The main criterion according to which, we can separate the seventh group od DEA methods is the inefficient frontier. This technique is applied, as in the previous classes, in order to improve the DMU's categorization. The first researchers who introduced the inefficient frontier method were Yamada et al. in the paper "An inefficiency measurement method for management systems". The principle behind this method is that to invert the standard DEA, which gives us IDEA, in order to estimate the units. This can be done through inverting the CCR model and optimizing the maximum ratio of input-to-output. Thereby, those units, which are not located on the inefficient frontier created by IDEA, can be considered as efficient.

The methods to rank single or multiple virtual DMUs are considered to be the eight class of the DEA approaches. This a quite new type of methods, in which virtual units are used. That is why, it still requires deeper research to prove the method's validity. It was firstly presented by Wang and Luo in the paper "DEA efficiency assessment using ideal and anti-ideal decision-making units". In this work, the Ideal Decision-Making Unit (IDMU) and the Anti-ideal Decision-Making Unit (ADMU) as the alternatives to standard DMU were proposed. Whilst the ADMU represents DMU, which to produce the minimum data output apply the maximized input, the IDMU apply the minimum data input assuming the maximized output. Such method implies that the DEA should be used two times

for both ADMU and IDMU, and the results of both should be amounted to the result of the original DEA model.

In the ninth class of DEA methods, the DM is able to define the categorization criteria for all units under estimation. The DM, in this case, does "interfering" into the efficiency measurement of selected data. Such "interference" largely varies due to the problem character and the DM's way of its solution. In the paper "Ranking decision-making units by imposing a minimum weight restriction in the data envelopment analysis" written by Wang et al., a model allowing the DM to put weight constraints on the units during estimation was introduced, as the example of ninth class of the DEA methods.

The last but not least class comprises methods of units' categorization, which are parts of the so-called "fuzzy" concept. They are also considered as the MCDM's subgroup. Researchers usually use this concept in the DEA under the MCDM application (According to Aldamak et al.).

2.4. STOCHASTIC FRONTIER ANALYSIS - SFA

Apart from the non-parametric DEA, there is also another set of methods estimating efficiency of economic agents' performance – Stochastic Frontier Analysis (SFA), but, in comparison with the DEA, it can be typified as parametric one. In case of the SFA, as an example, if we use production function in our

analysis, it takes into consideration under standard SFA only single input and multiple outputs or vice versa, but not multiple inputs and outputs at the same time. However, many researchers have developed the standard SFA model to apply both multiple inputs and outputs. Back to the example of production function, this function is simply reformulated in such way, that the quantity of outputs which economic agent able to realize is stated as a function of the inputs' quantity. Two issues are implied with this approach: a production function type is required to be specified and the estimation way of the coefficients in the production function, which have been considered ("Multiple input-output frontier analysis – From generalized deterministic to stochastic frontiers", A. Dellnitz, A. Kleine).

As it was said before, the standard SFA brings up the functional relations, which are confined to a single input and multiple outputs or a single output and multiple inputs. Bearing in mind such restriction, we can mostly obtain an explicit production function with a single dependent variable only, and a set of independent variables. As the result, such presupposition and the knowing about the errors' probability distribution brings the estimation problem. Fortunately, it is usually handled by the maximum likelihood (ML) ("Multiple input-output frontier analysis – From generalized deterministic to stochastic frontiers", A. Dellnitz, A. Kleine).

Besides, there have been other researchers, who developed different techniques to handle the single-multiple relation in the classical SFA. One of these techniques is aggregation of the multiple outputs to one output index However, some authors have attempted to deal with multiple inputs and multiple outputs by aggregating the multiple outputs to a single output index. In this case, we apply a two-step procedure, in which the aggregate output is calculated at first, and then the relation between inputs and aggregator is estimated. Thereby, we again obtain an explicit production function and, in this case, the variance of aggregate of output drives the disturbance in the model ("Multiple input-output frontier analysis – From generalized deterministic to stochastic frontiers", A. Dellnitz, A. Kleine).

Also, there is another type of the SFA - the so- called Generalized Frontier Analysis (GFA). Its principle lays down in the fact, that implicit functions in the production function modeling are used. This method makes researchers free of applying an aggregate proxy for the outputs and there is no need to use only one of them in the position of a dependent variable and the rest as the independent variables. Thereby, the way of an integrated parametric output-input frontier analysis of multiple nature is opened, and it makes possible to estimate chosen production function implicitly ("Multiple input-output frontier analysis – From generalized deterministic to stochastic frontiers", A. Dellnitz, A. Kleine).

The main privilege of the SFA methods, in comparison with those of the DEA, is that the former makes possible to separate inefficient units under estimation from

other shocks of stochastic character during the process of efficiency scores' calculation. Hence, SFA is the set of method allowing the inefficiency measure for each banking unit from the frontier with the best practice in one step estimation, which incorporates country-specific, banking and industrial variables ("Bank regulation and efficiency. Evidence from transition countries" K.Djalilov, J. Piesse).

Summarizing up the comparison of the Stochastic Frontier Analysis (SFA) and the Data Envelopment Analysis (DEA), we should briefly look at main characteristics of both. In the classical models of SFA and DEA, elements of the assessing process are different. In case of the DEA, both inputs and outputs are multiple, while in the standard SFA only one among two groups of input and output can be multiple. Although, it is worth to mention that multiple inputs and multiple outputs are allowed to be used in the new method within the SFA, which were described above. As for the algorithms applied in both SFA and DEA, linear programming is used in the DEA, whereas regressions with typical usage of the maximum likelihood (ML) estimation are applied in the SFA methods. Another important characteristic of both types of analysis is consideration of noise in the model, while the DEA includes noise in the efficiency results rather than accounts for directly, because of deterministic nature of the model; the SFA model accommodates noise explicitly. As for the functional output–input relation, in the DEA it is not specified, as we use those relation that might be linearized in case of

the DEA; on the contrary, such relation should be specified in the SFA model e.g., linear, double-log, semi-log ("Trajectories of efficiency measurement: A bibliometric analysis of DEA and SFA" H. W. Lampe, D. Hilgers).

CHAPTER 3 BANKING EVOLUTION IN UKRAINE AND GERMANY

3.1. UKRAINIAN BANKING SYSTEM'S BACKGROUND BEFORE THE FINANCIAL CRISIS

Banking systems from the East European region had entered the protracted process of the economy transition since the early 1990s. Similar to the other economic systems at the start of their transformation, the profound reconstruction was required in case of the post-soviet banking organizations. At time of the command planning, all banks were in possession of the state, which entirely controlled all steps of credit assignation and used the bank as a tool to redirect these credit funds to the state enterprises in order to finance inputs pre-planned by the command system. Because of such allocative mechanism, banks differed according to the economic sector affiliation. Household deposits had been gathered by the savings banks, while the state by itself was forcing the majority of these savings to be done. As for the payment system, it comprised a cash circulation among households and cash transfers within industrial sector, which the central bank was in charge of. Moreover, the scale of inputs applied by banks could not be characterized as a cost minimizing due to the quantitative nature of economic activities' incentives rather than the qualitative one. Thus, the post-

soviet banking systems in the East Europe region faced the major challenge laid in the field of input and output reconstruction.

The specific economic policies were designed and adopted by recently emerged states in the region. The main purpose of them bore transition character i.e., to transform the former command economy into the market one. This included overall liberalization of banking activities through freed interest rates, low-limit entry for new banks from abroad to the market as well as for domestic ones, and functions' reallocation to state banks from the central banks. The latter process eventually led to the state bank's privatization. To addition, the new legal framework had been designed from scratch in order to maintain the strong relationship between both sides of borrowers and lenders building the confidence in contract insurance. All of these measures stimulated the market progress in the East European region and increased the number of banks strengthening the diversification of their activities. However, as many countries had different duration and order in performing reconstructing reforms, they gained varied results, while the majority of economies have not fully finished the process of banking system reformation. Situation became much more complicated after the financial crisis entered the scene. This forced the East Europe countries to adjust their banking policies (S. Fries, A. Taci, "Cost efficiency of banks in transition: Evidence from 289 banks in 15 post-communist countries", 2004, Journal of Banking & Finance).

As for the Ukrainian banking system, it began the stage of formation and transformation in the period of 1991-1996. During this period, the required actions to transform the system were introduction of market mechanisms to launch the money market functioning, regulation of banking activities, and control of the banking functions' transformation to modern conditions. At this stage, there were profound changes in the nature of credit relations i.e., new methods of lending, settlements, and work with foreign currency, securities, etc. were introduced. In 1991, the National Bank of Ukraine was established. The organization was in charge of licensing, regulating, supervising, and registering banks. At the same time, expropriation and privatization of existing banks was carried out, as well as the creation of other, privately owned banks. The National System of Electronic Payments (EPS) and the National System of Mass Electronic Payments (NSMEP) were developed in order to help overcoming the crisis of non-payment and barter relations. Generally, this period can be characterized as the quantitative growth of Ukrainian banking system. During 1992, 60 new banks appeared, while in 1993 – the number of new banks reached 84. As for the 1996 year, 229 banks were registered in Ukraine, and 146 of them had licenses to conduct banking operations. The capital of the banking system reached 1.1 billion UAH, in terms of GDP percent it was 1.3%. At that time, banks could be established in two organizationally legal forms: joint-stock companies (open or closed) - about 70% and limited liability companies - about 30%. The final chord

of the formation stage of banking system development was the monetary reform carried out in 1996. Due to this reform, Ukrainian financial system adopted its own full-fledged currency - the hryvnia.

After the 1996 year, the new stage of banking development in Ukraine has launched. It was period of qualitative growth and development (1997-2007). During this time, the transformation of the economy and its transition to market management methods were mostly completed, hyperinflation was overcome, and economic growth began. Despite of significant strengthening of banking system in these years, its development was negatively affected by the Asian financial crisis in 1998. As the result of such effect, ten Ukrainian banks were liquidated. Nevertheless, in 2008 there were 184 operating banks with a capital of 69.6 billion UAH (9.6% of GDP), total assets amounted to 599.4 billion UAH, and loans given to the customers of over 485 billion UAH. A qualitatively new stage in the domestic banking system's development was the establishment of foreign banks' representative offices in Ukraine and banks with foreign capital since 2000. In 2007, 47 banks with the foreign part of ownership have already operated in the country, including 17 with 100% of foreign capital. The share of the latter in the authorized capital of Ukrainian banking system reached 35%, whereas the share of state-owned banks significantly decreased and amounted to only 8.5% on 1st January 2007. In the given period, the accounting and reporting procedures in banks became objects of started reformation, and, thereby, the transition to

international financial reporting standards was initiated. In 1998, the Deposit Guarantee Fund for Individuals (DGFI) was established ensuring the safety of customer deposits proceeding. Summing up the achievements of this period, we should also mention the growing process of first mergers and acquisitions of banks, increasing level of capital concentration, expansion of banking services' range, appearance of the first electronic money, introduction of corporate governance and risk management standards, and intensifying competition in the banking sector (V. Mishhenko, S. Naumenkova, "THE BANKING SYSTEM OF UKRAINE: PROBLEMS OF FORMATION AND DEVELOPMENT", 2016, Finance of Ukraine).

3.2. UKRAINIAN BANKING SYSTEM'S BACKGROUND DURING AND AFTER THE FINANCIAL CRISIS

The financial crisis (2008-2009) and post-crisis recovery (2010-2013) were quite dramatic stages of the Ukrainian banking system's development. Due to the global financial crisis of 2008-2009, Ukrainian banking did not become an exception among all world financial systems and, thus, bore significant costs. Taking into account that there were 184 banks operating in the country in 2009, this number decreased to 176 banks in 2012. At the same time, the situation fell to the critical peak during the second year of crisis (2009), when the capital of banks dropped

by 3.4%, assets - by 4.9%, and loans granted to the customers - by 5.7%. In addition, the share of overdue loans increased significantly: while in 2007 its number was 1.3%, in 2010 it became 11.2%. As a result of the crisis, which led to a decrease in the solvency and liquidity of some banks, the government decided to nationalize three major banks - PJSC Joint-Stock Bank Ukrgasbank (state share - 92.99%), PJSC RODOVID BANK (99.99%) and PJSC Joint-Stock Commercial Bank KYIV (99.94%). Over time, only the first one among three of them remained in the market. Nonetheless, a gradual recovery of the banking system began in 2010, with a promising result demonstrating that banks actually provided a pre-crisis level of development in 2012. If the losses of banks amounted to 38.5 billion UAH in 2009, in 2012 they received a total profit of 4.9 billion UAH. Moreover, the total share of overdue loans decreased to 7.7% . In 2009, all domestic banks established before 2007 in the form of closed joint stock companies (CJSCs) and limited liability companies (LLCs) were transformed into public joint stock companies (PJSCs), which contributed to the formation of a more transparent ownership structure. In 2012, a deep reorganization of the DGFI's activities was carried out. The DGFI was put in charge for running temporary administrations in the insolvent banks, and, in case of their liquidation, the DGFI became responsible for removing such banks from the market. Generally, in the specified period, the old risk management tools, corporate governance mechanisms were improved and modified, while the usage of

electronic banking services, Internet banking, the share of non-cash retail payments, and electronic money were expanded.

Since 2014, the new banking crisis has emerged. As the Russian-Ukrainian conflict brought political and economic destabilization to the whole region, banking sector of Ukraine run into new crisis period. It began with a sharp devaluation of the hryvnia and an acceleration of inflation, which led to a significant reduction in banking liquidity, deteriorating conditions for banks and, as the result, the overall reduced efficiency of banking activities. To addition, in the context of the economic downturn, the incomes of enterprises, especially the real incomes of households, decreased, because of this their creditworthiness deteriorated. Due to such crisis conditions, the number of banks has rapidly decreased. While during 1998-2013 34 insolvent banks were withdrawn from the market, and their depositors received compensation from the DGFI in the amount of 5.8 billion UAH, in the period of 2014-2015 63 banks were liquidated, and depositors were paid 54 billion UAH. Compared to 2013, the number of operating banks decreased by 69 units, assets - by 1.85%, and reserves for active operations (due to increased non-performing loans) increased in 2.4 times, which indicated a decrease in the financial stability of the banking system and more complicated conditions of lending. In 2016, the trend of banks' liquidation continued: only 109 banks still operated in Ukraine, compared to the 184 banks in 2008. The consequence of the 2014-2015 banking crisis was a significant change in the

structure of banking system and the mechanisms of financial intermediation in general. The reform of banking supervision, which began in 2008, has not been completed, and the level of confidence in the banking system has declined as never before in the history of independent Ukraine. At the same time, it should be noted that in the outlined period new principles of monetary policy were laid down: the transition to inflation targeting began, coordination of monetary and budgetary policies was strengthened, methods and tools of monetary regulation were improved. (V. Mishhenko, S. Naumenkova, “THE BANKING SYSTEM OF UKRAINE: PROBLEMS OF FORMATION AND DEVELOPMENT”, 2016, Finance of Ukraine)

3.3. DESCRIPTION OF THE UKRAINIAN BANKING SYSTEM DURING THE ANALYZED PERIOD

During 2005-2014, the number of banks was relatively stable and ranged from 165 (in 2005) to 184 (in 2008) units. At the same time, small banks, which served in local and highly specialized markets, prevailed among them by overall number. The ten largest banks accounted for more than half of the capital, assets, and liabilities, and twenty banks for about 85%. A specific feature of the domestic banking market development in 2004-2010 was the increase in the number of banks with foreign capital. For example, whereas in 2004 there were 19 such

banks operating on the domestic market, including 7 with 100% foreign capital, in 2010 their number increased to 55 and 20 respectively. The share of foreign capital increased from 9,6 to 40.8% from 2004 to 2010. On the first of May 2016, there were 42 such banks operating in the domestic market, including 16 with 100% foreign capital, and their share in the capital of the banking system reached 45.9%. State banks and banks with state-owned share in capital play a special role in the Ukrainian banking system. In fact, state-owned banks are CB PrivatBank JSC, PJSC "State Savings Bank of Ukraine" (Oschadbank) and PJSC "State Export-Import Bank of Ukraine" (Ukreximbank).

As for the first of April 2016, the state-owned banks' share and share of banks with the state share in capital were in total 31.9% of all banks' authorized capital in the country, and those banks possessing fully own authorized capital - 16.8%. The former type of banks accounted for 29.8% of assets and 31.4% of liabilities in the whole banking system, which is in several times higher than in 2007 ((V. Mishhenko, S. Naumenkova, "THE BANKING SYSTEM OF UKRAINE: PROBLEMS OF FORMATION AND DEVELOPMENT", 2016, Finance of Ukraine).

According to V. Mishchenko and S. Naumenkova, this degree of state participation in the banking sector is too high, which is not typical for countries with the developed markets. The consequences of the increasing role of state in the banking system may be deformation of the market principles of financial

intermediation and deterioration of banking competition. The measures that can change situation in the positive way, include the deeper privatization of state-owned banks, as well as an improvement of their functions, such as better corporate governance and stronger risk management systems, which will help to improve efficiency and competitiveness of the banking system. (V. Mishhenko, S. Naumenkova, “THE BANKING SYSTEM OF UKRAINE: PROBLEMS OF FORMATION AND DEVELOPMENT”, 2016, Finance of Ukraine).

A key characteristic of development level and banking system ability to support an economy is the availability of sufficient capital. On first of May 2016, the total capital of the banking system of Ukraine amounted to 139.2 billion UAH, which is in twice time more than in 2007. However, in 2015, due to the regulatory crisis in the banking system, it decreased compared to 2013 by 88.9 billion UAH. At the same time, the authorized capital turned out to be twice as large as the available one, which indicates a significant decapitalization of the banking system. The ratio of available capital to authorized capital decreased from 1.62 in 2007 to 0.5 in 2016. In addition, simultaneously with the decrease in equity, regulatory capital decreased from UAH 205 billion in 2014 to UAH 128.1 billion in 2016, which indicates a deterioration of the banking system’s financial stability. (Banking Sector Review, 2016, The official site of NBU)

This conclusion is confirmed by dynamics of the ratio of bank capital to GDP. In 2013, the ratio was 12.6%, and in 2015 it decreased to 5.2%. This means that

under the conditions of regulatory crisis, banking capital was not able to perform its functions, especially capital-creating and protective functions. Insufficient amount of bank capital and its low quality were largely caused by the imperfect resource base of banks, of which deposits of legal entities and individuals comprise the main components. During 2005-2016, the volume of deposits attracted by banks increased from 134.8 billion UAH to 750.3 billion UAH i.e., in almost 5.6 times, but the ratio of deposits to banks' capital decreased from 7.3% to 5.3%, which indicated deterioration of the resource base of banks. The main source of banking deposits during 2005-2020 were households, which accounted for 58.1% of total borrowings, while non-financial corporations covered 37% of total borrowings. Demand deposits and those with a term up to one year, the share of these deposits in 2016 was 42.8% and 38.5% respectively, prevailed among deposits due to term structure. Regarding the currency structure, it should be mentioned that banks attract almost half of their deposits in foreign currency. Thus, as for 2016, 47.1% of deposits were attracted in foreign currency, including 39% of corporate sector deposits and 54% of retail deposits. The banking crisis of 2014-2015 significantly affected the cost of raising banking resources. Since 2010 to 2016, average interest rates on deposits have increased from 9.4% to 11.7%. Household deposits' rates in the national currency increased the most - from 14.6% in 2010 to 19.1% in 2016. At the same time, deposits' rates in foreign

currency decreased for both corporate sector entities and households. (Banking Sector Review, 2016, The official site of NBU)

According to Banking Sector Review of NBU in 2016, analysis of lending activities of domestic banks showed that the volume of loans provided grew in 2016 compared to 2005. The total amount of loans granted by banks increased from 143.4 billion UAH in 2005 to 989.9 billion UAH, which is in almost seven times. The highest growth rates of lending were observed in 2006-2008, when their annual growth was over 70%. This fact, according to experts, was one of the banking crisis' causes in 2008. However, in 2009 the rate of lending decreased to 1.5%, and the actual resumption of lending began only in 2011, with an annual growth rate of 10.8%. After the new crisis of 2014-2015 period, in 2015 lending decreased by 3.8% compared to 2014 and a gradual recovery began only in early 2016 (V. Mishhenko, S. Naumenkova, "THE BANKING SYSTEM OF UKRAINE: PROBLEMS OF FORMATION AND DEVELOPMENT", 2016, Finance of Ukraine).

As for the last year of the analyzed period, December 2020, there were 75 banks operating in the country, including 35 banks with foreign capital (with 23 units own 100% foreign capital) and 6 state-owned banks. The number of bank customers on first of January 2019 is 56.7 million, of which 54.4 million are individuals (residents and non-residents).Also, it was noted that there is a steady trend towards the bank branches' closure: at the end of 2015, the number of

branches reached 12 thousand, while in December 2017 only 9.5 thousand bank branches were operating. In 2020, the network of banking institutions consists of more than 8002 branches, most of which belonged to state-owned banks. In the first half of 2016, the income of Ukrainian banks decreased by 56.4% and amounted to 88.0 billion UAH, while expenses grew by 18.6% to 97.2 billion UAH . In 2020, the total assets of banks amounted to 1536086 million UAH. Since 2014, under the influence of national currency devaluation and the economic downturn, as well as political instability in the country, a significant number of banks have faced problems, many of them according to the NBU decision were forced to initiate a liquidation process. Because of this, in 2018 the number of operating banks amounted to 82 units, which is by 93 financial institutions less than in 2008. Such conditions led to an application of temporary administration introduced in 86 banking institutions due to the deterioration of solvency. As for 2020, the interim administration continued to operate in three institutions. PJSC "Platinum Bank" and PJSC "Bank People's Capital" were withdrawn from the market due to the opacity of the ownership structure. The decision to revoke the banking licenses and liquidate PJSC Finbank, JSC Fortunabank, PJSC Diamantbank, PJSC JSCB Novy, PJSC CB Hephaestus was made due to the fact that recapitalization measures of these banks were insufficient to ensure a positive value of regulatory capital. PJSC "Vector Bank" was withdrawn from the market due to deteriorating financial performance, as

well as due to lack of funds and inability to timely and fully comply with legal requirements of creditors.

Along with the reduction of banks in Ukraine, nonetheless, there is a steady trend of growth of their total assets. Moreover, the number of net assets compared to previous years is also increasing. Thus, at the end of 2019, the net assets' number increased by 15.81% compared to 2018. On first of March 2020, total assets amounted to 2,032 billion UAH, which is by almost 50 billion UAH more than in 2019. It is also quite obvious due to reports, all indicators of the banking sector's performance increase with every year, which leads to the stabilization of the banking system. For instance, in 2020 total return on assets of Ukrainian banking is 6.25% and compared to 2019 it increased by 1.02%. Total return on capital, in turn, also increased and it is 45.63% in 2020 (Banking Sector Review, 2020, The official site of NBU).

In 2017, due to the reduction of provisions and increased operational efficiency, banking institutions reached a profitable level, the amount of regulatory capital increased to 115,817 million UAH. The recapitalization of banks continued, according to which banking institutions must provide capital in the amount of 500 million UAH in due time. Regulatory capital adequacy increased from 18.4% to 19.7% in the fourth quarter of 2019, and it was significantly higher than the minimum required level. Regulatory capital grew by 10.3% and authorized capital by 1.1% over the 2019 year. According to this data, Ukraine should focus on

maintaining the stability and reliability of the banking system, particularly on providing banking institutions with sufficient financial resources to properly perform their functions - lending to the economy (O. Gura, “PROBLEMS AND PROSPECTS OF FUNCTIONING OF THE BANKING SYSTEM OF UKRAINE”, 2020, “Efektyvna ekonomika”).

On first of January 2020, the ownership structure of the banking system assets of Ukraine was presented as follows: banks with a state share (in which the state owns a share of more than 75%) - 5 banks; banks of foreign banking groups - 21; banks with private capital (not less than 50% of the authorized capital) - 51 . According to Banking Sector Review of NBU in 2020, the banking system of Ukraine is characterized by a high level of competition and has the potential for development in the future (Banking Sector Review, 2020, The official site of NBU).

Despite of all positive trends, according to Banking Sector Review 2020 of NBU, Ukrainian banks started to operate in a more severe environment by the end of the 2020 year. The demand for banking services was temporarily weakened by the economic downturn associated with the quarantine restrictions. There was also a fall of demand for investment loans during the period of 2020. In contrast, demand for working capital loans kept steady. A much weaker financial performance changed the trend of high profitability during the past three years (2017-2020). On the other hand, in the last years the efforts were undertaken to

ensure accurate representation of the asset quality and banks' financial stability was strengthened. These steps prepared the Ukrainian banking sector for hard times. Therefore, there was no need to raise new capital for most of banks in order to go through the current economic downturn (Banking Sector Review, May 2020).

3.4. GERMAN BANKING SYSTEM'S BACKGROUND BEFORE 2008

The birth of German financial system can be considered the third quarter of the nineteenth century, when the industrialization process was developing in the given country. From the beginning, the prime basis of German financial system was consisted of different types of banks. In opposite to other market economies of that time, there was a big market share of cooperative and public banks, apart from private ones (D. Detzer, N. Dodig, T. Evans, E. Hein, H. Herr, F. J. Prante, "The German Financial System and the Financial and Economic Crisis", 2017, Springer International Publishing).

Nevertheless, in the late nineteenth century a key role in finance mobilization for larger companies was played by the biggest private banks. In case the large companies could not deal with the debt servicing, these private banks in exchange of aid obtained the vast shareholdings in such firms. The 1929 crisis made a powerful hit on the biggest German banks, which caused the following

bankruptcy and mergers. After such period, only three large banks left in the market. After the Second World War, the biggest banks of Germany initially stopped their functioning, as they were accused in collaboration with the Nazi government. However, during the period of Cold War, most of broken-up banks went through the process of reconstitution, and subsequently became a key source in providing external finance for the biggest West Germany companies, especially during the period of the so-called economic miracle (D. Detzer, N. Dodig, T. Evans, E. Hein, H. Herr, F. J. Prante, "The German Financial System and the Financial and Economic Crisis", 2017, Springer International Publishing).

It should be also mentioned the crucial role of savings banks in the German financial system. In the nineteenth century, when there was a rapid expansion of savings banks, the main role in establishing this type of banks was performed by local municipal governments. The local provincial areas were the places, where savings banks were functioning in order to provide financial aid for small and medium-sized companies, which private banks rejected to serve. In contrast to the private banks, their expansion was not stopped during the interwar period. As the result, after the Second World War, they were highly successful in financing the medium-sized companies leading to the West German prosper economic development in the post-war era. In addition, the savings banks unified in regional associations also provided financial help and gave an easy access to investment banking activities for bigger companies (D. Detzer, N. Dodig, T.

Evans, E. Hein, H. Herr, F. J. Prante, “The German Financial System and the Financial and Economic Crisis”, 2017, Springer International Publishing).

In the middle of 19th century, the smaller, in comparison to the above-mentioned sectors, cooperative banks entered the financial market of Germany. They resulted from initiative cooperation of small farmers and handicraft workers. Their expansion continued during the inter-war and post-war periods. The role of cooperative banks was to provide banking services to small companies and their primary motivation was to develop local economy rather than to gain a profit, which made them similar to the savings banks (D. Detzer, N. Dodig, T. Evans, E. Hein, H. Herr, F. J. Prante, “The German Financial System and the Financial and Economic Crisis”, 2017, Springer International Publishing).

During the Cold War period, German banking system was separated to West and East one. Recalling the Ukrainian banking in the period of Soviet Union, the East German banking was similarly centralized and functioned under the rules of command economy. The integration of this German region to market system has initiated since 1990, when the reunification with West Germany was announced (D. Detzer, N. Dodig, T. Evans, E. Hein, H. Herr, F. J. Prante, “The German Financial System and the Financial and Economic Crisis”, 2017, Springer International Publishing).

Unlike many other countries, such as the United States, the United Kingdom or Spain, before the Great Financial Crisis and the following the Great Recession in

the period of 2008–2009 years, there was not a real estate bubble in Germany. During the beginning period after the German unification, there was a medium-sized rise of real estate prices. Despite of this, German real estate prices stayed stable from the middle of 1990s until around 2012. The several aspects can explain such unique way of financial development in Germany. First aspect is that generally conservative way of real estate financing was prevailing. The business policies of main creditor-banks in the field, such as local savings banks, specialized mortgage banks, as well as state-owned banks, were not largely changed. Second aspect is that a vast and varied rental market is the main characteristic of the real estate market of Germany. Around 40% was owned and 60% were available for renting from the total housing stock in 2016. Despite of the slight drop of rented housing share during the last decades, there was not any fundamental transformation of the German real estate market. And last but not least aspect is that the German real interest rates were located on the highest level among the Euro area countries, which was caused by the relatively low inflation rate in Germany (D. Detzer, N. Dodig, T. Evans, E. Hein, H. Herr, F. J. Prante, “The German Financial System and the Financial and Economic Crisis”, 2017, Springer International Publishing).

According to D. Detzer and others, "before 2007 Germany was considered the ‘sick man of Europe’". The most important engine of demand was to increase net exports. The increasing current account surpluses in the 2000s successfully

evolved from the current account deficits in the 1990s, which was an exceptional situation after the Second World War. The Hartz-reforms of the early 2000s caused several consequences for private consumption. Firstly, in the early 2000s there was an increase of wage dispersion. Secondly, workers' bargaining power was decreased by the reforms and, thus, it caused the wage share fall. Because of these aspects, private consumption demand was weakened, which could not impact banking services' consumption in Germany. Unlike other countries with increasing wage inequality, the economy of Germany did not face rise of the private households' indebtedness because of efforts of maintaining or increasing consumption expenditures. The overall characteristic of German financial system before the financial crisis was that it sustained an 'export-led regime' i.e., the German economy relied on increasing current account surpluses and net exports as the main drivers of medium growth (D. Detzer, N. Dodig, T. Evans, E. Hein, H. Herr, F. J. Prante, "The German Financial System and the Financial and Economic Crisis", 2017, Springer International Publishing).

Only with simultaneous net capital exports it is possible to sustain current account surpluses. Because of this, it is not surprising that high capital outflows from Germany and an increasing net foreign assets position of the economy were the results of high current account surpluses. Between the late 1990s and 2008, there was a strong growth of German international financial integration. A vast increase of portfolio investment outflows and lending abroad by German banks were the

main characteristics of such integration. Mostly European countries had been the debtors, who received the lending from the side of German banks. Apart from that, during this period German banks rised their lending to the US. To addition to funds within Germany, the domestic banks were drawing on funds obtained in the US itself. Finally, offshore financial centers with financial market controls' of high level of laxity, such as Ireland, attracted German banks' investments during the period before 2007 (D. Detzer, N. Dodig, T. Evans, E. Hein, H. Herr, F. J. Prante, “The German Financial System and the Financial and Economic Crisis”, 2017, Springer International Publishing).

3.5. GERMAN BANKING SYSTEM’S BACKGROUND AFTER 2008

The global financial crisis brought serious damages to some of the biggest banks in Germany. Two biggest German banks, Deutsche Bank and Commerzbank, and two private banks of narrow specialization, Hypo Real Estate (HRE) and Industrie-Kreditbank (IKB) had a painful experience of enormous losses because of over-risky investments and questionable off-balance sheet activities in the period before the financial crisis. Only governmental interventions rescued HRE, IKB and Commerzbank from liquidation. In case of HRE, the bad situation led to complete a full nationalization of the given bank. As for the Deutsche Bank, it survived the crisis without any governmental aid (P. Behr, R. H. Schmidt “The

German Banking System" from "The Palgrave Handbook of European Banking", 2016, Macmillan Publishers).

In opposite, the financial crisis damaged the local savings and cooperative banks to a lower extent. During the period of crisis most of them dealt with the complex situation remaining stable and obtaining profit. This was largely related to the fact, that these banks kept traditional business model without any significant adjustments. Such beneficial position of these banks comprised firm ability to gather customer deposits and their strong relationships with local customers. Also, the fact that such types of banks obey local by-laws, which kept them away from many risky banking activities, explain why they stayed relatively successful in the period of crisis (P. Behr, R. H. Schmidt "The German Banking System" from "The Palgrave Handbook of European Banking", 2016, Macmillan Publishers).

However, the financial crisis did affect the savings banks group as a whole. Four units of the so-called Landesbanken, groups of regionally organized state-owned banks - HSH Nordbank, BayernLB, WestLB and SachsenLB - bore a large financial damage, which had an indirect negative effect on other group's institutions, with respect to their weight in the organization as business partners or another role. It is considered as one of the reasons why there was merging process of certain Landesbanken with stronger ones, or there was a liquidation of some of them. The one banking group which overcome the crisis with the least amount of

losses is the group of cooperative banks, which were not such involved in capital markets as the savings banks (P. Behr, R. H. Schmidt “The German Banking System” from “The Palgrave Handbook of European Banking”, 2016, Macmillan Publishers).

The great challenge for both public and private organizations of German banking, apart from negative consequences of the financial crisis, is to deal with the new regulatory regime, which was implemented after the crisis. Some parts of this regime were already applied in the practice, while there is still a going process of other parts’ designing and implementation (P. Behr, R. H. Schmidt “The German Banking System” from “The Palgrave Handbook of European Banking”, 2016, Macmillan Publishers).

Among most important challenges imposed by the above-mentioned regime, German financial system have to cope with the strict liquidity rules and higher capital requirements. Both of them were transformed into EU law trough CRD IV and based on Basel III. These requirements affect equally all types of German banking including those having access to public equity market as well as those finding new shares’ issuance highly complicated after the losses caused by the crisis (P. Behr, R. H. Schmidt “The German Banking System” from “The Palgrave Handbook of European Banking”, 2016, Macmillan Publishers).

Also, it is worth to mention the Single Supervisory Mechanism (SSM) imposing additional difficulties for German banks. Such mechanism obliges banks to cope

with new supervisors, who with a high likelihood may not fully cover German banking information related to inner specific characteristics and aspects of banking functioning in Germany. Nonetheless, EU supervision within the SSM framework does not subordinate savings and cooperative banks (P. Behr, R. H. Schmidt "The German Banking System" from "The Palgrave Handbook of European Banking", 2016, Macmillan Publishers).

Aside from SSM and Basel III/CRD IV, new regulatory rules and reporting requirements obliging banks to full compliance, emerged and forced German banking sector to rise substantial number of the relevant staff, which consequently increased the banking costs. This aspect became significant obstacle for many small German banks, which may lead to new wave of mergers (P. Behr, R. H. Schmidt "The German Banking System" from "The Palgrave Handbook of European Banking", 2016, Macmillan Publishers).

Finally, most German banks have already gone through the financial system adjustments redesigning banking products, processes, and, also, compensation systems. It is difficult to conclude to which point the new regulations will lead current banking system of Germany. Nevertheless, according to P.Behr and others, as the networks ('Verbünde') have a tendency of shielding cooperative and savings banks from the most sever negative impacts of the financial crisis, there will be no fundamental change in the traditional German banking structure

(P. Behr, R. H. Schmidt “The German Banking System” from “The Palgrave Handbook of European Banking”, 2016, Macmillan Publishers).

3.6. GENERAL DESCRIPTION OF GERMAN BANKING SYSTEM

Summing up the background of German banking system, we need to generally describe its most unique features, which makes it different in comparison to other banking systems. Also, the current stance of banking structure at the national level is required to be mentioned as well.

Private banks with profit orientation represent only little share of all German banks due to amount of all total bank assets, which in case of private organizations does not even reach a half of it. A mandate in supporting regional or local economies is granted to banks with large government involvement. Referring to cooperative banks, their predominant goal is a support of members' business rather than profit maximization. Obviously, such orientation imposed by mandates puts restraints on profit-maximization activities, but it is still opened question whether such limitation has a negative impact on their profit, or not(P. Behr, R. H. Schmidt “The German Banking System” from “The Palgrave Handbook of European Banking”, 2016, Macmillan Publishers).

Based on such German banking’s orientation, there is a quite positive result of limitation on profit maximization. It is the fact that German banking system was

relatively stable before the global financial crisis in 2008 and, as the result, it did not experience any major financial crisis after the end of the Second World War. This made German experience quite unique among all European countries (P. Behr, R. H. Schmidt “The German Banking System” from “The Palgrave Handbook of European Banking”, 2016, Macmillan Publishers).

Including the today situation, the so-called regional principle is complied by the cooperative banks and local savings. This principle implies that there should be no competition among local banks belonging to the same network. Whereas there is a high limitation on intra-pillar competition, it can be observed that the inter-pillar competition is very big in German banking (P. Behr, R. H. Schmidt “The German Banking System” from “The Palgrave Handbook of European Banking”, 2016, Macmillan Publishers).

Interesting fact is that the general profitability level of German banking does not reach the international level and, thus, is much lower. Partially, it can be explained by the above-mentioned high competition among different types of banks within the system. However, it seems the better fitting explanation is that a major part of German banks possess the legal form regarding public and cooperative banks. And as it was described above, the main objective of such banks is not profit maximization (P. Behr, R. H. Schmidt “The German Banking System” from “The Palgrave Handbook of European Banking”, 2016, Macmillan Publishers).

The majority of German banks belongs to universal type. It is clearly observed in banks, where commercial and investment banking services are offered together. The dominance of the banking model of universal nature matches up to the banking law of Germany and the tradition of getting all banking services by customers at one organization (P. Behr, R. H. Schmidt "The German Banking System" from "The Palgrave Handbook of European Banking", 2016, Macmillan Publishers).

Currently, there is a limitation on the presence of foreign banks in German economies. It is also due to the fact, that foreign banks enter the German market rather reluctantly because of different inner obstacles and due to mainly non-profit oriented banking system of Germany as it was described above (P. Behr, R. H. Schmidt "The German Banking System" from "The Palgrave Handbook of European Banking", 2016, Macmillan Publishers).

Summing up this section, we need to describe the banking structure in Germany by numbers due to the end of analyzed period of our research. According to the bank statistics of Deutsche Bundesbank, there were 1531 operating banks as for January of 2020, which is less in comparison to 2018, when the total number of German banks amounted near to 1800. This demonstrates us decreasing tendency of the total operating banks' number in Germany. However, it is still one of the biggest amount of banks in Europe. As for the total asset structure, according to EBF report of 2020, one of the largest segments by assets is represented by the

private-owned commercial banks, reaching around 40% of total assets in the banking system. The public banking sector comprising savings banks, Landesbanken, and cooperative banks' sector, represent totally 44% of total banks' assets. Around 16% of total assets is represented by foreign banks. In absolute number, there are currently 842 cooperative banks and 380 savings banks in the sector. As for the lending condition, lending to companies and the self-employed reached around €974 billion in 2019, which was an increase comparing to the previous year by 4.3%. Such positive lending was mainly caused by low interest rates in the recent years. The consequences of COVID-19 for banking sector in Germany is still not completely clear, but without significant countermeasures in 2020 on the cost side, according to S. Kuonen, operating result (before risks, write-downs and impairment losses) fell by around 25% in 2020 (S. Kuonen, C. Küst, K. Juchem, M. Strietzel and S. Maus, "The German banking market in the COVID-19 crisis: rising risks, failing revenues", 2020, Roland Berger: Global Consulting).

CHAPTER 4. RATIOS' ANALYSIS

4.1. DATA AND METHODOLOGY

In order to perform the following steps of the given research analysis, we used data from different types of sources. Comparing both banking systems of Ukraine and Germany, the data on one biggest representative bank from each system, according to total assets' amount, were applied. In case of Ukraine, we chose JSC CB PrivatBank as its total assets' number was always higher than in case of all other competitive banks in the Ukrainian banking system during the analyzed period e.g., it even crossed the limit of 500 000 000 thousand, UAH in third quarter of 2018. As for the German representative, we selected Deutsche Bank due to its leadership in amount of total assets, same as PrivatBank in Ukraine. The data to calculate the financial ratios for the Ukrainian bank were collected from the financial statements published on the website of National Bank of Ukraine (local central bank). In case of Deutsche Bank, all required data were available in the published annual reports on this bank's website, specifically in the financial data supplements for each year.

Regarding the chosen time span for our research, we put into analysis the period covering all years in the range from the beginning of 2009 till the end of 2020. This decision was conditioned by the fact, that our primary interest in the given research is to analyze the banking efficiency in the post financial crisis age. Of

course, it would be better to also cover the period before 2009, as we would be able to compare both time ranges, but unfortunately the proper required data on Ukrainian bank is absent before this year. The data on each bank were gathered on quarter basis. Thus, after all ratios' calculation procedure, we have 48 observations.

Considering limitation of available data for Ukrainian banking system, we decided to use the same ratios for each bank's ratio analysis in order to reach the most equalized and objective picture to be compared of banking efficiency performance for our studied banks. The full list of calculated ratios comprises Return on Assets (ROA), Return on Equity (ROE), Return on Deposits (ROD) and Net Income Margin (NIM) representing profitability ratios; Operating Income to Assets (OIA) and Asset Turnover (AT) representing efficiency ratios; Cash to Assets (CTA) and Cash to Deposits (CTD) representing liquidity ratios. These groups of indicators were taken from the above-mentioned research "Islamic financial system and conventional banking: A comparison" by A. Salman and H. Nawa.

In the empirical part we performed ratios' analysis in order to describe the evolution of each ratio during the analyzed period for both banks. The above-mentioned ratios were calculated in this way. Return on Assets was obtained from dividing the sum of Net Profit after Taxes and Interest Expense by Total Assets. Return of Equity was calculated via dividing Net Income by Total Equity Capital,

while through dividing Net Income by Total Customer Deposits we got Return on Deposits. Also, we obtained Net Income Margin via dividing Net income by Total Income. As for the efficiency ratios, Operating Income to Assets was equal to Operating Income divided by Total Assets, while Asset Turnover - Total Income divided by Total Assets. As for the liquidity ratios, Cash to Assets was obtained via dividing Cash by Total Assets, whereas Cash to Deposits was equal to Cash divided by Total Customer Deposits.

4.2. RATIOS' ANALYSIS OF UKRAINIAN BANK

In order to see performance of the biggest banks from each system, we need to analyze the evolution of each applied ratio during the observed period. First bank to be analyzed is Ukrainian PrivatBank, whose total assets reached its maximum amount during the whole period of 600 145 190 thousand, UAH in the third quarter of 2020, while its minimum peak was observed in the first quarter in 2009 and it amounted to 74 366 253 thousand, UAH. Such range of total assets' amount makes the PrivatBank the leader among other Ukrainian banks. For instance, the second largest bank Oschadbank JSC, reached its maximum amount of assets during the selected period in the first quarter in 2020 and it was only 314 674 545 thousand, UAH.

The first ratio needed to be overviewed is Return on Assets (ROA). This

indicator demonstrates how well a bank uses its assets in terms of profitability. The worth to mention pitfall of the ratio is that it does not take into account debt factor, whereas such indicator as ROE performs this task better as the total equity capital component is included. Nonetheless, ROA is still valuable to be analyzed, as it clearly shows the relationship between net income and total assets. The average value of ROA in case of PrivatBank was 0,037931 or 3,8% during the given observed period. This means, that on average, every unit of UAH (local currency – hryvna) invested in the bank's assets generated 3,8% of net income in the period from 2009 till 2020. The maximum value of ROA reached the number 0,106695 or 10,7% in the last quarter of 2015, while the minimum value of ROA was -0,48289 or -48,3% in the last quarter of next year 2016.

The overall evolution of this indicator looks like this:

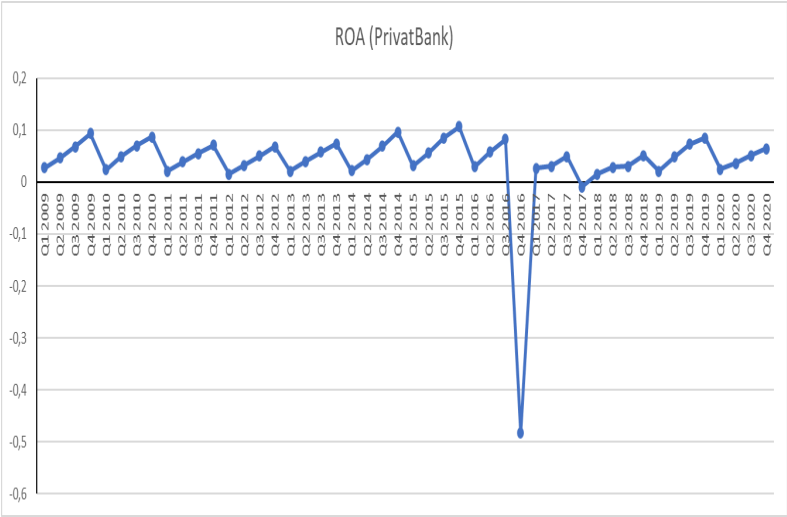

Figure IV.1. ROA of PrivatBank.

The situation before the last quarter of 2016 demonstrates that the value of ROA was moving within the framework of certain cycle. This cycle can be characterized by the increasing ROA through the quarters of each year and with the following decline at the beginning of next one. Despite of the relatively stable growth of total assets and net profit after tax, this movement of ROA can be explained by another component of the ratio – interest expenses. Cyclical development of this component, which had tendency to increase through the year and to decrease at the beginning of following one is the reason why we can observe such tendency of ROA.

As it was said before, ROA reached its lowest value in the last quarter of 2016, which was -0,48289 or -48,3%. This was caused by the enormous fall of the net profit after tax at the end of given year, the value decreased to -135 309 076 thousand, UAH. The main reason was that in 2016, the bank recognized loss on the redemption of financial liabilities of 1363 million, UAH, related to interest expense and foreign exchange translation losses of previous period. As the result, interest expense and foreign exchange translation losses largely decreased gains for 2016 (PJSC CB “PrivatBank”, Separate financial statements and Independent Auditor's Report, 31 December 2016). The following period after 2016 can be

characterized by returning to cyclical development of ROA growth, which was observed before 2016.

The next ratio to be analyzed is Return on Equity (ROE). And, as it was mentioned before, this indicator includes the debt factor of a bank, which can be seen in the variations of total amount of equity capital. The average ROE for PrivatBank in the observed period reached the negative value of -0,18726 or -18,7%, which indicates the issue of inconsistent net profit. The maximum of ROE was 0,115335 or 11,5% in the last quarter of 2010, while the minimum reached the enormous value of -10,6842 in the last quarter of 2016.

The evolution of ROE during the observed period is the following:

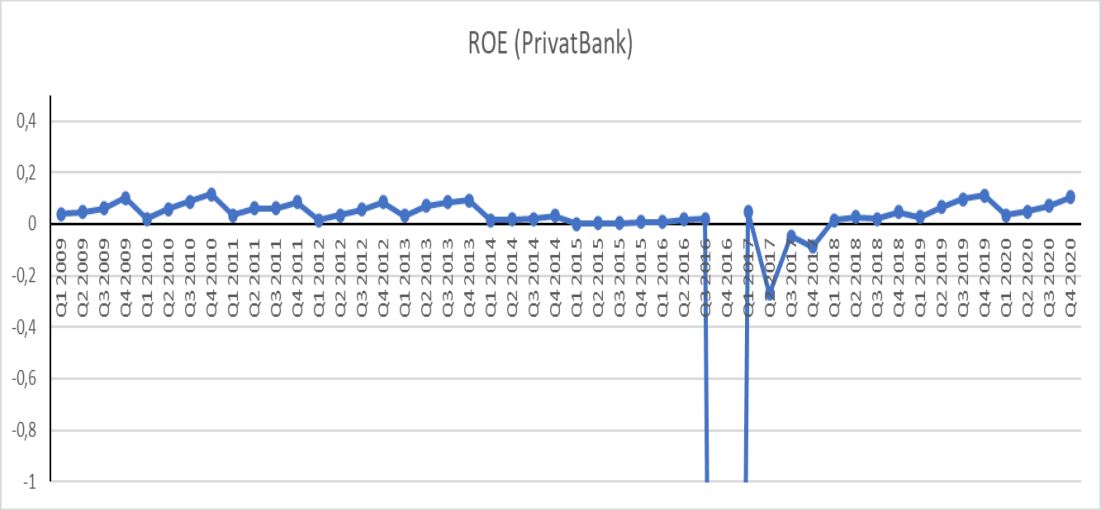

Figure IV.2. ROE of PrivatBank.

As the 2016 peak was too large to insert it in the graph without flattering other quarters' values, we cut the part of graph, where the complete peak of 2016 last

quarter was demonstrated. Such fall of ROE at the end of 2016 can be explained by the same reason as the fall of ROA. Net profit after tax was largely deteriorated by the need to redeem the previous period financial liabilities provoked by the banking regulation crisis of 2014-2015 in Ukraine. This is clearly seen even in the quarters beginning from the first quarter of 2014, when cyclical growth of ROE was replaced by the decreasing tendency. The following period after 2016 demonstrates the relative normalization of ROE development.

The following profitability indicator of our analysis is Return on Deposits (ROD). It indicates how well a bank applies its customer deposits in order to generate net income. The situation of PrivatBank shows that the average value of this indicator during the studied period was 0,002569 or 0,26%, which is quite low, but, nevertheless, not negative. This means, that on average, the bank generated very low amount of net income - 0,26% - with respect to its customer deposits. The period before the last quarter of 2016 demonstrates quite low values of ROD not exceeding 2,1% (the last quarter of 2009). The maximum value of this indicator was observed in the last quarter of 2019, and it was 0,14093 or 14,09% showing the peak of ROD recovery after the biggest fall in the notorious fourth quarter of 2016, when ROD reached the minimum value of -0,74779 or -74,8%. Such fall has the same explanation as ROA and ROE, proving the fact that PrivatBank faced the severe outcomes of the 2014-2015 crisis with the enormously increased amount of financial liabilities.

The overall evolution of ROD looks the following:

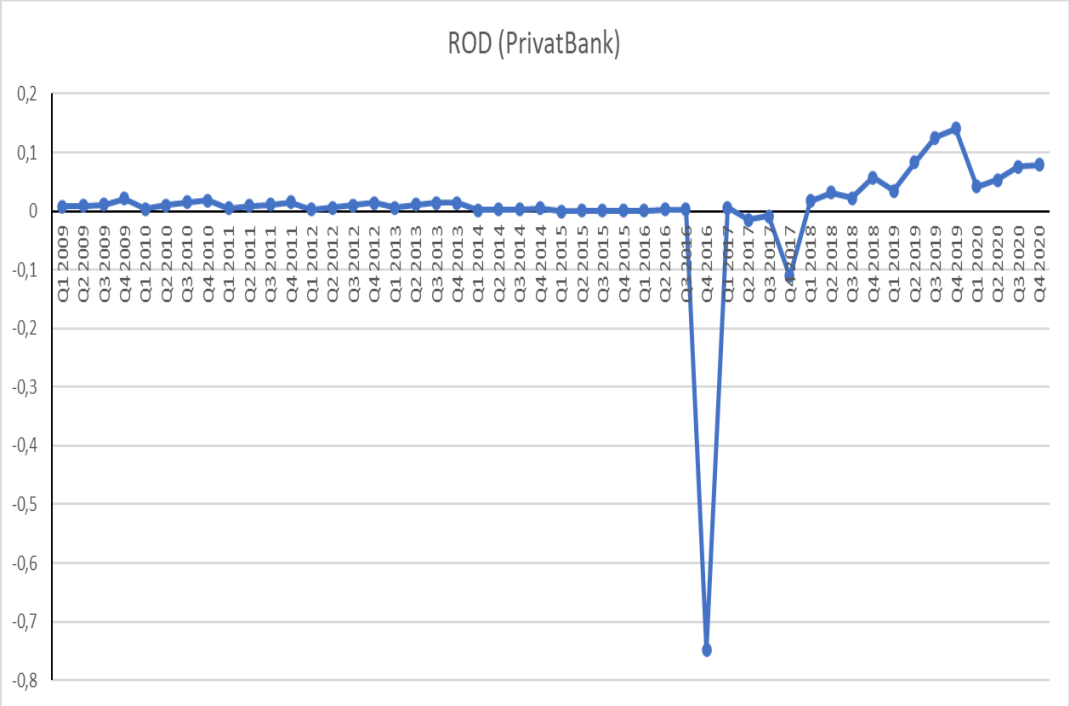

Figure IV.3. ROD of PrivatBank.

Another profitability indicator in our analysis is Net Income Margin (NIM). It measures how much net income was generated as the percentage of total income obtained. The average value of NIM during the post financial crisis period was 0,01925 or 1,9%, which indicates that each UAH unit of total income generated averagely 1,9% of net income in case of PrivatBank. The biggest value of NIM was obtained in the second quarter of 2019, and it was 0,737302 or 73,7%, while the lowest one was -7,55647 reached in the above-mentioned last quarter of 2016. The NIM evolution of PrivatBank is depicted in the following graph:

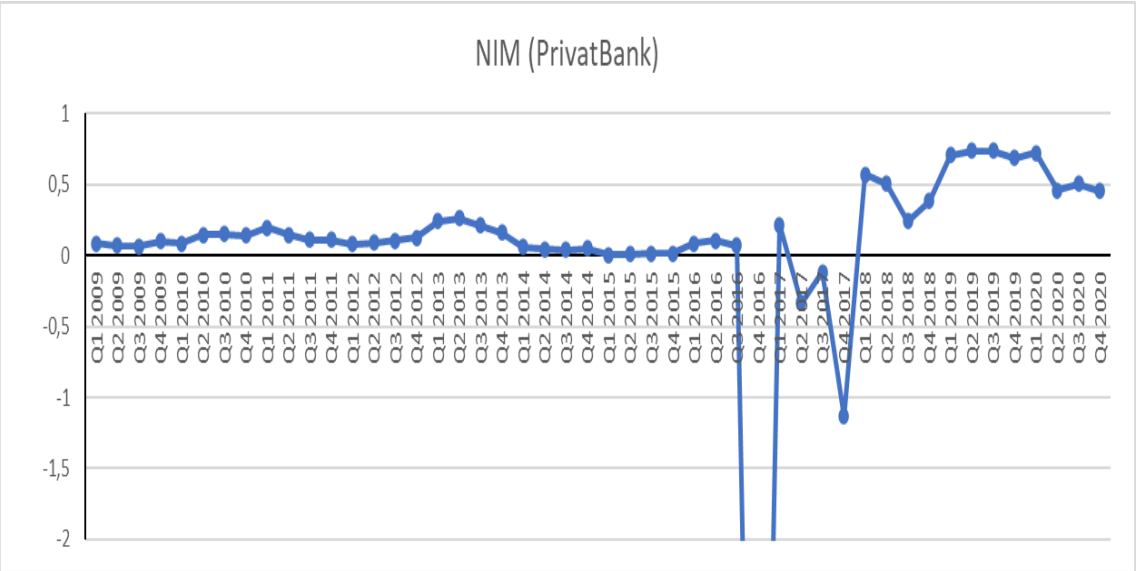

Figure IV.4. NIM of PrivatBank.

Again, as in the case of ROE graph, we cut the part with the lowest peak to omit flattering of other values, as the peak reached quite a low negative point. We can see, that relatively stable period before 2015 did not demonstrate high NIM output, even if the values were not negative. In turn, NIM started to decrease from 2014 reaching the lowest bottom in the fourth quarter of 2016. As the main changes of net income in 2016 was previously explained, there is a need to clarify the second large decrease of net income, which had an impact on NIM, in the last quarter of 2017. According to the Separate Financial Statements together with Independent Auditor's Report for 2017, such decrease can be explained by the fact that in 2017, the bank recognized 217 million UAH of an impairment loss with respect to its investment in an associate and, also, there was an ongoing process of covering financial liabilities from the last quarter of 2016 (PJSC CB

“PrivatBank”, Separate Financial Statements together with Independent Auditor's Report, 31 December 2017). The following period after 2017 indicates the relative stabilization of NIM with the slight decrease in the second quarter of 2020, which was related to the decrease of both total income and net income due to the COVID-19 situation (PJSC CB “PrivatBank”, Separate Financial Statements together with Independent Auditor's Report, 31 December 2020).

From the profitability ratios we pass to the efficiency ones. The first of them to be analyzed is Operating Income to Assets (OIA). This indicator measures the efficiency of a bank in total assets’ usage for generating operating income. The main unique characteristic of OIA is that it takes into account everyday business operations disregarding the cost effects of taxes and interest expenses. The PrivatBank, on average, had 0,037605 or 3,8% of OIA during the studied period, which means that each currency unit of total assets averagely generated 3,8% of the operating income. The largest value of OIA was obtained in the last quarter of 2015, and it was 0,106545 or 10,7%, while the lowest value, -0,48053 or -48,1%, was observed in the notorious fourth quarter of 2016. The reason why the indicator declined so at the end of 2016 was due to the negative value of the operating income caused by the above-mentioned deterioration of net profit after tax (even if the OIA formula disregards the effects of tax and interest expenses).

The overall OIA evolution can be demonstrated through the following graph:

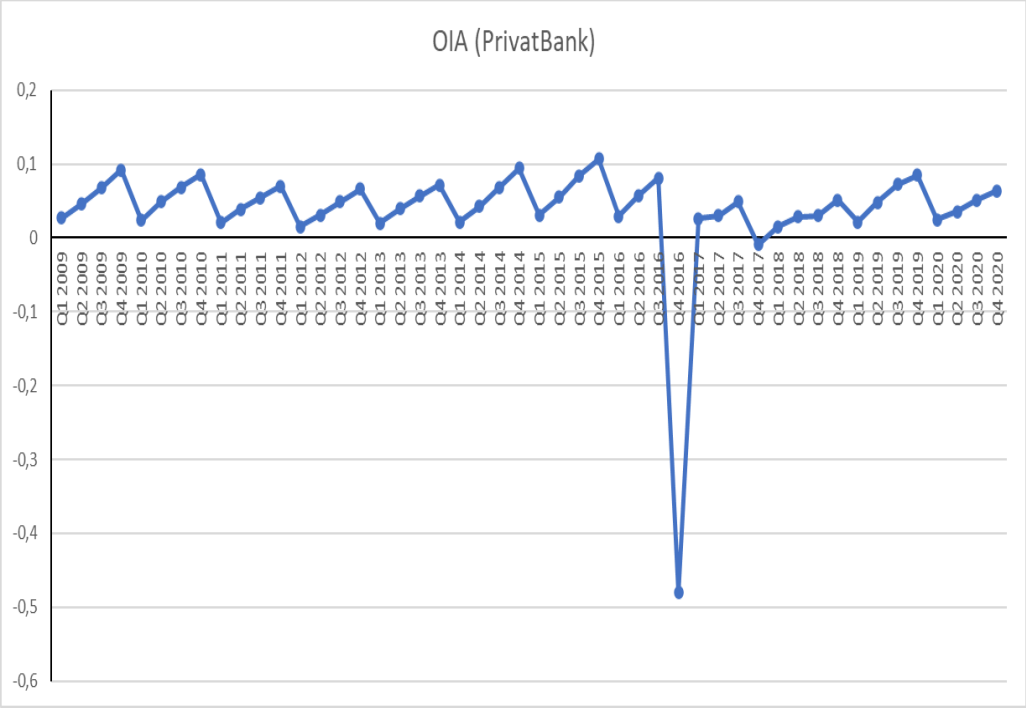

Figure IV.5. OIA of PrivatBank.

Such cyclical nature of OIA under normal conditions is dictated by the specific movements, which were described in the ROA case, of net profit after tax and interest expense components. These components tend to increase through all quarters of a certain year with the following fall at the beginning of next year's quarter.

Another efficiency ratio is the above-mentioned Asset Turnover (AT). It indicates how effectively a bank uses its assets in order to generate total income. The asset turnover ratio may be intentionally reduced when a bank purchases large amount of assets expecting higher growth. In contrast, selling assets in preparation for growth decline will lead to the ratio's increase. During the post financial crisis period, PrivatBank averagely generated 0,049096 or 4,9% of total income for each currency unit of assets. The maximum value, 0,12447 or 12,4%, was reached in

the last quarter of 2009, while the lowest one, 0,009087 or 0,9%, was observed in the first quarter of 2016.

The following graph demonstrates the AT evolution during the analyzed period:

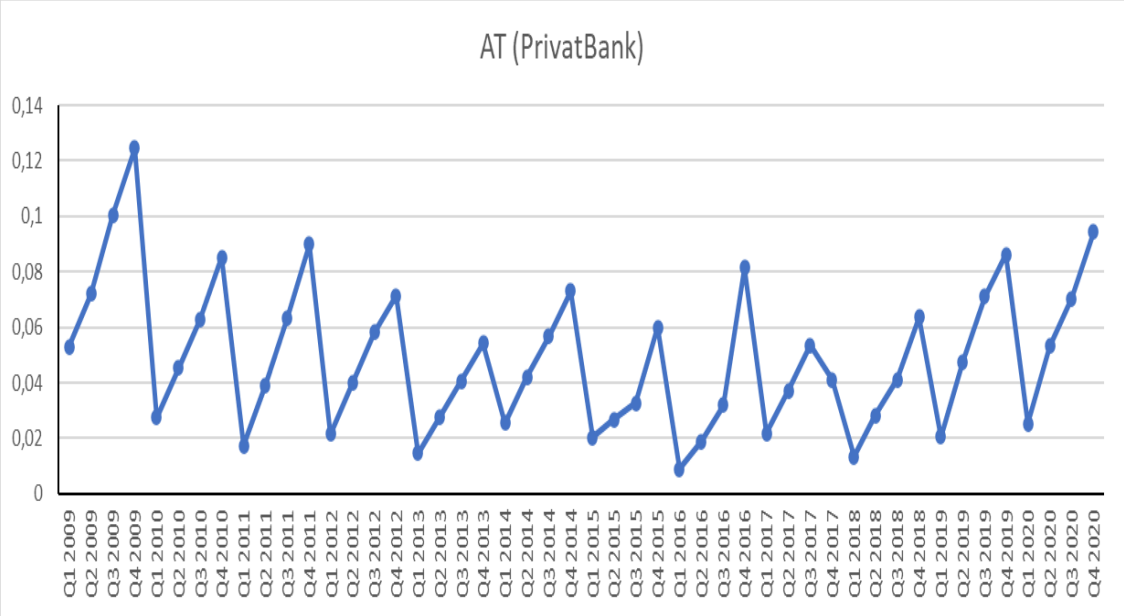

Figure IV.6. AT of PrivatBank.

Despite of the generally low results, AT indicator did not reach the negative value during the post financial crisis years, which indicates positive magnitudes of total income generated per one currency unit of the bank's assets. Despite of the relatively stable tendency of total assets to increase during the studied period, cyclical nature of AT movements is caused by the cyclical movements of total income, which, in turn, is highly impacted by the above-mentioned movements of interest expenses, as total income of a bank is obtained summing up components

also including net interest income.

As for the liquidity ratios, the first of them to be described in the given analysis is Cash to Assets (CTA). It is one of the measures of banking liquidity, which represents the percentage of total assets made up of cash and its equivalents. In case of PrivatBank, its average value of CTA during the studied period was 0,106626 or 10,66%, which shows that around 10,66% of total assets constituted by highly liquid bank's assets – cash and its equivalents. The highest value of CTA, 0,183338 or 18,3%, was observed in the third quarter of 2010, whereas the lowest one, 0,040057 or 4,01% , was in the last quarter of 2017.

It is clearly observable, according to the CTA graph, that there was not any strict tendency of this indicator's movement during the post financial crisis period. This is mainly related to the fact that amount of cash varied from quarter to quarter with the large decrease in the first quarter of 2017, which was obviously caused by the above-mentioned requirement to cover enormously raised financial liabilities. Nevertheless, this indicator stayed positive during the whole observed years indicating liquidity of the analyzed bank.

The evolution of CTA is depicted in the following graph:

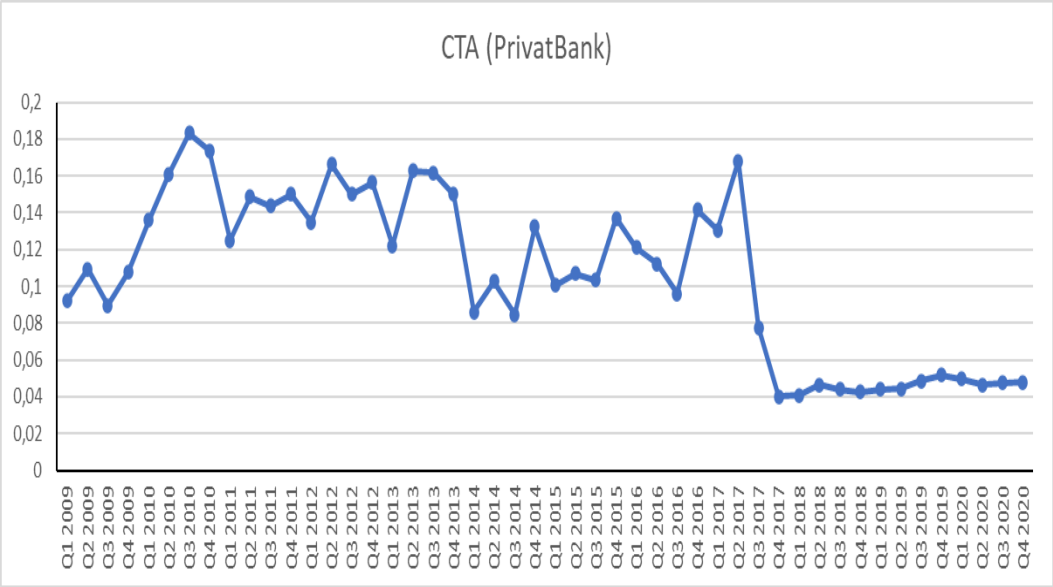

Figure IV.7. CIA of PrivatBank.

The second liquidity indicator Cash to Deposits (CTD) demonstrated quite similar situation to what was observed in case of the CTA. CTD can be described as the ratio showing the level of liquidity deriving from the banking requirement to hold appropriate amount of cash in order to service customers' net withdrawals. PrivatBank, on average, kept the level of CTD amounted to 0,171176 or 17,1% during the studied period. The maximum value, 0,282526 or 28,2%, was in the third quarter of 2010, while the minimum one, 0,087323 or 8,7%, was in the last quarter of 2020.

The upper graph shows the CTD evolution in the analyzed years:

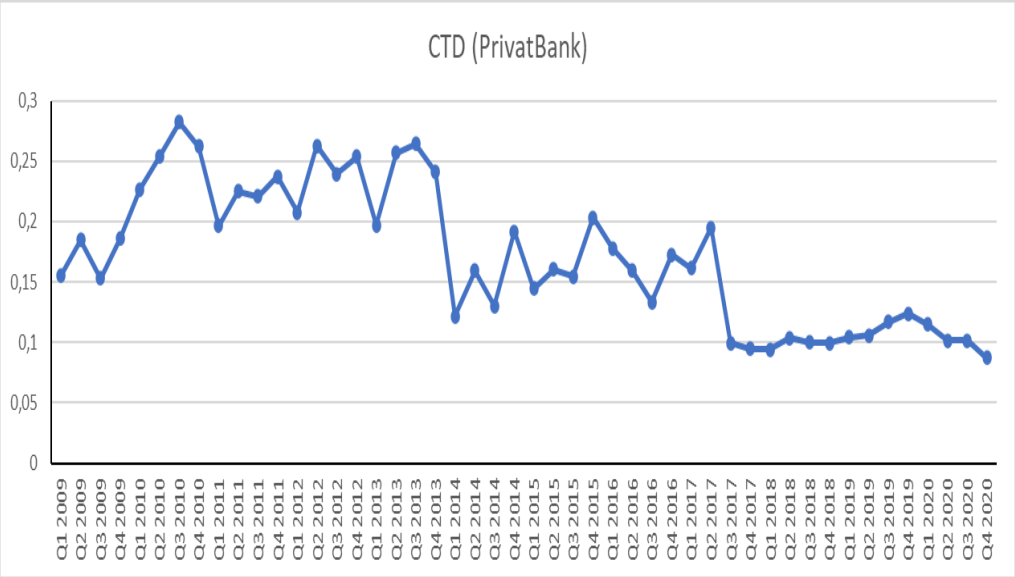

Figure IV.8. CTD of PrivatBank.

Due to the graph, it is clearly seen, that the level of CTD severely decreased at the beginning of 2017 with no following serious rise (it even reached the minimum in the last quarter of the period). Such tendency is explained by the consequences of the banking regulation crisis 2014-2015 for PrivatBank, which were described earlier. Generally, the analyzed bank kept the CTD ratio in the positive boundaries, even with high fluctuations, during the post financial crisis years.

Summing up the ratios' analysis of PrivatBank, we can conclude that the banking performance was more severely impacted by the national banking regulation crisis rather than the global financial crisis in 2008. The growth of such indicators as AT,CTD and CTA in the first years after the financial crisis largely enhance this conclusion. Despite of the overall recovery of the Ukrainian banking activities in the second half of the studied period, some ratios, like CTD, still require improvement.

Below on the page, a reader can find all values for each indicator and for each quarter during the observed period.

Table IV.1. All banking indicators of PrivatBank during the observed period.

	ROA	ROE	ROD	OIA	AT	CTA	CTD	NIM
Q1 2009	0,026969	0,0398956	0,00770597	0,02694	0,0529427	0,092028	0,155391	0,0862
Q2 2009	0,046119	0,04727411	0,00862646	0,04585	0,0720927	0,1093087	0,184994	0,0707
Q3 2009	0,068156	0,06003405	0,0109454	0,06776	0,1005748	0,0895119	0,15309	0,06363
Q4 2009	0,093007	0,10227999	0,02107922	0,0919	0,1244698	0,10749	0,185636	0,09806
Q1 2010	0,02384	0,02054563	0,00389876	0,02401	0,0275155	0,1360642	0,226499	0,08512
Q2 2010	0,048945	0,05795736	0,01020002	0,0486	0,045375	0,1611077	0,253773	0,14271
Q3 2010	0,069327	0,08633978	0,01465906	0,06863	0,0627167	0,1833384	0,282526	0,15168
Q4 2010	0,086391	0,11533525	0,01822464	0,08536	0,0852741	0,1738929	0,262373	0,14165
Q1 2011	0,02032	0,03526292	0,00533109	0,02059	0,0173998	0,124941	0,196702	0,19461
Q2 2011	0,038733	0,06168124	0,00874242	0,03861	0,039063	0,1484603	0,225195	0,14754
Q3 2011	0,054278	0,06014874	0,01063805	0,054	0,0634307	0,143706	0,220583	0,10926
Q4 2011	0,070784	0,0851387	0,0155247	0,06978	0,089772	0,1500216	0,237048	0,10945
Q1 2012	0,015437	0,01570124	0,0026746	0,01503	0,0215882	0,1348169	0,207502	0,08049
Q2 2012	0,031627	0,0342046	0,00576475	0,0309	0,0398164	0,1663509	0,262716	0,09168
Q3 2012	0,050002	0,0558271	0,0096091	0,04883	0,0582708	0,1499003	0,239148	0,10336
Q4 2012	0,067492	0,0837539	0,01441347	0,06597	0,071433	0,15634	0,253498	0,12444
Q1 2013	0,020361	0,03292463	0,00575353	0,02	0,0147842	0,1220263	0,196746	0,24137
Q2 2013	0,039942	0,07006194	0,01144988	0,03925	0,027783	0,1626226	0,257132	0,26064
Q3 2013	0,057617	0,08613473	0,0139687	0,05635	0,0406483	0,1616895	0,264128	0,21037
Q4 2013	0,073082	0,0922325	0,01402753	0,07178	0,0541991	0,1499236	0,240786	0,16115
Q1 2014	0,022151	0,01412934	0,00211985	0,02184	0,0254522	0,0859497	0,121644	0,05885
Q2 2014	0,043785	0,01856792	0,00293685	0,04263	0,0421009	0,1028538	0,15929	0,04504
Q3 2014	0,069148	0,02038199	0,00324151	0,06838	0,0566888	0,0847542	0,129916	0,0373
Q4 2014	0,095736	0,03300248	0,00529959	0,09418	0,0730929	0,1323438	0,191565	0,05009
Q1 2015	0,031156	0,00027677	3,7108E-05	0,03105	0,0203257	0,1004826	0,144704	0,00127
Q2 2015	0,055805	0,00243091	0,00038407	0,05554	0,026866	0,1068084	0,160578	0,00951
Q3 2015	0,084697	0,003555	0,00055587	0,08441	0,0327464	0,1033005	0,154519	0,01135
Q4 2015	0,106695	0,0078626	0,00121334	0,10655	0,0599381	0,1368898	0,20357	0,01361
Q1 2016	0,029266	0,00758823	0,0011238	0,02914	0,0090868	0,1209515	0,177784	0,08414
Q2 2016	0,057964	0,01769619	0,00280585	0,05767	0,0188363	0,1120629	0,159231	0,10483
Q3 2016	0,081832	0,01950494	0,00301627	0,08132	0,0319073	0,0959731	0,133183	0,06812
Q4 2016	-0,48289	-10,684187	-0,74778756	-0,48053	0,0813861	0,1417393	0,172345	-7,5565
Q1 2017	0,026318	0,04786679	0,00577018	0,02632	0,021775	0,1306708	0,161502	0,2144
Q2 2017	0,030091	-0,2711575	-0,01458111	0,03001	0,0373036	0,1681693	0,194744	-0,3375
Q3 2017	0,049238	-0,0460289	-0,00804078	0,04915	0,0535238	0,0774934	0,099481	-0,117
Q4 2017	-0,00934	-0,0889248	-0,11011353	-0,0093	0,0412581	0,040057	0,094439	-1,132
Q1 2018	0,015054	0,01481512	0,01765356	0,01505	0,0134331	0,0409706	0,09422	0,57145
Q2 2018	0,028466	0,02779337	0,03181055	0,02846	0,0282848	0,0463703	0,103741	0,5027
Q3 2018	0,030368	0,01900842	0,02246713	0,03035	0,0410179	0,0439115	0,099823	0,24095
Q4 2018	0,051024	0,04659465	0,0568934	0,05101	0,0637627	0,0425425	0,099334	0,38214
Q1 2019	0,021095	0,02690664	0,03440644	0,02109	0,020554	0,0438958	0,104306	0,70446
Q2 2019	0,048172	0,06541546	0,08338625	0,04817	0,0474805	0,0443781	0,105707	0,7373
Q3 2019	0,072107	0,09612351	0,12525927	0,07211	0,0709593	0,0486082	0,116712	0,73518
Q4 2019	0,084744	0,11149171	0,1409297	0,08474	0,0862868	0,0518081	0,123607	0,68456
Q1 2020	0,024414	0,03381559	0,04210955	0,02441	0,0253233	0,0496708	0,114734	0,71989
Q2 2020	0,035887	0,04825475	0,05320329	0,03589	0,053204	0,0465363	0,101662	0,45775
Q3 2020	0,051224	0,07147786	0,07548586	0,05122	0,0704252	0,0475888	0,101314	0,50347
Q4 2020	0,06405	0,10472223	0,07851175	0,06404	0,0944278	0,0477404	0,087323	0,45456

4.3. RATIOS' ANALYSIS OF GERMAN BANK

In case of German banking analysis, we studied the evolution of ratios' analysis of Deutsche Bank. The bank's total amount of assets during the post crisis period ranged from the minimum value of 1 297 674 million EUR to the maximum of 2 282 479 million EUR, which makes it the biggest bank in Germany according to the total assets' criterion.

As for the ROA, Deutsche Bank demonstrated quite modest results. On average, in the studied period ROA of Deutsche Bank gained the value of 0,001726 or 0,2%. The maximum was 0,003557 or 0,4% in the second quarter of 2011 and the minimum reached the value of -0,00178 or -0,2 in the third quarter of 2015.

The overall development of this indicator is depicted in the graph below:

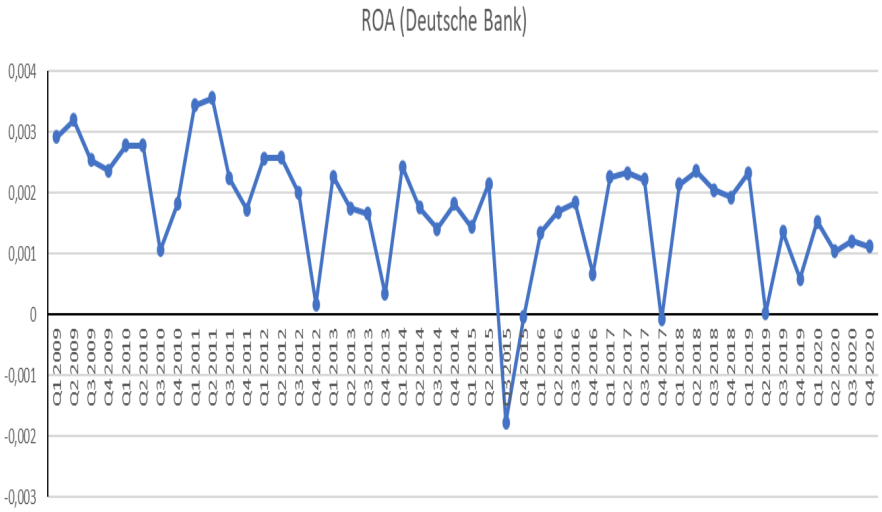

Figure IV.9. ROA of Deutsche Bank.

It could be seemed due to the graph, that ROA is highly unstable during the observed period because of high level of fluctuations, but the above-mentioned fact about short range of maximum and minimum values of ROA refutes such assumption. The “peaky” nature of ROA development can be explained by the changing in values of net profit after tax, which highly varied from quarter to quarter, whereas other two components of the indicator – interest expense and total assets – are less fluctuated.

The second profitability indicator ROE shows even higher level of indicator’s fluctuation during the period, and, as in case of ROA, it is also due to fluctuated net profit after tax. The average ROE over the period was 0,002263 or 0,22%, which is quite low, but not negative, nevertheless. The maximum value, 0,045427 or 4,5%, was in the first quarter of 2010, while the minimum, -0,0942 or -9,4%, as in case of ROA, was observed in the third quarter of 2015. Such fall in both cases of ROA and ROE is explained by the number of net profit after tax amounted to -6024,24 million EUR in this quarter. There were also other decreases of net income to negative values, which were reflected in the overall ROE evolution.

Such evolution is presented in the following graph:

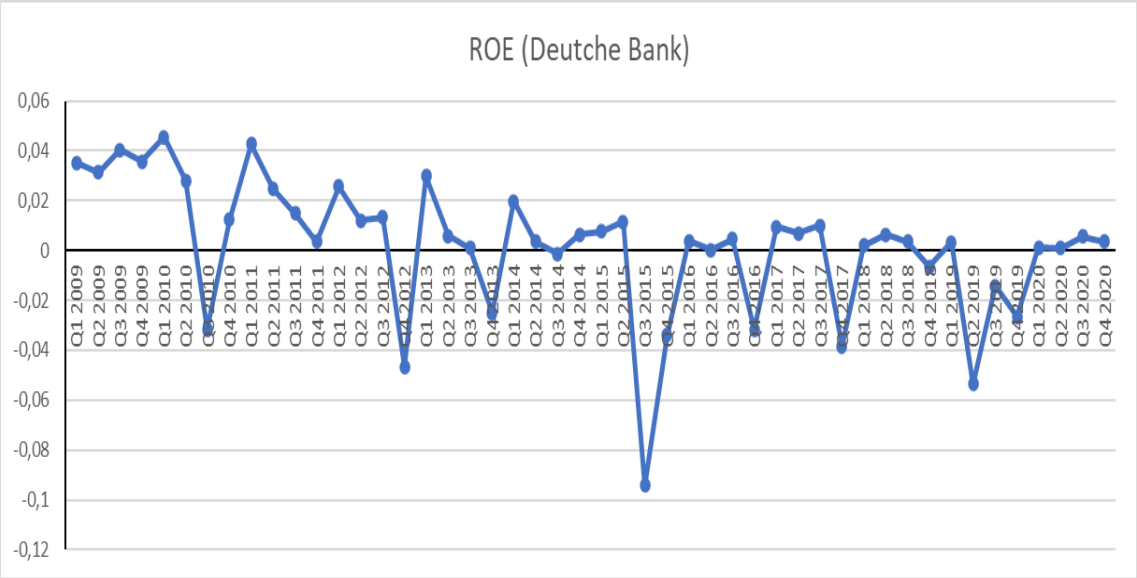

Figure IV.10. ROE of Deutsche Bank.

According to the graph, it is clearly observable that ROE indicator became more inclined to decrease under zero in the period after 2015, which reveals the issue of negative amount of net income generated per unit of equity capital. Apart from the inconsistent net income problem, it can be explained by higher capital requirements imposed by EU supervisory designed after the financial crisis, which was described in the previous chapter.

The almost identical situation can be observed in case of ROD. Its average value during the whole period reached 0,000183 or 0,02%, while the maximum and minimum values were 0,004855 or 0,5% and -0,01056 or -1,1%, respectively. The similarity of ROD tendency to ROE is enhanced by the fact, that both of maximum and minimum ROD values were reached in the same quarters as those values of ROE. This gives us a possibility to conclude that the fluctuation of net

income is the common reason of changes in case of profitability indicators of Deutsche Bank.

The ROD ratio's evolution is the following:

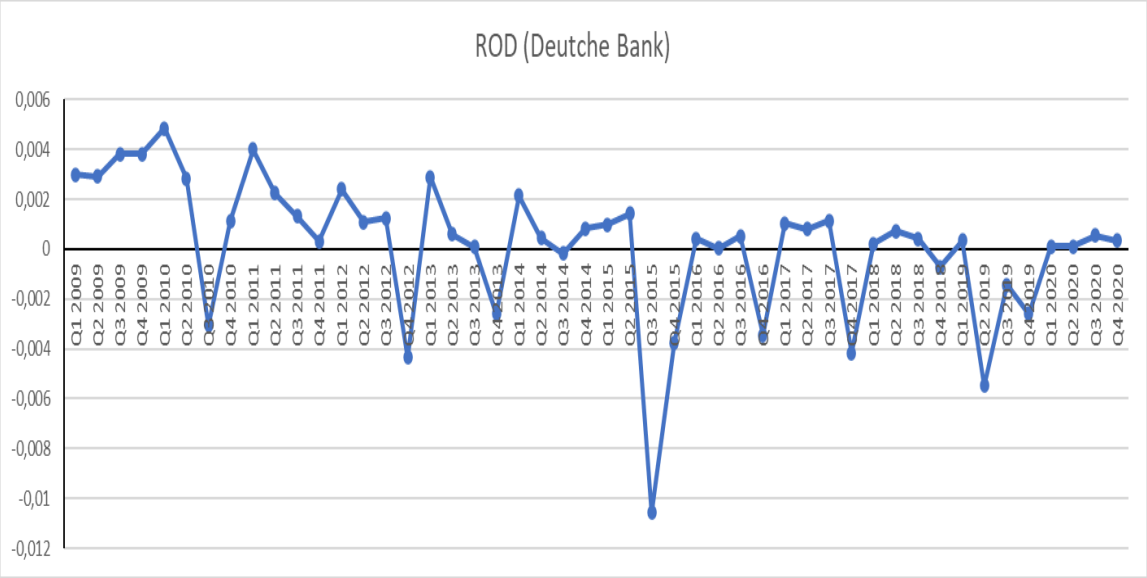

Figure IV.11. ROD of Deutsche Bank.

The additional evidence to the common reason of profitability ratios' evolution is the NIM. It even reached, on average, the negative value of -0,00623 or -0,6% showing that each currency unit of total income averagely generated the number of net income below zero. The maximum and minimum values were observed in the same quarters as the previous two profitability ratios, and they were 0,203867 and -0,58501, respectively. Apart from the mentioned net income fluctuations, the negative average of NIM was also obtained due to the decreasing tendency of total income during the second half of the observed period. From the 10020,6 million

EUR at the beginning of 2018, total income fell to the amount of 6745,1 million EUR in the last quarter of 2020.

The overall NIM evolution is the following:

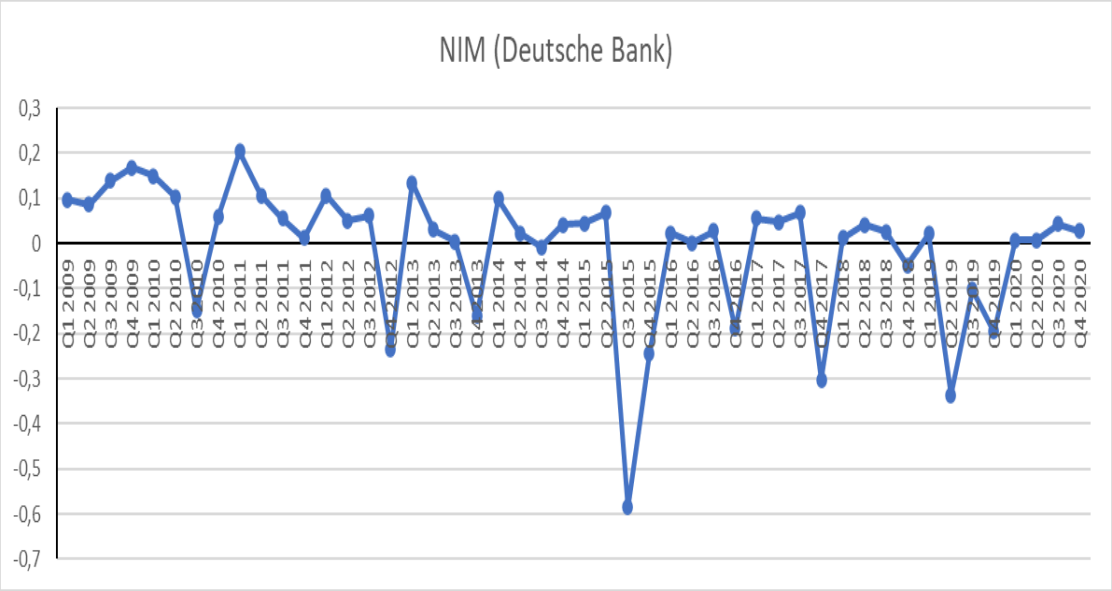

Figure IV.12. NIM of Deutsche Bank.

As for the efficiency indicators, OIA and AT were impacted by the high variations in net profit after tax too, as this component comprised both operating and total incomes. The average OIA during the period reached 0,00164 or 0,16% showing that each currency unit of assets averagely generated 0,16% of operating income in case of Deutsche Bank. The range of this OIA development varied from the maximum, 0,003921 or 0,39% in the first quarter of 2011, to the minimum, -0,00173 or -0,17% in the third quarter of 2015, demonstrating generally low results of the German bank's efficiency in generating operating income.

The following graph indicates the OIA development:

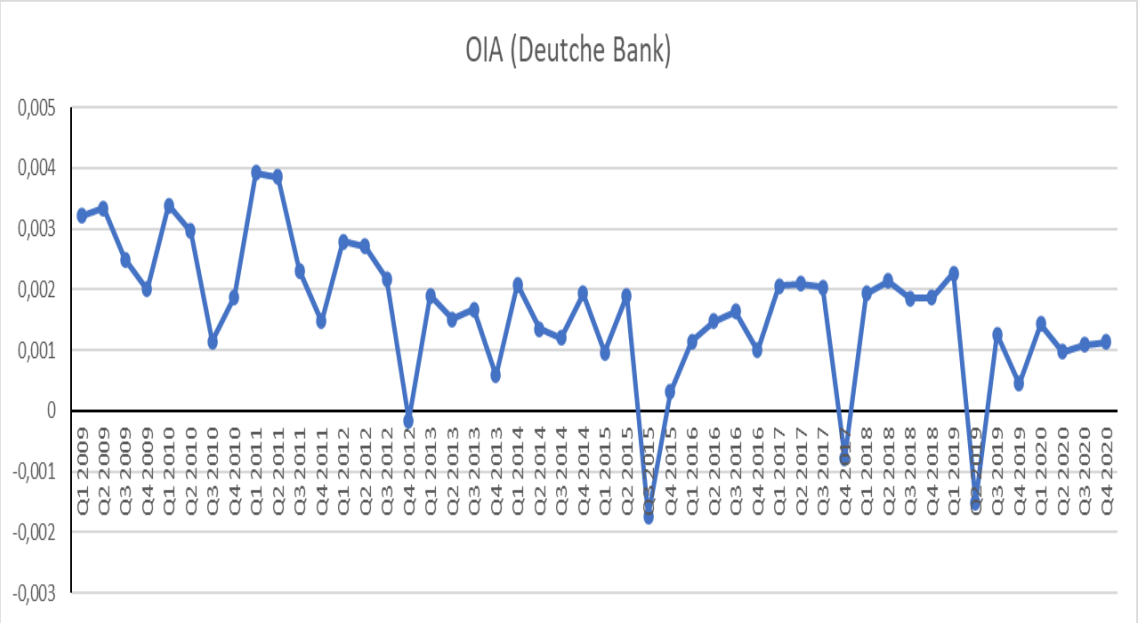

Figure IV.13. OIA of Deutsche Bank.

Referring to the results of AT, this indicator, compared to OIA, reached higher results without any negative values, which can be explained by lower influence of the net profit after tax component included in the total income with other income elements. The average AT of Deutsche Bank during the post crisis period was 0,006018 or 0,6% with the maximum, 0,00716 or 0,7% in the second quarter of 2009, and the minimum, 0,004224 or 0,4% in the third quarter of 2010, demonstrating positive results with the highest fluctuations in the first two years after the financial crisis and following relative stabilization.

The development of AT can be observed in the following graph:

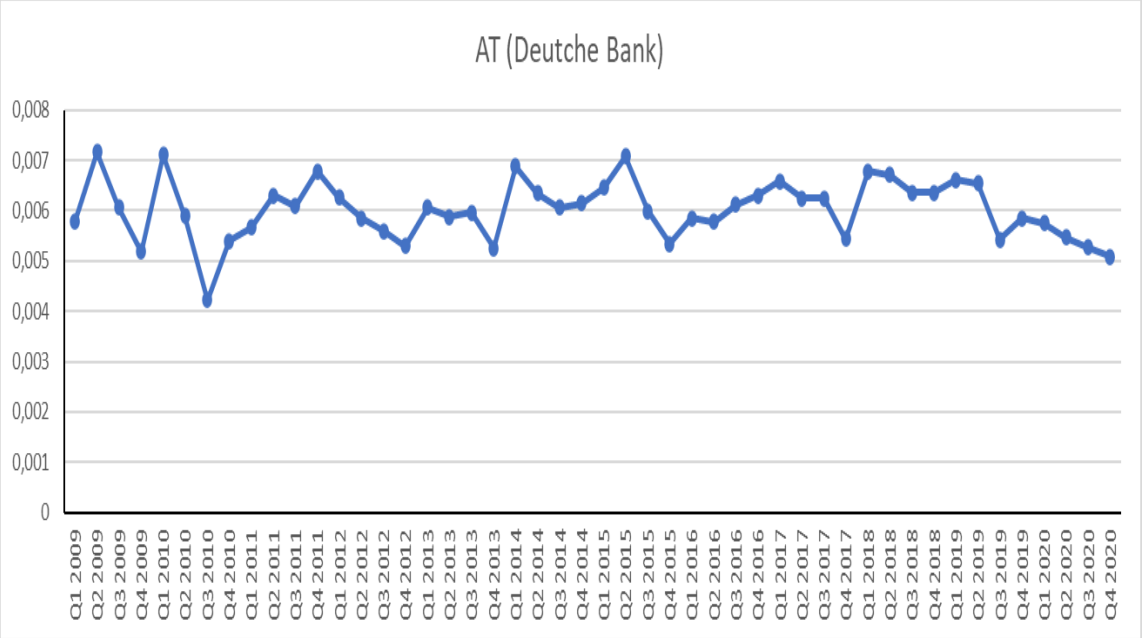

Figure IV.14. AT of Deutsche Bank.

As for the liquidity ratios, CTA and CTD both demonstrated positive results during the observed period with common continuous increase beginning from the fourth quarter of 2013. Since the total assets and total customer deposits stayed relatively stable during the post financial crisis years, such liquidity rise is easily explained by the increase of cash and its equivalents on the bank's account. The reasons of this were policy restrictions and new regulations' implementation in the German banking related to preservation of negative consequences of the crisis described in the previous chapter. German banks were obliged to keep higher amount of cash in order to safely service thecustomer deposits, and Deutsche Bank did not become the exception. The slight decrease of the given indicators

can be observed in the quarters of 2020, which is related to the COVID-19 complications and business activities' restrictions.

The average CTA and CTD during the observed period were 0,061296 and 0,167664, respectively. While the maximum of CTA was 0,153424 or 15,3% with the minimum of 0,005351 or 0,53%, the range of CTD comprised the maximum of 0,396428 or 39,6% and the minimum of 0,024967 or 2,5%. Such results indicated generally acceptable level of liquidity of Deutsche Bank in the studied years.

The following graphs illustrate the development of CTA and CTD, respectively:

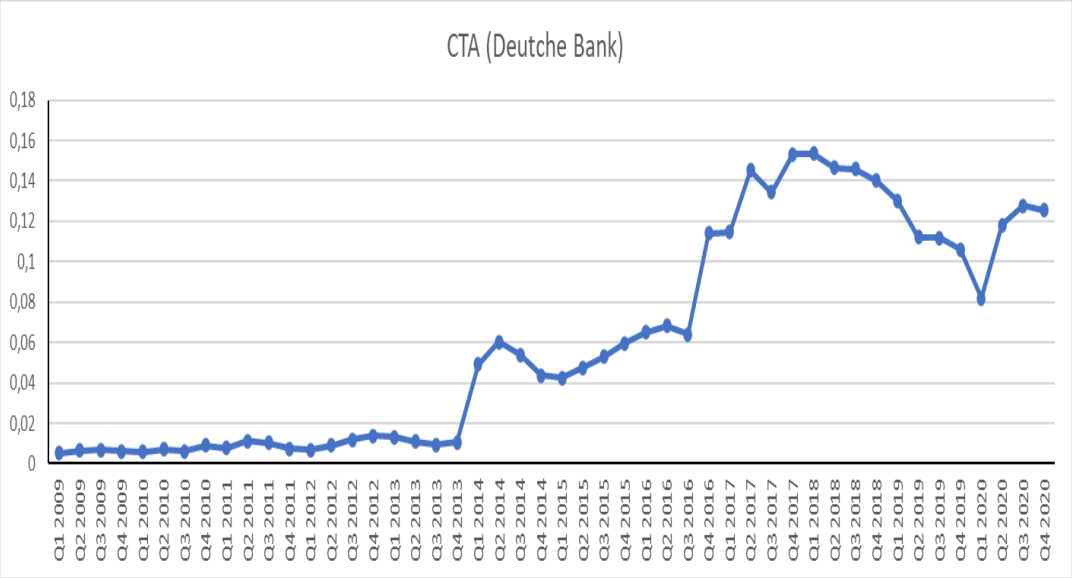

Figure IV.15. CTA of Deutsche Bank.

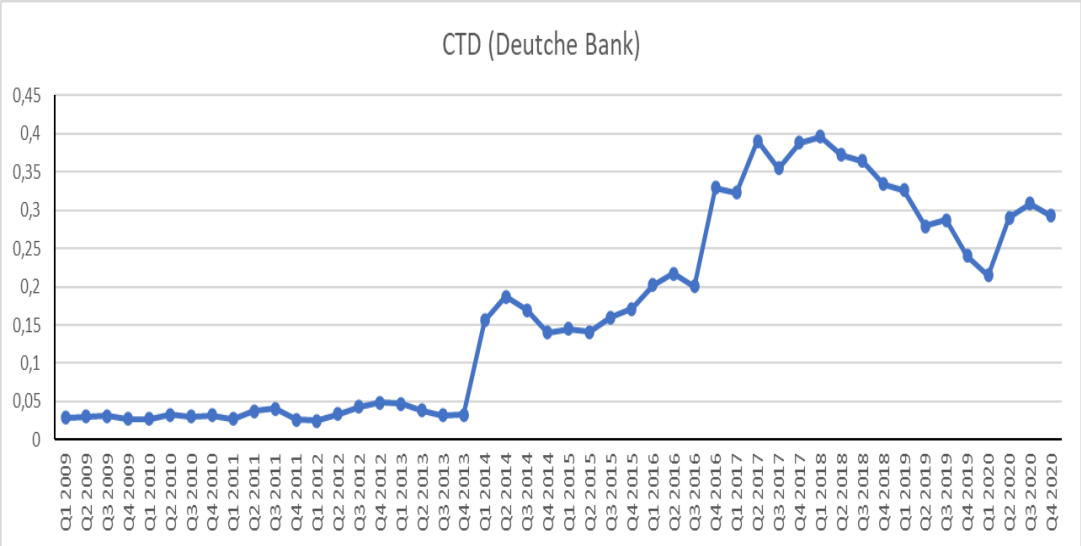

Figure IV.16. CTD of Deutsche Bank.

Overall banking performance of Deutsche Bank in the give period can be characterized by relatively low results of the above-mentioned indicators, which demonstrates poor returns on the main banking activities. However, the boundaries of ratios' range indicated no high decreases and positively stable situation of the banking activities in the post financial crisis years. On the following page, a reader can find all ratios of Deutsche Bank for each quarter during the analyzed period.

Table IV.2. All banking indicators of Deutsche Bank during the observed period

	ROA	ROE	ROD	OIA	AT	CTA	CTD	NIM
Q1 2009	0,002918	0,035115	0,002987	0,003219	0,005799	0,00535127	0,028447949	0,096909
Q2 2009	0,003198	0,031287	0,002914	0,003337	0,00716	0,00638997	0,030046238	0,086564
Q3 2009	0,00254	0,040301	0,003817	0,002493	0,006062	0,00677229	0,030794059	0,138469
Q4 2009	0,002371	0,035746	0,003806	0,002002	0,005186	0,00622791	0,02715124	0,168316
Q1 2010	0,002782	0,045427	0,004855	0,00339	0,007105	0,00599243	0,027346738	0,149718
Q2 2010	0,002777	0,028087	0,00283	0,002963	0,005887	0,00697789	0,032615265	0,102849
Q3 2010	0,001056	-0,03165	-0,00306	0,001143	0,004224	0,00612387	0,030074679	-0,14728
Q4 2010	0,001818	0,012393	0,001133	0,001872	0,005398	0,00900332	0,032130176	0,058812
Q1 2011	0,003437	0,042616	0,003995	0,003921	0,005671	0,0077829	0,026895365	0,203867
Q2 2011	0,003557	0,024633	0,002245	0,003852	0,006299	0,0112132	0,037767698	0,105819
Q3 2011	0,002241	0,014976	0,001321	0,002313	0,006084	0,01038651	0,040303153	0,055952
Q4 2011	0,001726	0,003484	0,000309	0,001478	0,006782	0,00736009	0,026470344	0,012674
Q1 2012	0,002565	0,025598	0,002392	0,002792	0,006254	0,00695898	0,024967356	0,10659
Q2 2012	0,002577	0,011941	0,0011	0,002711	0,005847	0,00900288	0,033444663	0,050625
Q3 2012	0,002001	0,013279	0,001242	0,002171	0,0056	0,01197971	0,043252274	0,061407
Q4 2012	0,000164	-0,04653	-0,00435	-0,00016	0,0053	0,01378498	0,048296141	-0,23445
Q1 2013	0,002265	0,029755	0,002888	0,001895	0,006068	0,01319083	0,046617708	0,134654
Q2 2013	0,001748	0,005828	0,000605	0,001509	0,005874	0,01109751	0,038268724	0,029859
Q3 2013	0,001656	0,000905	9,51E-05	0,001675	0,00596	0,00948818	0,031572011	0,004796
Q4 2013	0,000337	-0,02495	-0,00259	0,000587	0,005258	0,01064577	0,032505157	-0,16114
Q1 2014	0,002428	0,019791	0,002136	0,002076	0,006882	0,04920461	0,155889496	0,097969
Q2 2014	0,001762	0,003675	0,000442	0,001354	0,006339	0,0603491	0,187054345	0,022517
Q3 2014	0,001407	-0,00138	-0,00017	0,001197	0,006061	0,05376234	0,16917894	-0,00884
Q4 2014	0,001819	0,006459	0,000828	0,001929	0,006144	0,04358978	0,139759065	0,042049
Q1 2015	0,001435	0,007663	0,000976	0,000965	0,006455	0,04233111	0,144482302	0,044303
Q2 2015	0,002144	0,011559	0,001427	0,001902	0,007078	0,04751514	0,140429161	0,068206
Q3 2015	-0,00178	-0,0942	-0,01056	-0,00173	0,005989	0,05305478	0,159974247	-0,58501
Q4 2015	-4,2E-05	-0,0339	-0,00375	0,000313	0,005339	0,05950416	0,170977846	-0,24431
Q1 2016	0,001347	0,00384	0,000423	0,00115	0,005846	0,06494427	0,202167588	0,02324
Q2 2016	0,001691	0,000322	3,52E-05	0,001476	0,005775	0,06813555	0,217217921	0,00191
Q3 2016	0,001843	0,004502	0,000514	0,001641	0,006114	0,06409293	0,200236878	0,026926
Q4 2016	0,000671	-0,0316	-0,00344	0,001001	0,006303	0,11402615	0,329630147	-0,1886
Q1 2017	0,002256	0,009601	0,001033	0,002062	0,006583	0,11468915	0,322502967	0,055814
Q2 2017	0,002324	0,007029	0,000799	0,002097	0,006245	0,1450302	0,390574185	0,04754
Q3 2017	0,002217	0,009876	0,001127	0,002031	0,006245	0,13433862	0,354999422	0,068267
Q4 2017	-8,2E-05	-0,03838	-0,00417	-0,00077	0,005434	0,15301433	0,387808065	-0,30256
Q1 2018	0,002141	0,001938	0,00021	0,00193	0,006781	0,15342379	0,396427586	0,01198
Q2 2018	0,002358	0,006404	0,000718	0,00214	0,006714	0,14644061	0,372589545	0,042057
Q3 2018	0,002051	0,003658	0,000414	0,00185	0,006359	0,14579202	0,363984375	0,026084
Q4 2018	0,001927	-0,00654	-0,00072	0,00186	0,006365	0,13999415	0,334389848	-0,04763
Q1 2019	0,002329	0,003188	0,000349	0,002266	0,006608	0,13033475	0,325702598	0,021117
Q2 2019	2,83E-05	-0,05362	-0,00546	-0,00151	0,006541	0,11209669	0,27923661	-0,33531
Q3 2019	0,00136	-0,01426	-0,00142	0,001263	0,00542	0,11182664	0,287201432	-0,10228
Q4 2019	0,000589	-0,02656	-0,00259	0,000443	0,005854	0,10602978	0,240458141	-0,19527
Q1 2020	0,00153	0,001172	0,000116	0,001436	0,005745	0,08173589	0,214998586	0,00765
Q2 2020	0,001039	0,001096	0,000106	0,00097	0,005463	0,11812168	0,29012726	0,007888
Q3 2020	0,00121	0,005637	0,000537	0,001086	0,005267	0,12767794	0,308285476	0,042242
Q4 2020	0,001117	0,003444	0,000332	0,001128	0,00509	0,12541568	0,292604205	0,027972

CONCLUSION

Comparing the results of both banks from Germany and Ukraine, quite controversial assumption could arise in mind of a reader. At the first sight, the banking performance of Ukrainian bank is more efficient than of German one. This is true, but regarding of all background of both banking systems, this can be hardly considered as the obvious advantage of the Ukrainian bank.

Table 3. Average results in the post financial crisis period of both banks' indicators.

	ROA	ROE	ROD	OIA	AT	CTA	CTD	NIM
Deutsche Bank (in %)	0,2	0,22	0,02	0,16	0,6	6,13	16,8	-0,6
PrivatBank (in %)	3,8	-18,7	0,26	3,8	4,9	10,66	17,1	1,9

As it was described in the previous chapters, the banking system of Ukraine struggled with the usage of risky operations during the whole post crisis period. However, it is quite obvious according to the indicators that such high average results were extrapolated from the ranges, in which minimum values of some indicators were enormously low in certain quarters of the observed period. For instance, the minimum value of ROE, the most objective ratio including debt factor, during all analyzed quarters reached the bottom point of vast -10,6842. This proves the fact, that Ukrainian bank was not successful in effectively generating net income from one currency unit of capital equity, exposing the bank's instability and propensity to risky operations during the post financial crisis period. Therefore, despite of the higher average results of banking

performance indicators of Ukrainian representative, we can conclude that the banking system of Ukraine can produce higher returns at the expense of falling into enormous peaks due to overall system instability and due to such internal macroeconomic catastrophe, as the Banking Regulation crisis of Ukraine in 2014-2015.

As for the German bank's results, the value ranges of all indicators during the post crisis years were quite narrow. And despite of the absence of outstanding high results of ratios, the German representative, taking into account the above-mentioned narrow ranges of indicators' values, demonstrated the general stability of the banking system performance in the post financial crisis period. This can be explained by the implementation of new regulatory regime in Germany as a response to the consequences of the Great Recession. Such regime impacted all types of banks in Germany, including the analyzed one. It obliged German banks to implement the strict liquidity rules and higher capital requirements. Therefore, low results of German banking efficiency were obtained in the exchange for long-term stability and absence of huge bottom peaks in the banking performance ratios.

Finally, it is worth to state that our comparative analysis gives the evidence of the fact, that higher efficiency is not always unequivocally positive output of banking activities, as in such case a banking system can be highly instable and exposed to risky and controversial operations.

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