

Efficiency of State Banks in the Economy of Poland and Ukraine

Giorgio Dominese* • Artem Piatkov** • Sergey Yakubovskiy*** • Tetiana Rodionova****

Abstract. The purpose of the research is to analyze and compare the efficiency of public, private and foreign banks in Poland and Ukraine for the period 2014-2020. To achieve the goal of the study, a quantitative approach based on the calculation of financial ratios such as net interest margin (NIM), average return on equity (ROAE), average return on assets (ROAA) and cost-to-income ratio (CIR) is used. The best performance indicators and the best efficiency in terms of criteria such as NIM, ROAE, ROAA and CIR in the period 2014-2019 were demonstrated in Poland by state-owned banking groups; however, in 2020, according to ROAE and ROAA, the best results showed banks with foreign capital (in particular, the banking group BNP Paribas Polska). The private bank Getin Noble was the worst in all evaluation criteria.

The largest share of net assets in the banking system of Ukraine, as in Poland, is occupied by state-owned banks, while the share of foreign banks continued to decline, and the share of private banks was the smallest in the banking system. However, the best indicators of NIM, ROAE, ROAA, and CIR in the last three years were demonstrated in Ukraine by foreign banks.

The result of the analysis shows that in the crisis situation caused by the COVID-19 pandemic, both in Ukraine and Poland, banks with foreign capital showed the highest efficiency in their activities, and the least - banks fully controlled by national capital. Modeling of the efficiency of state-owned banks in Ukraine showed that state-owned banks are mostly inefficient; this requires their privatization with the mandatory participation of foreign investors.

Giorgio Dominese*, Artem Piatkov**, Sergey Yakubovskiy***(✉), Tetiana Rodionova****

* Professor, Chair of Transition Studies Research Network, Venice, Italy.

E-mail: g.dominese@transitionstudiesnetwork.org

** Competitor at the Department of World Economy and International Economic Relations, Odessa I. I. Mechnikov National University, Odessa, Ukraine.

E-mail: pyatkov.artiom@stud.onu.edu.ua

*** Doctor of Economics, Professor, Chair of the Department of World Economy and International Economic Relations, Odessa I. I. Mechnikov National University, Odessa, Ukraine.

E-mail: syakubovskiy@onu.edu.ua

**** Ph.D. (Economics), Associate Professor of the Department of World Economy and International Economic Relations, Odessa I. I. Mechnikov National University, Odessa, Ukraine.

E-mail: t.rodionova@onu.edu.ua

Keywords: efficiency of the banking system, foreign investors, net interest margin, average return on equity, average return on assets, cost-to-income ratio.

JEL Classification: C23, E22, G21, G24, O16, O24, P34.

1. Problem statement

The current global crisis is unprecedented and unparalleled in terms of scale and geographical scope. The percentage of countries experiencing a simultaneous recession is higher than at any time in human history - 92.9%. During the Great Depression, this percentage reached 83.8%, and during the global financial crisis of 2007-2009 - 61.2%. Its causes go beyond traditional notions of financial and economic cycles. The COVID-19 pandemic not only served as a “trigger” for realizing the crisis potential that had already developed in the global stock market by 2020 but also acts as a powerful autonomous factor in the sharp deterioration of the global macroeconomic situation. The pandemic shock has placed all countries of the world in front of the need to balance between measures to protect people’s health, overcome the recession and maintain financial stability in the face of global instability.

The economic fallout from COVID-19 has fueled a surge in insolvency on corporate and household debt, undermining banks’ asset quality in OECD countries. In 2021, due to the ongoing pandemic crisis, banks had seen significant growth in non-performing loans (NPLs) on account of rising nonpayments from home and corporate customers and were forced to increase their reserves and allowances for possible loan losses. This deterioration in bank asset quality and profitability will limit the ability of banks to absorb higher loan losses over time as they can broker lending and support the recovery. Therefore, it is critical for banking, monetary and tax authorities to have a clear understanding of the performance of bank assets when planning ongoing responses and possible discontinuation of support.

The purpose of the article is to investigate the profitability and efficiency of certain categories of banks (public, private and foreign) and compare which category of banks is more financially stable and efficient.

2. Analysis of recent research and publications

The study of the development of emerging market economies attracts the attention of a large number of scientists. In particular, in Chumachenko et al. (2021), Dominese et al. (2020, 2021), Lomachynska et al. (2020), Malyarenko (2021), Maslii et al. (2018, 2019), the role of foreign investments in the development of economies, financial systems and the banking sector of the Central and East European countries was evaluated.

N. Rakhmatillaev and H. Hersugondo were directly involved in the analysis of the financial efficiency of the banking systems in the emerging market economies. In particular, N. Rakhmatillaev (2018) conducted a survey on the factors of financial

efficiency of state and private banks in Uzbekistan for 2010-2016 years. The data of three public, seven private, and eleven joint-stock banks were analyzed. To achieve the goal of the study, two main categories of factors were used: internal (II, non-II, non-PL, LD, LR, and CAR) and external (GDP growth rate and inflation). The dependent variable in the examination was ROA. It has been shown that substandard loans adversely affect the profitability of all types of banks. Deposits, however, have had a significant positive impact on the efficiency of SOB's, so they should try to attract more deposits as the main source of funds. To improve the efficiency and increase the rentability of state banks, N. Rakhmatillaev recommends reducing the level of non-performing loans in state banks and developing strategies that would allow attracting better loans.

H. Hersugondo (2021) investigated the influence of NPA, CAR, and IR on the financial efficiency of banks in Indonesia during the period 2015-2019. To achieve the goal of the study, he applied a quantitative approach to the study, using the analysis of financial ratios and the regression model. The research noted the negative impact of NPA on the bank's profitability (determined by ROA, ROE and NIM) of both state-owned and private commercial banks. Thus, H. Hersugondo concluded that an increase in the level of NPL would worsen the efficiency and rentability of banks. In addition, CAR was found to have a significant and negative relationship with ROE and NIM, while there was no relationship with ROA. This indicated that the higher the CAR, the lower the ROE and NIM.

3. Research data

For the research purpose, the seven largest commercial banks in Poland were selected by assets (3 of which are state-owned, 3 with foreign capital, and one private).

Table 1. Total number of assets of certain categories of commercial banks in the period 2014-2020 (PLN billion)

Categories of banks	2014	2015	2016	2017	2018	2019	2020
State banks:	446.5	475.70	521.00	555.00	588.50	627.90	688.80
PKO Bank Polski	248.7	266.9	285.6	300.0	324.0	347.9	377.0
Bank Pekao	167.6	168.8	174.2	185.5	191.1	203.3	233.2
Alior Bank	30.2	40.0	61.2	69.5	73.4	76.7	78.6
Banks with foreign capital:	328.6	356.1	356.8	460.7	478.2	529	528.6
Santander Bank Polska	134.5	139.7	150.1	152.7	205.9	209.5	229.3
mBank	118.0	123.5	133.7	131.4	145.8	158.7	180.1

Categories of banks	2014	2015	2016	2017	2018	2019	2020
BNP Paribas Bank Polska	40.5	65.4	72.3	72.7	109.0	110.0	119.6
Private banks:	68.8	70.8	66.5	59.8	49.9	52.8	49.9
Getin Noble Bank	68.8	70.8	66.5	59.8	49.9	52.8	49.9

Source: Compiled by the authors based on (PKO Bank Polski, Bank Pekao, Alior Bank, Santander Bank Polska, mBank, BNP Paribas Bank Polska, Getin Noble Bank).

According to Table 1, the largest number of assets among state-owned banks was owned by the PKO, a bank whose assets are growing (from 248.7 PLN billion in 2014 to 377 in 2020). Pekao Bank's assets also grew and stood at 233 billion in 2020. Alior Bank had the least amount of assets among banks in this category.

Among banks with foreign capital, Santander Bank (229.3 billion) and mBank (180.1 billion) had the most assets as of 2020. BNP Paribas has less assets (119.6 billion). At the same time, it should be noted that the assets of this category of banks are also growing over the entire period under study. The largest private commercial bank in Poland in the period 2014-2020 was Getin Noble, whose assets as of 2020 amounted to only 49.9 PLN billion and have been declining noticeably since 2015.

Net interest margin (NIM) can be used as a significant indicator of a bank's performance. NIM is a measure of comparing the net interest income that a banking group earns from lending products such as loans and mortgages with the output interest it pays to holders of savings accounts and certificates of deposit (A. Bloomenthal, 2021). We can calculate the net interest margin using the following equation:

$$NIM = \frac{\text{Net interest income}}{\text{Average earning assets}} \quad (1)$$

A positive net interest margin indicates that the company is operating at a profit, while a negative indicator indicates investment inefficiency. In the latter scenario, the firm may take corrective action by applying the funds to the outstanding debt or transferring these assets to more profitable investments.

Table 2. Net interest margin of certain categories of banks for the period 2014-2020

Categories of banks	2014	2015	2016	2017	2018	2019	2020
State banks:	3.8	3.5	3.4	3.6	3.6	3.6	3.1
PKO Bank Polski	3.6	3.0	3.2	3.3	3.4	3.4	3.0

Bank Pekao	3.1	2.8	2.8	2.8	2.8	2.9	2.5
Alior Bank	4.7	4.6	4.1	4.6	4.6	4.5	3.9
Banks with foreign capital:	2.8	2.6	2.8	2.9	2.8	2.9	2.5
Santander Bank Polska	3.0	3.1	3.3	3.5	3.2	3.2	2.7
mBank	2.6	2.1	2.3	2.5	2.6	2.7	2.3
BNP Paribas Bank Polska	2.9	2.7	2.7	2.7	2.7	2.9	2.6
Private banks:	2.2	1.7	1.9	2.0	2.2	1.9	2.0
Getin Noble Bank	2.2	1.7	1.9	2.0	2.2	1.9	2.0

Source: Compiled by the authors based on (PKO Bank Polski, Bank Pekao, Alior Bank, Santander Bank Polska, mBank, BNP Paribas Bank Polska, Getin Noble Bank).

After analyzing the data on net interest margin (Table 2), it can be concluded that the best indicator among state-owned banks throughout the entire period under review was with the Alior Bank (rate stable at 4.5-4.7% prior to the COVID-19 pandemic). PKO bank also showed at 3-3.6% during 2014-2020. Pekao Bank showed the lowest rate (2.5% in 2020, which is lower than in 2019 - 2.9%).

Among banks with foreign capital, Santander Bank has the best performance (at the level of 3-3.5% in the period 2014-2019 and 2.7% in 2020). Bank BNP Paribas was stable throughout the entire period under study (the indicators practically do not change, fluctuating around 2.6-2.9%). The indicator of mBank was the worst among banks with foreign capital and amounted to 2.3% in 2020, which is 0.4% worse than the previous year.

Private Getin Noble Bank demonstrated the worst results among all banks over the study period. The worst result was 2015 when the net interest margin decreased to 1.7%. However, in the period 2016-2018, there was an increase in the indicator. In 2020, the bank's net interest margin was 2%.

Thus, Alior Bank, Santander Bank Polska and BNP Paribas Bank Polska turned out to be the most attractive banks for potential investors. Also, good performance is observed in PKO and Pekao banks.

State-owned banks have shown the best net interest margins between 2014 and 2020. They are followed by banks with foreign capital and private bank Getin Noble. It is worth noting that state-owned banks are characterized by a drop in 2020, while Getin Noble Bank even showed a slight increase in NIM this year.

The following indicator of banks efficiency is the average return on equity (ROAE). Calculated as the ratio of net income for the fiscal year to the average value of balance

sheet capital, ROAE provides information on the rate of return on equity utilized (W. Kenton, 2021). This cost of capital can incorporate last-minute share deals, share buybacks, and dividend payments. This suggests that ROE may not precisely reflect the actual profitability of a business over a given period of time. ROAE can provide a more exact expression of a company's corporate profitability, especially if the cost of equity has changed significantly during the financial year. We can derive ROAE as follows:

$$ROAE = \frac{EAT}{\text{Average shareholders' equity}} \quad (2)$$

where:

EAT = profit after taxes

$\text{Average shareholders' equity}$ = (total equity at the beginning + end of the financial year)/2

A high ROAE means that the bank earns more income for every dollar of equity capital. It also tells the analyst what leverage the company is using to achieve higher returns, be it profitability, asset turnover, or leverage. The result of these three measurements is ROAE. Profit margin provides information on operating efficiency and is calculated by dividing the net profit from the sale. Average asset turnover is a measure of asset performance and is calculated by dividing sales by average total assets. Leverage, measured as the average assets divided by the size of the average shareholders' equity, is a measure of a banks' debt level.

Table 3. Average return on equity of certain categories of banks in the period 2014-2020

Categories of banks	2014	2015	2016	2017	2018	2019	2020
State banks:	12.1	9.9	10.5	9.3	10.6	7.8	-2.1
PKO Bank Polski	12.4	10.4	9.1	9.0	10.0	10.0	-6.0
Bank Pekao	11.5	9.7	9.8	11.0	10.2	9.5	4.5
Alior Bank	12.4	9.5	12.7	8.0	11.7	3.8	-4.7
Banks with foreign capital:	8.8	7.8	7.2	7.6	8.3	6.9	3.6
Santander Bank Polska	10.6	11.3	10.4	10.0	10.6	8.5	4.0
mBank	12.1	11.8	10.1	8.3	9.4	6.6	0.6
BNP Paribas Bank Polska	3.6	0.2	1.2	4.4	4.8	5.7	6.3

Private banks:	7.2	1.1	-0.8	-12.1	-12.4	-21.4	-24.6
Getin Noble Bank	7.2	1.1	-0.8	-12.1	-12.4	-21.4	-24.6

Source: Compiled by the authors based on (PKO Bank Polski, Bank Pekao, Alior Bank, Santander Bank Polska, mBank, BNP Paribas Bank Polska, Getin Noble Bank).

As we can see in Table 3, the best average return on equity among state banks between 2014 and 2015 was shown by PCO Bank (10.4-12.4%), but in 2016 the figure dropped markedly to 9.1%, which was worse than Pekao Bank (9.8%) and Alior Bank (12.7%) which showed the best figure among state banks for the entire study period. In 2019, Alior Bank's average return on equity fell heavily to 3.8%, explaining the decision to increase the provision for early repayment of retail loans.

In 2018-2019, the PKO Bank demonstrated a stable profitability rate of 10%, which, however, became negative in 2020 due to the consequences of the pandemic. Pekao Bank has endured the effects of the pandemic best of all, with a 4.5% rate in 2020 (the second-best rate among all categories of commercial banks).

Among banks with foreign capital, the best performance in the period of 2014-2015 was observed at mBank (in the region of 11.8-12.1%, which is the best performance among foreign banks over the entire study period). However, in the future, the average return on equity of this bank decreases, and in 2020, the figure was only 0.6%.

The most stable indicator in the period 2014-2020 was observed at Santander Bank (fluctuated around 8.5-11.3%, however, in 2020, the worst indicator for the entire period of 0.4% was observed). The average return on equity of BNP Paribas Bank is growing in the period 2015-2020 and as of 2020, the profitability rate was 6.3% - the best indicator among all categories of commercial banks in the reporting year.

The worst indicator is demonstrated by the private bank Getin Noble. In the period 2014-2015, the return on equity was positive (7.2 in 2014), but since 2014 the indicator has been steadily deteriorating and at the end of 2020 the return on equity was -24.6%. Based on the results of 2020, the banking group adopted a recovery plan for the Group to return to sustainable profitability and achieve the required levels of capital adequacy, will be implemented until the end of 2024, and provided there are no external or internal factors that impede the planned recovery path (Getin Noble Bank, 2021).

The best indicators of return on capital in the period 2014-2019 were demonstrated by state-owned banks, but in 2020 their indicator became negative for the first time and amounted to -2.1%. The indicators of foreign banks throughout the period 2014-2020 were positive and as of the last year, amounted to 3.6% (the best indicator among all categories of commercial banks). The indicator of the private bank Getin Noble, as mentioned above, is deteriorating over the entire analyzed period.

The next efficiency measure is the average return on assets (ROAA). It is equal to the net profit divided by the total average assets. The total amount of average assets

is equal to the average value of total assets at the beginning of the period plus total assets at the end of the period. A score of 5% or higher is generally considered good (W. Kenton, 2021). Lower return on investment reflects the higher intensity of banks' assets (the bank needs more money to make a profit). ROAA is presented as:

$$ROAA = \frac{\text{Net income}}{\text{Average total assets}} \quad (3)$$

where:

Net income = net income for the same period of time as assets

Average total assets = (Assets at the beginning + end of the financial year)/2

The ratio shows the profitability of bank operations. A high value of the indicator indicates the efficient use of the bank's assets, but at the same time it may reflect the high riskiness of operations.

These calculations show how effectively the bank attracts and allocates the received resources. Low profitability may be due to the insufficient size of the client base or the bank's conservative investment policy. If the profitability exceeds the average values for the banking system, then this is a consequence of a significant share of a cheap client base, successful speculative operations, and placement of assets in highly profitable operations.

Table 4. Average return on assets of certain categories of banks in the period 2014-2020

Categories of banks	2014	2015	2016	2017	2018	2019	2020
State banks:	1.0	0.9	0.9	0.9	0.9	0.8	0.4
PKO Bank Polski	1,4	1,2	1,1	1,1	1,2	1,2	-0,7
Bank Pekao	1,8	1,4	1,4	1,4	1,3	1,1	0,5
Alior Bank	1,2	0,9	1,2	0,8	1,0	0,3	-0,4
Banks with foreign capital:	1.5	1.2	1.2	1.1	1.2	0.9	-0.2
Santander Bank Polska	1.4	1.7	1.5	1.5	1.3	1.0	0.5
mBank	1.2	1.0	1.0	0.8	0.9	0.7	0.1
BNP Paribas Bank Polska	0.4	0.1	0.1	0.4	0.5	0.6	0.6
Private banks:	0.5	0.1	-0.1	-0.9	-0.8	-1.2	-1.1

Getin Noble Bank	0.5	0.1	-0.1	-0.9	-0.8	-1.2	-1.1
------------------	-----	-----	------	------	------	------	------

Source: Compiled by the authors based on (PKO Bank Polski, Bank Pekao, Alior Bank, Santander Bank Polska, mBank, BNP Paribas Bank Polska, Getin Noble Bank).

According to Table 4, the best return on assets among state-owned banks in the period 2014-2018 was demonstrated by Pekao Bank (1.8% in 2014 was the best among banks in this category). In the period 2015-2018, the return on assets of this bank was stable at 1.4%, but since 2018 this indicator has been decreasing (for example, in 2019 it was 1.1%, and in 2020 - already 0.5%, which, however, still was the best result in the last year).

The indicator of the average return on assets of the PKO bank fluctuated at the level of 1.1-1.2% in the period 2015-2019, however, in 2020, due to the consequences of the crisis, it became negative for the first time (-0.7%) and at the same time the worst among state-owned banks. The same trends can be seen at Alior Bank, whose profitability ratio decreased from 1% in 2018 to -0.4% in 2020.

Among foreign banks, the best profitability indicator was observed at Santander Bank (at the level of 1.4-1.7% in 2014-2017), however, starting from 2018, the situation is gradually deteriorating and the return on assets of the banking group as of 2020 was 0.5%. Also, mBank showed good performance (at the level of 0.9-1.2% in 2014-2018). The return on assets of this banking group was 0.1% in 2020 (the worst result among banks with foreign capital. The profitability indicators of the BNP Paribas group were the lowest in the period 2014-2019 (0.4% in 2014 and at the level of 0.1% in the period 2015-2016, which are among the lowest rates among all categories of banks); however, there is an upward trend in the return on assets indicator and in 2020 this indicator was 0.6%, which was the best value among foreign banks.

As for the private bank Getin Noble, this bank's average return on assets was declining in the period 2014-2020. In 2020, the indicator was -1.1% (the worst indicator among all categories of commercial banks), which, however, is better than the indicator in 2019 (-1.2%).

Thus, it can be noted that the best indicators of return on assets as of 2020 were demonstrated by foreign banks BNP Paribas (0.6%) and Santander Polska (0.5%). Among state-owned banks, Pekao Bank (0.5%) is worth noting.

It should be noted that foreign banks showed the best return on assets among all categories of banks in 2014-2019; however, in 2020, the best indicator was observed among foreign banks (0.4%), which is the best indicator among all categories of banks. The ratio of foreign banks was stable at 0.9% in the period 2015-2018, and only since 2019 has there been a noticeable decrease in this indicator. The private bank Getin Noble is declining in the period 2014-2020 and at the end of 2020 it was -1.1%. It is worth noting the generally negative trend towards a decrease in the average return on assets of all categories of commercial banks from 2018 to 2020. Another

important indicator of banks' efficiency is the cost-to-income ratio. It is similar to the rate of return on operating activities and is equal to the operating value divided by operating income (J. Thompson, 2021). This ratio represents the efficiency of banks in minimizing costs while increasing profits. The lower this ratio, the more efficient the bank. The ratio of costs and revenues is exactly the same:

$$CIR = \frac{\text{Operating cost}}{\text{Operating income}} \quad (4)$$

The cost-benefit ratio is a significant financial metric for any business, especially the financial sector. Banks and financial institutions often use the ratio to track how expenditures change relative to revenues to make strategic growth decisions. For example, investing in customer service can immediately reduce the cost-benefit ratio of a bank, but improve its overall profits. The idea is to use the cost-income ratio as a deterrent to create additional revenue streams associated with their relatively low cost, such as selling other services to existing customers, so revenue increases faster than costs.

Table 5. Efficiency of doing business of certain categories of banks for the period 2014-2020

Categories of banks	2014	2015	2016	2017	2018	2019	2020
State banks:	47.1	49.6	47.5	45.8	43.8	42.3	44.0
PKO Bank Polski	47.1	52.1	49.7	46.0	44.2	41.3	41.0
Bank Pekao	44.7	45.6	43.7	44.4	44.0	42.6	44.0
Alior Bank	49.4	51.1	49.1	46.9	43.1	43.0	47.0
Banks with foreign capital:	59.1	64.1	55.7	51.5	51.1	52.6	50.1
Santander Bank Polska	53.1	57.3	50.3	46.3	48.3	50.8	55.8
mBank	58.9	50.1	45.7	45.9	42.6	42.2	41.1
BNP Paribas Bank Polska	65.2	85.0	71.2	62.4	62.3	64.7	53.3
Private banks:	49.4	79.5	59.5	62.2	70.7	92.1	79.0
Getin Noble Bank	49.4	79.5	59.5	62.2	70.7	92.1	79.0

Source: Compiled by the authors based on (PKO Bank Polski, Bank Pekao, Alior Bank, Santander Bank Polska, mBank, BNP Paribas Bank Polska, Getin Noble Bank).

Analyzing the index of business efficiency (Table 5), it should be noted that the best

indicators both among state banking groups and among all categories of banks were demonstrated by PCO Bank. The worst result of this bank was in 2015 when the cost-to-income ratio was 52.1%, but further improvement of the bank's operating efficiency is traced, and as of 2020, this indicator was 41%. Pekao Banking Group (44% in 2020) was the second-best performer among state-owned banks. Alior Bank was the worst among state-owned banks, but its score is also quite high at 47%.

Santander Bank Group had the best performance ratio among foreign-owned banks in 2014. However, since 2015, the mBank group shows the best cost-to-income ratio (so their indicator was 50.1% in 2015, and at the end of 2020 already 41.1%, which is the second best indicator among all categories of banks).

BNP Paribas Polska group has the worst indicators of business efficiency among both foreign and all categories of banks (in the period 2014-2019, the cost-to-income ratio fluctuated between 62.3-85%), but in 2020 the indicator was 53.3%, which is the best result in the entire period.

As for the private bank Getin Noble, the best operating efficiencies were 49.4% in 2014 and 59.5% in 2016. In the other years (particularly starting in 2017), the cost-to-income ratio has deteriorated markedly. In 2019, the indicator recorded the worst rate among all categories of banks (92.1%). In 2020, the figure was 79%, which is markedly better than the previous year's figure.

Based on the analysis results, it can be concluded that the state-owned banks of the PKO, Pekao and Alior groups, and the bank with foreign capital mBank demonstrated the best business performance.

Banks demonstrated the best business performance with state capital (the best indicator for the entire period of 2014-2020). Foreign banks were in second place, business efficiency improved compared to 2015 and amounted to 50.1% in 2020. The performance of private bank Getin Noble is deteriorating in the period 2017-2019, but in 2020 there is an improvement in the indicator, which amounted to 79%.

Thus, we can conclude that the best performance indicators and the best efficiency in terms of criteria such as NIM, ROAE, ROAA and CIR in the period 2014-2019 were demonstrated by state-owned banking groups; however, in 2020, during the pandemic and economic crisis, according to such indicators, both ROAE and ROAA showed the best results for banks with foreign capital (in particular, the banking group BNP Paribas Polska). The private bank Getin Noble was the worst in all evaluation criteria. The following will be an analysis of the Ukrainian banking sector, which is one of the most profitable in Central and Eastern Europe. Therefore, a comparison of the Polish and Ukrainian banking systems will be appropriate.

At the end of 2020, there were 71 banks in Ukraine (4 of them were owned by the government). The number of solvent banks decreased by two, as Venum Bank renounced its license and became a financial company, and Ukrspotsbank was merged into Alfa-Bank under a simplified procedure (NBU, 2021).

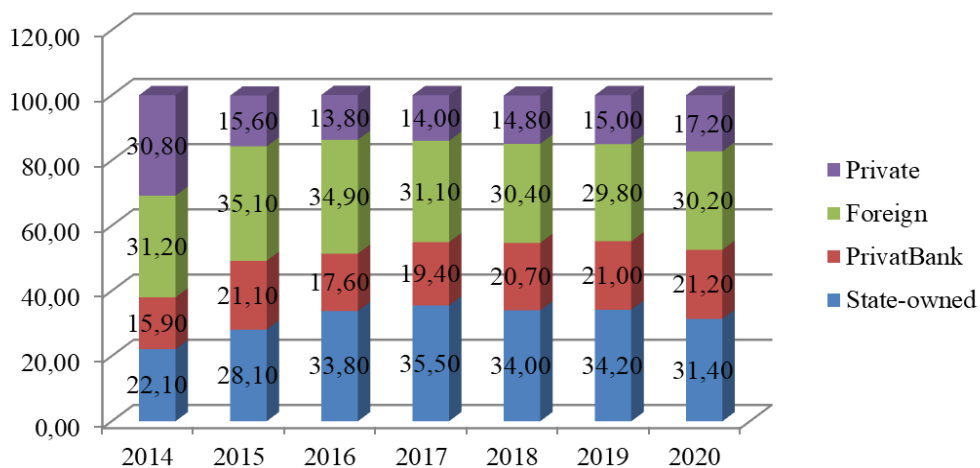


Figure 1. Distribution of net assets by groups of banks in the period 2014-2020 (in %) Source: Compiled by the authors based on (NBU, 2020, 2021).

Analyzing the distribution of net assets by groups of banks (Fig. 1), we can conclude that foreign and private banks occupied the largest share of assets in the Ukrainian banking sector in 2014. From 2015 to 2016, this trend changed: private banks' assets decreased significantly (due to the crisis) and the proportion of the state in total assets of the banking sector increased significantly (from 22% in 2015 to 51% in 2016) after the nationalization of PrivatBank. The main reason for the nationalization of Privatbank, the largest bank in the national financial system, was the huge gap between the bank's liquid assets and liabilities in the amount of UAH 148 billion (Tustanovskiy, et al., 2019). PrivatBank held 20% of the banking sector until nationalization. For this reason, the nationalization of Privatbank caused the most fundamental structural changes in ownership. Thanks to NBU and Government's actions, SBs have been occupying a significant share in the national banking system since 2016.

As of the end of 2020, the state's share in the banking sector's total assets decreased to 52.6% (UAH 818.287 billion). The share of private banks increased to 15.2%. After five years of decline, the share of foreign banks rose to 30.2%, which is the second-lowest figure for the entire study period. According to Table 8, PrivatBank has the largest number of assets among all state-owned banks, and after the bank's nationalization (starting in 2016), the total number of assets increases (from UAH 205.359 billion in 2016 to UAH 382.643 billion in 2020). Oschadbank is the next bank in terms of net assets. The bank's assets grew steadily in the period 2014-2017, but in 2018 there was a decrease in assets by UAH 16.087 billion. In 2020, the total number of assets amounted to UAH 233.6 billion. Ukreximbank's assets grew in the period 2014-2017, but since 2018 they have been declining. As of 2019, the total number

of assets amounted to UAH 192.875 billion. As for Ukrgasbank, its assets have been growing throughout the study period. Thus, in 2014 the number of assets of this bank amounted to UAH 20.715 billion, and in 2020 - UAH 142.703 billion.

Table 6. Total number of assets of certain categories of banks in the period 2014-2020 (UAH billion)

Categories of banks	2014	2015	2016	2017	2018	2019	2020
State banks:	268.559*	342.000*	630.306	728.574	739.774	818.287	951.821
PrivatBank	229.036	274.934	205.359	254.870	278.120	309.659	382.643
Oschadbank	124.314	159.096	210.639	233.873	217.786	249.145	233.600
Ukreximbank	123.530	141.349	160.402	170.618	161.643	140.346	192.875
Ukrgasbank	20.715	41.555	53.906	69.213	82.225	119.137	142.703
Banks with foreign capital:							
Raiffeisen Bank Aval	47.352	53.573	57.365	67.017	73.801	82.786	107.287
Alfa-Bank	35.524	42.517	38.954	49.473	60.744	72.370	98.257
UkrSibbank	26.401	43.418	45.329	46.180	52.043	53.196	72.298
OTP Bank	23.650	21.154	24.832	29.832	32.575	44.829	58.962
Private banks:							
FUIB	41.819	43.003	53.826	61.471	68.869	74.474	100.06
Tascombank	2.961	3.814	8.130	13.843	17.709	19.223	24.054

Note: *Except for Privatbank, which was nationalized in 2016

Source: Compiled by the authors based on (PrivatBank, Oschadbank, Ukreximbank, Ukrgasbank, Raiffeisen Bank Aval, Alfa-Bank, UkrSibbank, OTP Bank, FUIB, Tascombank).

Raiffeisen Bank Aval, Alfa-Bank, UkrSibbank and OTP Bank have the largest number of assets among foreign banks (UAH 336.804 billion in 2020). Raiffeisen Bank Aval's assets are growing throughout the study period and in 2020 amounted to UAH 107.287 billion. Alfa-Bank's assets have been growing since 2016, and as of 2020 they amounted to UAH 72.370 billion. UkrSibbank's assets increased almost 3 times (compared to 2014) and amounted to UAH 72.298 billion in 2020. OTP Bank's assets have been growing since 2015 and amounted to UAH 44.829 billion in 2020.

The largest private banks were FUIB and Taskombank, with total assets of UAH 100.06 billion in 2020. Both banks' assets are growing throughout the study period

and, as of 2020, amounted to UAH 76.065 billion (FUIB) and UAH 24.054 billion (Taskombank).

It is noteworthy that the banking sector's size significantly decreases relative to the economy as a whole in the period 2014-2019. The sector's total assets reduced from 96% of GDP in 2014 to 50% of GDP in 2019. In nominal local currency terms, the banking sector expanded during this period, but as these years were marked by very high inflation and exchange rate depreciation, in real terms and according to the size of the economy, the banking sector has shrunk significantly (BSTDB, 2021). However, despite the COVID-19 pandemic, banking sector assets increased by 54% of GDP in 2020 (the first significant growth in the last seven years), but this is still quite a low figure compared to the Polish banking sector.

Table 7. Net interest margin of certain categories of banks for the period 2014-2020

Categories of banks	2014	2015	2016	2017	2018	2019	2020
State banks:	4.47*	3.03*	2.22	2.97	3.67	3.5	3.46
PrivatBank	3.76	0.83	0.91	2.86	6.67	7.37	7.07
Oschadbank	5.23	4.72	3.80	2.89	2.68	2.64	3.45
Ukreximbank	2.56	1.88	2.22	1.74	1.16	1.19	0.83
Ukrgasbank	5.63	2.48	1.94	4.38	4.17	2.80	2.51
Banks with foreign capital:	7.89	7.18	8.04	8.64	10.25	9.57	8.6
Raiffeisen Bank Aval	9.36	9.16	10.83	11.24	11.83	10.53	10.12
Alfa-Bank	5.43	3.25	4.49	6.72	7.50	6.76	6.92
UkrSibbank	5.81	7.22	7.64	8.52	11.18	10.60	8.41
OTP Bank	10.96	9.07	9.18	8.09	10.48	10.38	8.94
Private banks:	6.55	5.97	5.78	7.65	8.12	8.53	8.99
FUIB	7.30	6.53	6.10	7.70	8.91	10.34	10.89
Tascombank	5.80	5.41	5.45	7.59	7.32	6.71	7.09

Note: *Except for Privatbank, which was nationalized in 2016

Source: Compiled by the authors based on (PrivatBank, Oschadbank, Ukreximbank, Ukrgasbank, Raiffeisen Bank Aval, Alfa-Bank, UkrSibbank, OTP Bank, FUIB, Tascombank).

According to Table 7, the largest indicator of net interest margin among state-owned banks was demonstrated by PrivatBank - 7.07% in 2020 (it should be noted that the figure increased in 2016-2019 but decreased in 2020). Next is Oschadbank, whose net interest margin was 3.45% in 2020 (in 2014-2019, the figure decreased but increased in 2020). In

2020, Ukrgasbank demonstrated an interest margin of 2.51%. Ukreximbank's indicator was the lowest among all state-owned banks and amounted to 0.83%. Among foreign banks, Raiffeisen Bank Aval (10.12%) and OTP Bank (8.94%) showed the highest net interest margin in 2020. Alfa-Bank's indicator was the lowest among foreign banks and amounted to 6.92%. FUIB Bank showed the highest net interest margin among private banks, 10.89%. Tascombank's net interest margin was 7.09%.

It can be concluded that the best indicators of net interest margin were demonstrated by foreign banks (the highest indicators in the period 2014-2019). However, in 2020 the net interest margin of foreign banks decreased to 8.6%, which was lower than that of private banks - 8.99%. The net interest margin of state-owned banks was the worst among all categories, and as of 2020, amounted to 3.46% (decreasing in the period 2018-2020).

Table 8. Average return on equity of certain categories of banks in the period 2014-2020

Categories of banks	2014	2015	2016	2017	2018	2019	2020
State banks:	-77.52*	-82.75*	-319.84	-44.19	17.67	24.08	1.46
PrivatBank	1.02	1.00	-1246.96	-198.52	49.21	75.80	45.62
Oschadbank	-52.11	-92.28	4.05	2.38	0.81	1.34	13.37
Ukreximbank	-77.08	-165.15	-42.48	7.89	7.15	0.76	-58.04
Ukrgasbank	-103.38	9.18	6.03	11.50	13.51	18.40	4.89
Banks with foreign capital:	-72.69	-80.45	-18.66	35.40	41.28	35.42	20.49
Raiffeisen Bank Aval	-66.06	-39.96	51.84	53.56	46.47	34.97	31.47
Alfa-Bank	-70.14	-107.77	-134.99	16.51	29.23	28.41	11.71
UkrSibbank	-22.11	1.28	-36.84	38.55	44.99	38.38	17.62
OTP Bank	-132.45	-175.35	45.35	32.98	44.43	39.90	21.16
Private banks:	0.10	-18.55	4.27	17.73	30.96	24.53	20.14
FUIB	-2.45	-37.38	7.33	16.17	35.60	30.00	26.64
Tascombank	2.64	0.29	1.20	19.29	26.32	19.05	13.63

Note: Profit or loss for the financial year after tax in% of equity. *Except for Privatbank, which was nationalized in 2016

Source: Compiled by the author based on (PrivatBank, Oschadbank, Ukreximbank, Ukrgasbank, Raiffeisen Bank Aval, Alfa-Bank, UkrSibbank, OTP Bank, FUIB, Tascombank).

According to Table 8, the highest return on equity among state-owned banks in 2018-2020 was demonstrated by PrivatBank. Ukrgasbank also showed good profitability,

with an average return on capital of 13.51% in 2018 and 18.4% in 2019. Oschadbank showed excellent profitability in 2020 compared to previous years (13.37%). The profitability of Ukreximbank is declining in the period 2017-2020.

Raiffeisen Bank Aval (31.47%), OTP Bank (21.16%) and UkrSibbank (17.62%) showed the highest return on equity in 2020 among foreign banks. Alfa-Bank's profitability was the worst (11.71%).

Among private banks, FUIB Bank showed the highest return on equity (26.64%). The return on equity of Taskombank was 13.63%.

Again, foreign banks showed the best average profitability rate for the last three years. As of 2020, their figure was 20.49%. Return on equity of state-owned banks was 1.46%, and private - 20.14%. It should be noted that state-owned banks were able to significantly improve their performance compared to 2016 (particularly for Privatbank), but due to the low performance of Ukreximbank, their overall performance in 2020 was lower than in 2019.

According to Table 9, PrivatBank (7.1%) showed the highest average return on assets of state-owned banks in 2020, and this indicator has been growing significantly since 2016. Ukrgasbank (0.31%), Oschadbank (1.15%) and Ukreximbank (-3.36%) showed lower return on assets. The performance of these banks also increased compared to 2014-2015.

Among foreign banks, Raiffeisen Bank Aval showed the highest average return on assets - 4.29% in 2020 (there has been a decline since 2017). The profitability of OTP Bank was 3.71%, which is lower than in 2019. UkrSibbank showed a 2.11% return on assets. Alfa-Bank's profitability is growing in the period 2017-2019, but in 2020 it amounted to 1.3%, which is the lowest figure among foreign banks. Among private banks, FUIB demonstrated the highest return on assets (3.84% in 2020). The profitability of this bank grew steadily from 2015 to 2019. The return on assets of Taskombank was 1.76%.

Table 9. Average return on assets of certain categories of banks in the period 2014-2020

Categories of banks	2014	2015	2016	2017	2018	2019	2020
State banks:	-11.62*	-6.15*	-18.34	-2.18	1.60	3.15	5.20
PrivatBank	0.12	0.11	-73.56	-10.43	4.82	11.17	7.10
Oschadbank	-8.86	-8.66	0.25	0.25	0.07	0.11	1.15
Ukreximbank	-10.38	-10.62	-0.65	0.46	0.48	0.04	-3.36
Ukrgasbank	-15.62	0.84	0.61	1.02	1.02	1.28	0.31
Banks with foreign capital:	-9.02	-5.57	-0.38	4.41	5.45	5.06	2.85

Raiffeisen Bank Aval	-8.99	-3.63	6.70	8.55	7.44	5.51	4.29
Alfa-Bank	-6.80	-6.86	-10.05	1.35	2.38	2.90	1.30
UkrSibbank	-4.07	0.07	-2.33	3.98	5.68	4.97	2.11
OTP Bank	-16.22	-11.85	4.15	3.74	6.31	6.87	3.71
Private banks:	-0.04	-2.36	0.41	1.51	3.4	3.44	2.80
FUIB	-0.39	-4.75	0.72	1.63	4.25	4.45	3.84
Tascombank	0.32	0.03	0.10	1.39	2.55	2.43	1.76

Note: Profit or loss for the financial year after tax in % of total assets. *Except for Privatbank, which was nationalized in 2016

Source: Compiled by the author based on (PrivatBank, Oschadbank, Ukreximbank, Ukrgasbank, Raiffeisen Bank Aval, Alfa-Bank, UkrSibbank, OTP Bank, FUIB, Tascombank).

We can conclude that the most profitable banks in the period 2014-2016 were private banks, but from 2017 to 2019, foreign banks were the most profitable among all categories. The average return on assets of foreign banks as of 2019 was 5.06%, while the return on private banks was 3.44%. The profitability of state-owned banks has improved compared to 2016 and in 2019 amounted to 3.15%.

In the period from 2016 to 2020, the return on assets of state-owned banks is growing significantly and in 2020 they became the most profitable among all categories.

Table 10. Efficiency of doing business of certain categories of banks for the period 2014-2020

Categories of banks	2014	2015	2016	2017	2018	2019	2020
State banks:	99.14*	-4.47*	32.39	93.81	73.41	67.54	85.65
PrivatBank	68.28	57.72	-88.33	184.84	42.57	31.28	40.36
Oschadbank	111.97	55.13	60.35	74.11	114.65	99.31	80.35
Ukreximbank	139.96	-110.63	28.97	52.39	70.61	79.79	159.97
Ukrgasbank	45.50	42.10	128.56	63.90	65.82	59.79	61.93
Banks with foreign capital:	65.63	98.14	48.66	48.67	44.35	50.01	54.94
Raiffeisen Bank Aval	51.16	49.44	46.01	43.16	40.26	46.85	49.56
Alfa-Bank	47.77	101.32	59.39	51.92	48.34	61.49	55.63
UkrSibbank	77.50	44.52	43.84	52.75	47.90	52.91	65.89
OTP Bank	86.08	197.28	45.41	46.86	40.91	38.78	48.68

Private banks:	47.5	53.83	67.24	56.09	63.45	64.16	64.97
FUIB	37.90	44.30	55.27	61.13	59.18	58.53	62.13
Tascombank	57.09	63.36	79.2	51.05	67.72	69.79	67.81

Note: *Except for Privatbank, which was nationalized in 2016

Source: Compiled by the authors based on (PrivatBank, Oschadbank, Ukreximbank, Ukrgasbank, Raiffeisen Bank Aval, Alfa-Bank, UkrSibbank, OTP Bank, FUIB, Tascombank).

Analyzing this indicator (Table 10), it should be noted that in 2016-2017 PrivatBank was the worst state-owned bank in terms of business efficiency (in 2016, this indicator was even negative because the bank showed an operating loss). However, in the period 2018-2019, the bank showed the best cost-benefit ratio among all state-owned banks. Ukrgasbank also demonstrated a good cost-benefit ratio (61.93% in 2020). Ukreximbank showed the worst indicator (159.97% in 2020, which is worse than in previous years). The worst ratio was recorded in Oschadbank, which amounted to 80.35% in 2020. This is due to a significant decrease in net interest and non-interest income of the bank, as well as an increase in operating expenses.

Among foreign banks, the best cost/income ratio in 2020 was shown by OTP Bank (48.68%) and Raiffeisen Bank Aval (49.56%). Alfa-Bank also showed a good indicator (55.63%). A slightly worse indicator is observed in UkrSibbank (65.89%). Among private banks, FUIB remained the best (62.13%).

We can conclude that the best ratio of costs and revenues for the last four years was demonstrated by foreign banks (54.94% in 2020). The rate of private banks is deteriorating in the period 2017-2019 (through Taskombank) and in 2020 amounted to 64.97%. The ratio of costs and revenues of state-owned banks in the period 2017-2019 is significantly improving, but in 2020 it amounted to 85.65%, the worst figure among all banks' categories.

4. Modeling the efficiency of state-owned banks in Ukraine.

This section will study the effectiveness of state-owned banks in Ukraine. It will also be determined which of the independent variables (total capital, foreign exchange results, administrative expenses, total assets and commission income) have the greatest impact on the dependent variable (net income). The analysis used a panel sample - annual data of financial statements of 10 banks for the period 2010-2020, a total of 100 observations. Based on the correlation matrix, statistically significant variables were selected and the first model was formalized as follows:

$$NI = const + \beta * TE + \beta * SB + \beta * RTFC + \beta * AE + \beta + TA + \beta * FCI \quad (5)$$

where NI - net profit, TE - total capital, SB - state-owned banks - binary variable (which takes 1 in the case of a state-owned bank, and 0 - commercial), $RTFC$ - results

from foreign exchange trading, *AE* - administrative costs, *TA* - total assets, *FCI* - commission income.

Table 11. Results of evaluation of efficiency of state-owned banks in Ukraine in the period 2010-2020 (with binary variable)

Variable	Coefficient	Standard error	t-statistic	Probability
SB	-15.795	7.920	-1.994	0.053
TA	0.011	0.089	0.129	0.898
TE	2.390	0.466	5.131	0.000
AE	-4.954	2.579	-1.921	0.062
FCI	-0.658	1.509	-0.436	0.665
RTFC	2.347	2.503	0.938	0.354

Source: compiled by the authors

According to table 11 it can be concluded that state-owned banks operate inefficiently (the ratio is -15.795), which confirms the above research (of the state-owned banks, only PrivatBank demonstrates high efficiency). The sizes of total capital, administrative expenses and results from foreign exchange trading have the greatest impact on banks' net profitability. Less - commission income. Total assets were insignificant.

The second model was formalized without insignificant variables:

$$NI = const + \beta * TE + \beta * SB + \beta * RTFC + \beta * AE \quad (6)$$

where *NI* - net income, *TE* - total capital, *SB* - public banks, *RTFC* - results from foreign exchange trading, *AE* - administrative costs.

Table 12. Results of evaluation of efficiency of state-owned banks in Ukraine in the period 2010-2020

Variable	Coefficient	Standard error	t-statistic	Probability
SB	-13.392	5.367	-2.495	0.017
TE	2.343	0.426	5.495	0.000
AE	-5.468	1.161	-4.708	0.000
RTFC	1.902	2.270	0.838	0.407

Source: compiled by the authors

Excluding insignificant variables table 14, we obtain almost the same results (significant impact on the net return on total capital and administrative costs).

Profitability from foreign exchange trading had a smaller impact on profitability. The last model was formalized without the use of the binary variable SB (public banks), and took the following form:

$$NI = const + \beta * TE + \beta * RTFC + \beta * AE + \beta + TA + \beta * FCI \quad (7)$$

where *NI* - net income, *TE* - total capital, *RTFC* - results from foreign exchange trading, *AE* - administrative costs, *TA* - total assets, *FCI* - commission income.

Table 13. Results of evaluation of efficiency of banks in Ukraine in the period 2010-2020 (without binary variable)

Variable	Coefficient	Standard error	t-statistic	Probability
TA	-0.124	0.043	-2.909	0.004
TE	2.084	0.287	7.274	0.000
AE	-2.418	1.322	-1.829	0.070
FCI	-0.439	0.841	-0.522	0.603
RTFC	1.824	1.400	1.303	0.196

Source: compiled by the authors

The general analysis of banks' efficiency shows (table 13) that in the period 2010-2020 the efficiency of all banks in Ukraine was significantly influenced by the size of total capital, total assets and administrative costs. It should be noted that without the introduction of a binary variable, the size of assets is an influential factor in the efficiency of banks. Thus, the application of the binary variable methodology can improve the quality of the model, namely to identify the fact that it is not total assets that affect efficiency but the type of ownership.

Thus, it can be concluded that the type of ownership, total capital, administrative costs, and results from foreign exchange trading significantly impact banks' net profitability. It should be noted that the coefficient of determination is quite low - 0.37 in the final version of the model, which leaves room for further research, what factors affect the efficiency of Ukrainian banks, but the main issue of this work was highlighted, as evidenced by the significant coefficient of the binary variable - state-owned banks are less efficient (coefficient is -15.795).

5. Conclusions.

Organizing the results obtained, we can draw the following conclusions. In both Ukraine and Poland, state-owned banks occupy the major part of the banking sector, with the largest number of total assets. In Poland, the best performance indicators and the best efficiency in terms of criteria such as NIM, ROAE, ROAA and CIR in the

period 2014-2019 were demonstrated by state-owned banking groups; however, in 2020, during the pandemic and economic crisis, according to such indicators, both ROAE and ROAA showed the best results for banks with foreign capital (in particular, the banking group BNP Paribas Polska). The private bank Getin Noble was the worst in all evaluation criteria.

The largest share of net assets in the banking system of Ukraine is also occupied by state-owned banks, while the share of foreign banks continued to decline, and the share of private banks was the smallest in the banking system. However, the best indicators of net interest margin, average return on equity, average return on assets and cost-to-income ratio in the last three years were demonstrated by foreign banks. It should be noted that state-owned banks were able to significantly improve their results compared to 2016 (in particular, this applies to PrivatBank).

Modeling the efficiency of state-owned banks in Ukraine showed that state-owned banks are mostly inefficient, and their profitability is most affected by the sizes of total capital, administrative expenses and results from foreign exchange trading. It was also concluded that the type of ownership, total capital, administrative costs, and results from foreign exchange trading significantly impact banks' net profitability.

In such a situation, the banking system of Ukraine requires the privatization of state-owned banks with the mandatory participation of foreign investors.

References

- Alfa-Bank Ukraine. (2022). *Financial Statements*. Available at: <https://alfabank.ua/ru/investor-relations>.
- Alior Bank. (2022). *Financial results*. Available at: <https://www.aliorbank.pl/en/investor-relations/financial-results.html>.
- Bank Pekao. (2022). *Reports*. Available at: <https://www.pekao.com.pl/en/investors-relations/reports/reports.html>.
- Black Sea Trade and Development Bank (BSTDB). (2021). *Overview of the financial sector in Ukraine*. Available at: https://www.bstdb.org/BSTDB_Overview%20of%20the%20financial%20sector_UKRAINE.pdf.
- Bloomenthal, A. (2021). *Net Interest Margin*. Available at: <https://www.investopedia.com/terms/n/netinterestmargin.asp>.
- BNP Paribas Bank Polska. (2022). *Periodic Reports*. Available at: <https://www.bnpparibas.pl/en/investor-relations/stock-exchange-reports/periodic-reports>.
- Chumachenko D., Derkach T., Babenko V. (2021). Development Prospects of Banking Sector in Central and Eastern European Countries in Terms of Financial Integration. *Studies of Applied Economics*, 39(7). <https://doi.org/10.25115/eea.v39i7.4949>
- Dominese G., Yakubovskiy S., Tsevukh J. (2020). Impact of International Migration Flows on the European Union and Ukraine. *Journal Transition Studies Review*, 27(2), 83-98. <https://doi.org/10.14665/1614-4007-27-2-007>.

- Dominese G., Rodionova T., Tsviakh A. (2020). Comparative Analysis of the Return on Foreign Investments of the United States, Germany and Japan. *Journal Global Policy and Governance*, 9(2), 17-27. <https://doi.org/10.14666/2194-7759-9-2-002>
- Dominese, G., Yakubovskiy, S., Rodionova, T. (2021). Determinants of the government bond yields of Italy, Spain, Portugal and Greece. *Journal Global Policy and Governance*, 10(1), 23–34. Doi: <https://doi.org/10.14666/2194-7759-10-1-002>
- European Banking Federation. (2020). *Banking in Europe: EBF Facts & Figures 2020*. Available at: https://www.ebf.eu/wp-content/uploads/2020/11/EBF_043537-Banking-in-Europe-EBF-Facts-and-Figures-2020.pdf.
- European Banking Federation. (2022). *Poland's banking sector: Facts & Figures*. Available at: <https://www.ebf.eu/poland/>.
- Getin Noble Bank. (2022). *Periodic reports*. Available at: <https://www.gnb.pl/en/reports/periodic-reports/page,3.html?0=page&1=2>.
- Getin Noble Bank S.A. (2021). *Activities of the Bank and the Group in 2020*. Available at: https://www.gnb.pl/storage/file/core_files/2021/6/2/9f7520c810257ba387d973d38eb64ef1/Sprawozdanie%20Zarz%C4%85du_2020_eng.pdf.
- Hersugondo, H., Anjani, N., Pamungkas, I. (2021). The Role of Non-Performing Asset, Capital, Adequacy and Insolvency Risk on Bank Performance: A Case Study in Indonesia. *The Journal of Asian Finance, Economics and Business*, 8(3). <https://doi.org/10.13106/jafeb.2021.vol8.no3.0319>.
- Kahkonen, S. (2017). *Competitive and Well-Governed State Banks that Serve Everyone – a Prerequisite for Stronger Growth in Ukraine*. Available at: <https://www.worldbank.org/en/news/opinion/2017/12/14/ukraine-state-banks>.
- Kenton, W. (2021). *Return On Average Equity (ROAE)*. Available at: <https://www.investopedia.com/terms/r/roae.asp>.
- Kenton, W. (2021). *Return on Average Assets – ROAA Definition*. Available at: <https://www.investopedia.com/terms/r/roaa.asp>.
- Lomachynska I., Babenko V., Yemets O. (2020). Impact of the Foreign Direct Investment Inflow on the Export Growth of the Visegrad Group Countries. *Studies of Applied Economics*, 38(4). <http://dx.doi.org/10.25115/eea.v38i4.4007>
- Malyarenko, T. (2021). China's Belt and Road Initiative in the Contested Eastern Neighborhood: A Case Study of Ukraine. *Lex Portus*, 7(2), 39-63. <https://doi.org/10.26886/2524-101X.7.2.2021.3>
- Malyarenko, T., Wolff, S. (2021). Introduction “Belt and Road Initiative in the South Caucasus and Eastern Europe: Trade, Policy, Regulations”. *Lex Portus*, 7(2), 7-10. <https://doi.org/10.26886/2524-101X.7.2.2021.1>
- mBank. (2022). *Annual reports*. Available at: <https://www.mbank.pl/en/investor-relations/financial-results/>
- Maslii, N., Zakharchenko, N., Butenko, V., Savastieieva, O., Butenko, T., Shyriaieva, L. (2018). Modern technologies of detection and prevention of corruption in emerging information society. *Problems and Perspectives in Management*, 16(1). [https://doi.org/10.21511/ppm.16\(1\).2018.06](https://doi.org/10.21511/ppm.16(1).2018.06).
- Maslii, N., Demianchuk, M., Skribans, V. (2019). Bifurcation Points Analysis Application in Economic Studies. *ICIBE*, September 27–29, 359-364. Hong Kong, China. [https://doi.org/10.21511/ppm.16\(1\).2018.06](https://doi.org/10.21511/ppm.16(1).2018.06)

- [org/10.1145/3364335.3364405.](https://www.minfin.com.ua/banks/stat/count/)
- Minfin. (2022). *Number of banks in Ukraine*. Available at: <https://index.minfin.com.ua/banks/stat/count/>.
- Narodowy Bank Polski. (2022). *Financial System, Financial System Development Reports*. Available at: <https://www.nbp.pl/homen.aspx?f=/en/systemfinansowy/rozwoj.html>.
- NBA. (2020). *Ukraine unblocks NPL sales by state banks*. Available at: <https://eba.com.ua/en/uryad-zaprovadyv-protseduru-prodazhu-nepratsyuyuchykh-kredytiv-derzhavnymy-bankamy/>.
- NBU. (2020). *Annual Report 2019*. Available at: https://bank.gov.ua/admin_uploads/article/annual_report_2019_final-eng.pdf?v=4.
- NBU. (2021). *Annual Report 2020*. Available at: <https://bank.gov.ua/en/news/all/richniy-zvit-natsionalnogo-banku-ukrayini-za-2020-rik>.
- NBU. (2021). *Banking Sector Review, August 2021*. Available at: https://bank.gov.ua/admin_uploads/article/Banking_Sector_Review_2021-08_eng.pdf?v=4.
- Oschadbank. (2022). *Financial Reporting*. Available at: <https://www.oschadbank.ua/ua/about/financial-reporting>.
- OTP Bank. (2022). *Reports and Publications*. Available at: <https://en.otpbank.com.ua/about/informations/annual-reports/>.
- PKO Bank Polski. (2022) *Financial Results & Presentations*. Available at: <https://www.pkobp.pl/investor-relations/financial-results-presentations/#subcategory=178691>.
- Privatebank. (2022). *Financial statements*. Available at: <https://en.privatbank.ua/about/financial-statements>.
- Protsenko, V., Ivantsova, A. (2019). *From Oschadbank To PrivatBank: How Ukraine Got Its State-Owned Banks And Why Wants To Sell Them*. Available at: <https://voxukraine.org/en/from-oschadbank-to-privatbank-how-ukraine-got-its-state-owned-banks-and-why-wants-to-sell-them/>.
- PUMB. (2022). *Annual reports*. Available at: https://about.pumb.ua/en/finance/annual_reports.
- Rakhmatillaev, N. (2018). *Determinants of profitability of state-owned banks in Uzbekistan*. Available at SSRN: <https://ssrn.com/abstract=4016064>
- Raiffeisen Bank Aval. (2022). *Financial Statements*. Available at: <https://raiffeisen.ua/storage/files/20-rba-separate-ukr-financial-statements-1-1-1-1-1.pdf>.
- Santander Bank Polska. (2022). *Financial statement*. Available at: <https://www.santander.pl/en/investor-relations/financial-statement>.
- Tascombank. (2022). *Annual Reporting and Audit*. Available at: <https://tascombank.ua/docs/#5c272fa2fe1924094ca51d12>.
- Thompson, J. (2021). *How to Calculate a Cost-to-Income Ratio*. Available at: <https://bizfluent.com/how-6398870-calculate-cost-to-income-ratio.html>.
- Tustanovskiy, Y., Denys, O., Plieshakova, N. (2019). *The Corporate Governance Reforms of the State-Owned Banks of Ukraine*. Available at: <http://we.clmconsulting.pl/index.php/we/article/view/463>.
- Ukreximbank. (2022). *IFRS Financials*. Available at: <https://www.eximb.com/eng/menu/profile-ukreximbank/financial-statements/ifrs-financials.html>.

UkrGasbank. (2022). *Annual Financial Statements*. Available at: https://www.ukrgasbank.com/en/about/fin_results/rishfin/auditors_report/.

UkrSibbank. (2022). *Financial Statements*. Available at: <https://my.ukrsibbank.com/ua/about-bank/financial-reports/>.