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COMMERCIAL BANKS PERFORMANCE 2008–2012

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Abstract. A country's image, economic development process and GDP growth is significantly influenced by its banking sector performance. Banking's success largely depends on public confidence. Only a small part of the banking services customers understand the indicators and ratios which are used to assess bank's activities. Therefore, there is a need to analyze banks performance results in Lithuania. The paper presents a principal component analysis model applied on banks performance ratios in Lithuania. The main purpose of this article is to analyze basic indicators used in banks performance evaluation by principal component method. The obtained results represent the main components with the highest influence on Lithuanian commercial banks performance results in 2008–2012 year period. The main findings of the study indicate that commercial banks in Lithuania have been affected by different factors during 2008–2012 periods. It has been noted that Scandinavian capital commercial banks' performance results have been influenced by similar factors, have had similar structure of the factors, which has been more stable in comparison with small and/or Lithuanian capital banks. Conclusions and recommendations help banks' board to improve their competitiveness and financial results, thus it also helps them to make appropriate decisions. It is also useful for an academic community to understand the structure of main components in banking sector.

Keywords: banks performance, banks ratios, profitability, liquidity ratios, capital adequacy, efficiency ratios, leverage ratios, principal component analysis, financial statement.

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JEL classification: G21.

1. Introduction

In order to develop any kind of business, it is necessary to analyse the present situation and foresee the future. Constant evaluation of financial performance is one of the most important domestic activities in every enterprise as well in commercial banks' sector. Commercial banks play a significant role in economic growth of countries. Through their intermediation function banks manage their activity in the efficient allocation of resources of countries by mobilizing resources for productive activities. They transfer funds from those who don't have productive use of it to those with productive venture. In addition to resource allocation good bank performance rewards the shareholders with sufficient return for their investment. When there is return there shall be an investment which, in turn, brings about economic growth. On other hand, poor banking performance has a negative repercussion on the economic growth and development. Poor performance can lead to runs, failures and crises (Ongore, Kusa 2013).

Commercial banks, analysed in this paper, are the most active members of financial markets – more and more private persons and business enterprises are taking the advantages of their services. Therefore, it is very important to properly evaluate the financial state of the banks and make the appropriate decisions.

Lithuanian banks' market share is more than 80 percent of the financial market, so it has a great importance for the country's economy. The granting of credit can be considered as a commercial bank's active role in Lithuania, because the successful executions of these activities provide basic banking income, it also increases the reliability and stability of the bank, as well as the credit failure may be the main cause of bank insolvency. The financial sector has experienced a serious challenge due to the fall of the fourth largest bank Snoras during the last quarter of 2011. The banking industry has not experienced such shock for more than ten years, so this incident was high-profile, but the banking system has proven to be ready and able to manage stressful situations. Moreover, Ukio bank has had its license revoked in the beginning of 2013. Therefore, there is a need to analyze banks performance results in Lithuania and identify the key factors.

A key information tool for bank analysis is the financial statement, which is comprised of the balance sheet and Profit & Loss account. The information of Profit & Loss account and asset & liabilities management allow to form banks ratios, because banks performance evaluation is based on banks' ratios analysis. Ratios could be classified into two main classes: financial and non-financial ratios. The first class of financial ratios is more detailed (liquidity ratios, capital adequacy ratios, profitability ratios, efficiency ratios, leverage ratios, market value ratios) and could be further divided into few smaller groups of ratios (Jasevičienė 2012).

Interest income, or net interest income, is the main source of revenue in the majority of banks worldwide as well as in Lithuania. Some authors (Choudhry 2012) note that interest income can form more than 60% of operating income, and for smaller banks and building societies it reaches 80% or more. Banks' ability to accumulate revenues

determines banks results. The result of banks also depends on cost level. Costs of a bank give a lot of information about bank's ability to manage its costs effectively. Furthermore, significant elements of cost are interest expenses and provisions for loans losses, which are large, compared to the loan revenues of the bank. The provision is based on a subjective measure by management of how much of the loan portfolio can be expected to be repaid by the borrower.

Financial analysis helps to understand better the processes and phenomena taking place in the banks, it also helps to determine the results of enterprise performance finance-wise, to evaluate the present condition and future perspectives. The information provided by the financial analysis helps to check whether the past decisions proved to be right, it also helps to justify present and future decisions of management (Darškuvienė 2010). Financial ratios enable us to identify unique bank strengths and weaknesses, which itself informs about bank profitability, liquidity and credit quality (Ghoch 2012). Despite the popularity of banks' performance analyses' measures and methods in literature (Du Pont (Aarma, Vainu, Vensel 2004); CAMEL (Hays *et al*. 2009); investment activities' analysis (Cicea, Hincu 2009); non-financial measures for banks evaluation (Chantapong 2005; Chen, Chen 2008; Olweny, Shipho 2011; Ongore, Kusa 2013) and ROA, ROE (Badreldin 2009; Flamini *et al*. 2009; Dietrich, Wanzenried 2011; Khrawish 2011), these measures are criticized and have significant shortcomings that are proposed by different financial analysts and institutions (ECB 2010; Lindblom, Von Koch 2002). Therefore, there is a need to analyze banks performance results and use full – scale ratios' method.

2. Analysis method - Principal Component Analysis

In order to analyse and evaluate activities of the Lithuanian banks, principal component analysis (PCA) has been chosen. The principal component analysis, the same as factor analysis, is used for analysing and evaluating the bank's performance at large sample characteristics. The essence of component analysis is direct evidence of the correlation matrix splitting it into a number of orthogonal components, whose number is equal to the initial number of indicators. The mathematical expression of this model is:

$$Z_j = a_{j1} F_1 + a_{j2} F_2 + \ldots + a_{jn} F_n \ (j=1,2, \ldots m),$$

here each of the indicators Z_j can be linearly expressed as n non correlated between the main components of the combination of Fi and principal components weights a_{ji} indicates the relative weight of each component indicator of the formation of the research (Martišius, Kėdaitis 2010). In this method, the total variance remains the same as the total variance of the initial indicators are equal to the total amount of the main components of variance.

The main advantage of this approach is the data reduction, saving only the key necessary and useful information to the study results. Principal components method is used in the scientific sources investigating and evaluating the activities of banks, the

profitability, efficiency and other indicators. Scientists Ho and Wu (2009) analysed the online banking performance, based on key components of the model in Taiwan. The main variables in this study were: the number of deposits, operating expenses, number of employees, revenue, equipment value, average daily value of transactions (in monetary terms). The study identified two main components, and the results led to the conclusion that the number of employees has the lowest influence on online banking success and other factors that had higher rates showed that Taiwan's various banks' internet banking has been influenced by a number of deposits, operating costs, income and the value of the equipment. Authors Shih, Zhang and Liu (2004) compared the banks activities in China. The study has been performed using the method of principal components. The main variables have been used for capital risk, credit risk, profitability, risk and liquidity risk indicators and it has been found out that banks in this country have a negligible impact on the liquidity risk; banks that have more assets, has a stronger correlation with the yield risk. It is also noted that credit risk has a negative relationship with future expected profitability; credit risk positively correlates with risk capital. During the analysis, the banks have been divided into separate regions in China, and then it has been found out that the large regions' banks effectively carry out their activities, whereas banks in the peripheral parts of China are more exposed to political factors and it determines their lower profitability and less efficient operations, compared with banks located in larger cities.

Summing up all the scientific studies using the statistical / mathematical methods, it can be concluded that principal component analysis method is successfully applied in banks performance studies and the results provide the possibility for decision making.

3. PCA model and its application

Analysis of Lithuanian commercial banks performance and evaluation is based on PCA. The model selection reasoning is as follows: examined banks' have a large sample of indicators; analysis period is from 2008 to 2012 third quarter (pre – crisis; crisis and post – crisis periods) and for each year for each bank individually calculated ratios are based on the performance profitability, efficiency, leverage and others groups of ratios.

It is difficult to analyse, evaluate and interpret such large sample of indicators (all banks in five years consists of about 1000 ratios) so -the principal component analysis makes an opportunity to combine these indicators into key components, which means that it is possible with the least possible factors to explain as much as possible variable dispersion.

3.1. 2008 year analysis

Table 1 presents commercial banks performance ratios in Lithuania. There is a large sample of ratios and it is difficult to form analysis' conclusions. For this reason it is necessary to apply principal components method for a large sample reduction.

Table 1. Lithuanian banks' performance ratios in 2008 (Source: created by authors using data obtained from LBA Statistics)

	Ratios																	
Banks	Gross interest income margin	Interest expenses to assets ratio	NIM	Total operating income to assets ratio	Non - interest income to assets ratio	Non - interest expenses to assets ratio	Profit margin	Non - interest expense ratio	Interest expense ratio	The provisions for loan losses ratio	Cost – income ratio	Overhead efficiency ratio	Leverage ratio	Assets to equity ratio	ROA	ROE	Total loans to total deposits ratio	The funding gap	Profit to employee ratio
Hansabankas	0,059	0,03	0,030	0,073	0,014	0,023	0,263	0,314	0,393	0,002	0,517	0,625	0,103	9,668	0,019	0,185	1,369	0,375	127,69
Danske	0,056	0,042	0,01	0,060	0,004	0,014	-0,046	0,231	0,704	0,004	0,781	0,279	0,0002	0	-0,003	0	2,825	1,875	-32,55
DnB	0,058	0,036	0,022	0,065	0,007	0,017	0,083	0,260	0,544	0,014	0,569	0,432	0,072	13,874	0,005	0,075	2,906	1,923	57,56
Medicinos	0,077	0,044	0,032	0,097	0,021	0,037	0,080	0,382	0,456	0	0,702	0,563	0,123	8,129	0,008	0,063	0,962	-0,038	10,37
Nordea	0,045	0,03	0,010	0,049	0,004	0,007	0,041	0,147	0,699	0	0,486	0,587	0	0	0,002	0	4,924	3,998	49,41
Parex	0,053	0,037	0,02	0,064	0,011	0,029	-0,052	0,458	0,583	0,003	1,098	0,372	0,081	12,369	-0,003	-0,041	3,289	2,289	-14,81
SEB	0,055	0,03	0,023	0,066	0,012	0,015	0,203	0,228	0,487	0,001	0,444	0,763	0,087	11,437	0,013	0,154	2,010	1,038	162,04
Siauliu	0,066	0,05	0,020	0,075	0,010	0,020	0,113	0,266	0,608	0,000	0,679	0,485	0,138	7,246	0,009	0,062	1,254	0,262	33,55
Ukio	0,059	0,036	0,023	0,091	0,032	0,034	0,149	0,372	0,401	-0,001	0,620	0,940	0,112	8,902	0,014	0,121	0,999	-0,0005	85,14

PCA process by steps

Analysis is standardised and 4 components are extracted. There are 4 significant components (1 component with 9,63729 eigenvalue and 53,540 percent of variance; 2 component with 4,7245 eigenvalue and 26,247 percent of variance; 3 component with 1,64686 eigenvalue and 9,149 percent of variance; 4 component with 1,05872 eigenvalue and 5,882 percent of variance) with the 94,819 cumulative percentages.

The graphical view of the components is represented in Figure 1 where the curve reflects eigenvalues on y axis. The each dot on the curve shows each significant component above the line and the curve under the line shows all other components which are not a part of the analysis.

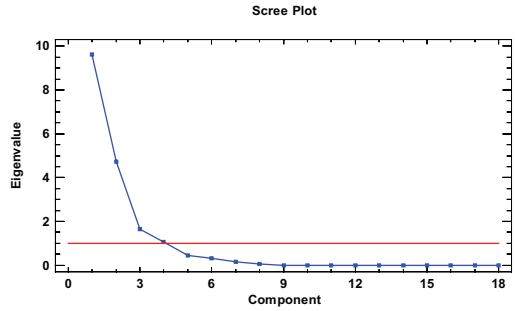

Fig. 1. Graphical view of the principal components (Source: created by authors)

This procedure performs a principal components analysis. The purpose of the analysis is to obtain a small number of linear combinations of the 18 variables which account for most of the variability in the data. In this case, 4 components have been extracted,

since 4 components has had eigenvalues greater than or equal to 1,0. Altogether they account for 94,8187% of the variability in the original data. The each of the principal component has coefficient for each commercial banks' performance ratio (see Table 2). This table shows the equations of the principal components. For example, the first principal component has the equation:

0,207265 gross interest income margin – 0,0370187* interest expenses to assets ratio + 0,290456*NIM + 0,272744* total operating income to assets ratio + 0,260687* non-interest income to assets ratio + 0,223568* non-interest expenses to assets ratio + 0,245226* profit margin + 0,151399* non-interest expense ratio – 0,305311* interest expense ratio – 0,0850487* cost – income ratio + 0,213972* overhead efficiency ratio + 0,275992* leverage ratio + 0,183341* assets to equity ratio + 0,275596*ROA + 0,256184*ROE – 0,288521* total loans to total deposits ratio – 0,289026* the funding gap + 0,177588* profit to employee ratio,*

here the values of the variables in the equation are standardised by subtracting their means and dividing by their standard deviations.

Table 2. Component weights of ratios (Source: created by authors)

Ratios	*Interest component*	*Non-interest expenses component*	*Expenses component*	*Non-interest income component*
gross interest income margin	0,207265	–0,254768	–0,35422	–0,162276
interest expenses to assets ratio	–0,0370187	–0,352101	–0,450046	0,0160104
NIM	0,290456	–0,0373242	–0,0725411	–0,236448
total operating income to assets ratio	0,272744	–0,204979	–0,116285	0,206314
non-interest income to assets ratio	0,260687	–0,0954678	0,133933	0,497492
non-interest expenses to assets ratio	0,223568	–0,2947	0,185837	0,182392
profit margin	0,245226	0,282273	–0,0751152	–0,1096
non-interest expense ratio	0,151399	–0,31771	0,415449	0,00174176
interest expense ratio	–0,305311	–0,0451575	–0,198852	–0,0091059
cost – income ratio	–0,0850487	–0,387864	0,301032	–0,0650926
overhead efficiency ratio	0,213972	0,208487	0,0982778	0,517319
leverage ratio	0,275992	–0,125863	–0,00540875	–0,201523
assets to equity ratio	0,183341	–0,0295619	0,421992	–0,497025
ROA	0,275596	0,218696	–0,0789203	0,000466471
ROE	0,256184	0,257819	–0,0771219	–0,115588
total loans to total deposits ratio	–0,288521	0,114954	0,208424	0,0467859
the funding gap	–0,289026	0,11755	0,201131	0,0506898
profit to employee ratio	0,177588	0,370321	0,0921465	–0,0667335

The principal components' influence for each of a commercial bank individually is explained in Table 3.

Table 3. Principal components influence for each of a bank performance results (Source: created by authors)

Row	*Banks*	*Interest component*	*Non-interest expenses component*	*Expenses component*	*Non-interest income component*
1	*Hansabankas*	3,09173	2,12249	0,347371	–0,753755
2	*Danske*	–4,03434	–1,13728	–1,23232	0,236487
3	*DnB*	–0,678295	0,589647	0,367308	–1,33628
4	*Medicinos*	2,9119	–2,85711	–1,02592	0,191001
5	*Nordea*	–4,72893	2,45399	–0,162079	1,13032
6	*Parex*	–2,12469	–2,81244	2,58902	–0,403256
7	*SEB*	1,44929	2,87813	0,173939	–0,416499
8	*Siauliu*	0,493498	–1,1216	–1,75944	–0,646122
9	*Ukio*	3,61984	–0,115832	0,702119	1,9981

Bank Hansabankas's performance results have been influenced by two components: interest component (coeff. 3,09173) and non-interest expenses component (coeff. 2,12249). Danske bank branch's performance results has had one strong dominating component – interest component with coefficient –4,03434. DnB bank's results has not been affected by a single component, but the strongest coefficient (–1,33628) shows that non-interest income component has been the dominating factor. Medicinos bank has had two dominating components – interest component and non-interest expenses component, similarly to Nordea bank branch. Parex commercial bank performance results have been influenced by tree factors – interest component, non-interest expenses and total expenses component. One of the biggest bank in Lithuania SEB has had non-interest expenses component (coeff. 2,87813) dominating in banks performance results. Siauliu bank's has not had one or two strong dominating components as other commercial banks, but expenses factor has been the strongest in its performance. Ukio bank (with revoked license in 2013.02) in 2008's performance results has had interest component (coeff. 3,61984) as dominating factor.

All ratios have had different coefficients, but the interest component and expenses component have been the dominating in Lithuanian commercial banks. Furthermore, bank's branches have had dominating components with weaker coefficients compared with the dominating commercial banks in Lithuanian banking sector. It means that dominating banks are able to operate better than banks' branches and banks with weaker components should take measures and changes in order to improve performance.

3.2. 2009 year analysis

Table 4. Lithuanian banks' performance ratios in 2009 (Source: created by authors using data obtained from LBA Statistics)

Banks	Ratios																		
	Gross interest income margin	Interest expenses to assets ratio	NIM	Total operating income to assets ratio	Non - interest income to assets ratio	Non - interest expenses to assets ratio	Profit margin	Non - interest expense ratio	Interest expense ratio	The provisions for loan losses ratio	Cost – income ratio	Overhead efficiency ratio	Leverage ratio	Assets to equity ratio	ROA	ROE	Total loans to total deposits ratio	The funding gap	Profit to employee ratio
Danske	0,058	0,082	0,02	0,064	0,005	0,017	-1,252	0,269	0,687	0,064	0,857	0,299	-0,078	-12,845	-0,080	1,022	1,723	0,730	-881,91
DnB	0,052	0,029	0,02	0,059	0,008	0,024	-0,569	0,410	0,496	0,135	0,812	0,318	0,068	14,730	-0,034	-0,497	3,067	2,072	-318,79
Medicinos	0,076	0,051	0,026	0,091	0,014	0,030	0,005	0,335	0,557	-0,004	0,757	0,475	0,118	8,503	0,0004	0,004	0,891	-0,109	0,71
Nordea	0,035	0,020	0,015	0,040	0,005	0,009	-0,124	0,218	0,504	-0,001	0,439	0,594	0	0	-0,005	0	3,790	2,937	-116,45
Parex	0,057	0,04	0,018	0,067	0,010	0,037	-0,947	0,554	0,587	0	1,341	0,268	0,128	7,825	-0,063	-0,496	2,236	1,238	-212,8
SEB	0,043	0,031	0,01	0,054	0,011	0,017	-1,190	0,307	0,566	0,013	0,707	0,650	0,059	16,926	-0,064	-1,088	1,675	0,687	-762,04
Swedbank	0,051	0,03	0,020	0,067	0,016	0,021	-0,862	0,308	0,457	0,003	0,568	0,795	0,099	10,142	-0,058	-0,589	1,095	0,097	-399,91
Siauliu	0,068	0,06	0,01	0,076	0,008	0,017	-0,192	0,231	0,721	0	0,827	0,446	0,125	7,990	-0,015	-0,117	1,017	0,019	-63,4
Ukio	0,059	0,052	0,007	0,072	0,013	0,025	-0,248	0,351	0,727	0,0004	1,288	0,508	0,093	10,704	-0,018	-0,198	0,683	-0,3158	-121,95

Table 4 represents commercial banks performance ratios in Lithuania in 2009. There is a large sample of banks ratios and it is necessary to apply PCA for a large sample reduction.

PCA process by steps

Analysis is standardised and the extracted 5 components are used. There are 5 significant components (1 component with 5,03106 eigenvalue and 33,540 present of variance; 2 component with 3,51638 eigenvalue and 23,443 present of variance; 3 component with 2,6825 eigenvalue and 17,88 present of variance etc.) with the 97,931 cumulative percentages.

The graphical view of the components significance is represented in Figure 2 where the curve reflects eigenvalues on y axis and components on x axis. The each dot on the curve shows each significant component above the line and the curve under the line shows all other components which are not a part of the analysis.

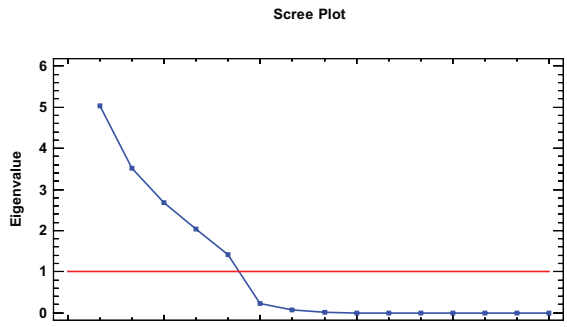

Fig. 2. Graphical view of the principal components (Source: created by authors)

In this case, 5 components have been extracted, since 5 components have had eigenvalues greater than 1,0. Together they account for almost 98% of the variability in the original data. The each of the principal component has coefficient for each commercial banks' performance ratio (see Table 5).

Table 5. Component weights of ratios (Source: created by authors)

Ratios	*Income component*	*Net profit component*	*Expenses component*	*Non-interest component*	*Interest component*
gross interest income margin	0,393943	–0,0614744	0,154858	–0,0238586	–0,305286
interest expenses to assets ratio	0,160237	–0,38655	0,28883	–0,0454288	–0,263898
NIM	0,0816228	0,19839	–0,289759	0,0139964	–0,650893
total operating income to assets ratio	0,409483	–0,009935	0,0967302	–0,154022	–0,24062
non-interest income to assets ratio	0,247223	0,182728	–0,168885	–0,462803	0,136605
non-interest expenses to assets ratio	0,353484	–0,0586877	–0,349359	0,089968	0,0037162
profit margin	0,153319	0,377407	0,300632	0,246153	0,003827
non-interest expense ratio	0,206592	–0,0978734	–0,486174	0,203511	0,143523
interest expense ratio	0,172781	–0,314317	0,386541	0,0889356	0,232501
cost – income ratio	0,28717	–0,269475	–0,113895	0,20544	0,370886
overhead efficiency ratio	–0,134459	0,289731	0,055631	–0,511781	0,204943
leverage ratio	0,316923	0,251194	–0,148332	–0,0617722	0,250244
ROA	0,119244	0,392835	0,299051	0,239585	0,0119447
total loans to total deposits ratio	–0,305517	0,0973085	–0,180864	0,444574	–0,065067
profit to employee ratio	0,232675	0,369123	0,111059	0,279753	0,125289

The table of component weights shows the equations of the principal components. For example, the first principal income component has the equation:

0,393943 gross interest income margin + 0,160237*, interest expenses to assets ratio + 0,0816228*NIM + 0,409483* total operating income to assets ratio + 0,247223* non-interest income to assets ratio + 0,353484* non-interest expenses to assets ratio + 0,153319* profit margin + 0,206592* non-interest expense ratio + 0,172781* interest expense ratio + 0,28717* cost – income ratio – 0,134459* overhead efficiency ratio + 0,316923* leverage ratio + 0,119244*ROA – 0,305517*total loans to total deposits ratio + 0,232675* profit to employee ratio,*

here the values of the variables in the equation are standardised by subtracting their means and dividing them by their standard deviations.

Principal components influence for each of commercial bank's performance results in 2009 is shown in Table 6.

Table 6. Principal components influence for each of commercial bank performance results (Source: created by authors)

Row	*Banks*	*Income component*	*Net profit component*	*Expenses component*	*Non-interest component*	*Interest component*
1	*Danske*	–1,4478	–3,91666	1,01814	–0,115465	–1,41972
2	*DnB*	–0,627499	0,555387	–1,5243	1,49786	–0,715838
3	*Medicinos*	3,14623	1,80388	0,356551	–0,278188	–1,79153
4	*Nordea*	–3,787	2,29748	0,959262	1,51075	0,258263
5	*Parex*	1,82754	–1,21335	–2,71706	1,40892	0,734311
6	*SEB*	–2,01317	–0,613628	–0,703637	–1,61037	0,83765
7	*Swedbank*	–0,469533	1,35608	–1,17948	–2,65352	–0,130982
8	*Siauliu*	1,35195	0,201525	2,44321	0,266987	0,158608
9	*Ukio*	2,01928	–0,470708	1,34732	–0,0269793	2,06924

Danske bank branch's performance results in 2009 have been affected by the net profit factor (coeff. –3,91666) and this bank has had –433,899 million litas loss at the end of the 2009. DnB bank's results have been affected by the expenses and non – interest component. Medicinos bank has had one income dominating component and at the end of the 2009 this bank has had a profit (0,362 million litas). Nordea has had two dominating factors – income and net profit components, Parex bank – expenses component (coeff. –2,71706) and income component (coeff. 1,82754). Scandinavian bank's SEB performance results in 2009 have been affected by income component (coeff. 2,01317) and Swedbank has had non – interest component as dominating component in performance results. Siauliu bank's results have been influenced by expenses component and Ukio bank's results has had two dominating factors. Mostly all banks in 2009 has had a loss (except for Medicinos bank), but each bank's result has been affected by different factors (components).

3.3. 2010 year analysis

Lithuanian banks performance results of 2010 are represented in Table 7. There are 9 banks and 18 ratios matrix as a base for PCA.

PCA process by steps

Analysis is standardised and the extracted are just 3 components with the 91,347 cumulative percentages. The analysis is based on 3 components (1 component with 6,51086 eigenvalue and 46,506 percent of variance; 2 component with 4,054 eigenvalue and 28,958 percent of variance; 3 component with 2,22361 eigenvalue and 15,88 percent of variance).

Table 7. Lithuanian banks' performance ratios in 2010 (Source: created by authors using data obtained from LBA Statistics)

Banks	Ratios																		
	Gross interest income margin	Interest expenses to assets ratio	NIM	Total operating income to assets ratio	Non - interest income to assets ratio	Non - interest expenses to assets ratio	Profit margin	Non - interest expense ratio	Interest expense ratio	The provisions for loan losses ratio	Cost – income ratio	Overhead efficiency ratio	Leverage ratio	Assets to equity ratio	ROA	ROE	Total loans to total deposits ratio	The funding gap	Profit to employee ratio
Citadele	0,050	0,035	0,015	0,071	0,020	0,050	-0,632	0,707	0,498	0	1,410	0,405	0,155	6,468	-0,045	-0,288	1,145	0,147	-123,74
Danske	0,082	0,064	0,018	0,087	0,005	0,010	0,012	0,116	0,741	-0,026	0,449	0,481	0,001	936,12	0,001	1	1,213	0,213	11,59
DnB	0,039	0,018	0,021	0,047	0,008	0,014	-0,231	0,304	0,373	-0,077	0,484	0,595	0,076	13,121	-0,011	-0,143	2,166	1,168	-96,11
Medicinos	0,062	0,03	0,028	0,078	0,016	0,029	-0,522	0,372	0,438	0	0,661	0,544	0,113	8,885	-0,041	-0,363	0,802	-0,198	-72,29
Nordea	0,024	0,01	0,015	0,033	0,009	0,009	0,123	0,268	0,277	0	0,371	1,028	0	0	0,004	0	3,859	2,903	94,14
SEB	0,033	0,022	0,011	0,046	0,013	0,016	-0,012	0,350	0,473	-0,007	0,665	0,816	0,084	11,939	-0,001	-0,007	1,610	0,627	-6
Swedbank	0,036	0,02	0,017	0,050	0,015	0,021	-0,004	0,418	0,378	-0,002	0,672	0,706	0,103	9,707	-0,0002	-0,002	0,943	-0,055	-1,42
Siauliu	0,046	0,03	0,012	0,053	0,007	0,014	-0,194	0,265	0,632	0	0,722	0,510	0,110	9,115	-0,010	-0,094	0,945	-0,053	-50,21
Ukio	0,035	0,036	-0,001	0,051	0,016	0,023	-0,127	0,446	0,699	0	1,480	0,706	0,082	12,173	-0,008	-0,079	0,574	-0,426	-61,31

The graphical view of the components' significance is presented in Figure 3 where the curve reflects eigenvalues on y axis and components on x axis. The each dot on the curve shows each significant component above the line and the curve under the line shows all other components which are not a part of the analysis.

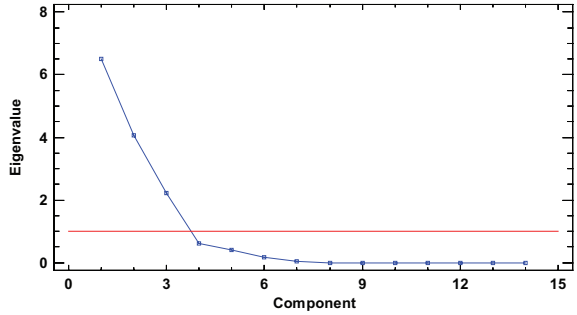

Fig. 3. Graphical view of the principal components (Source: created by authors)

The purpose of the banks' performance analysis in 2010 is to obtain a small number of linear combinations of the 14 variables which account for most of the variability in the data. The each of the principal component has coefficient for each commercial banks' performance ratio (see Table 8).

Table 8. Component weights of ratios (Source: created by authors)

Ratios	*Profit component*	*Income component*	*Interest component*
gross interest income margin	0,164617	0,431386	0,143937
Interest expenses to assets ratio	0,167874	0,423107	–0,159784
NIM	0,0297336	0,11174	0,64271
total operating income to assets ratio	0,250474	0,347961	0,131075
non-interest income to assets ratio	0,270151	–0,30092	–0,0523223
non-interest expenses to assets ratio	0,352044	–0,178722	0,0517113
profit margin	–0,349176	0,0626629	–0,225708
non-interest expense ratio	0,279411	–0,328157	–0,0549335
interest expense ratio	0,131324	0,334446	–0,431924
cost – income ratio	0,281596	–0,162203	–0,388984
overhead efficiency ratio	–0,305965	–0,243218	–0,073123
leverage ratio	0,310375	–0,205044	0,0216354
ROA	–0,34144	0,0762593	–0,256232
total loans to total deposits ratio	–0,28481	–0,148452	0,234059

The Table 8 shows the equations of the principal components. For example, the first principal component has the equation:

0,164617 gross interest income margin + 0,167874* interest expenses to assets ratio + 0,0297336*NIM + 0,250474* total operating income to assets ratio + 0,270151* non-interest income to assets ratio + 0,352044* non-interest expenses to assets ratio – 0,349176* profit margin + 0,279411* non-interest expense ratio + 0,131324* interest expense ratio + 0,281596* cost – income ratio – 0,305965* overhead efficiency ratio + 0,310375* leverage ratio – 0,34144*ROA – 0,28481* total loans to total deposits ratio,*

here the values of the variables in the equation are standardised by subtracting their means and dividing them by their standard deviations.

According to the weights of ratios, income and profit components have more ratios with the higher coefficients compared with interest component. It means that banks with third dominating component are affected mostly through the net interest margin elements. The results of more detailed analysis are presented in Table 9.

According to analysis results, Lithuanian banks performance results have been affected by three components: profit, income and interest. Citadele, Nordea and SEB banks' results have been influenced mostly by profit component (coeff. 4,73137; –4,37345; –1,3039). Citadele and SEB banks have had a loss at the end of 2010, thus Nordea results show a profit. Danske, Swedbank and Siauliu commercial banks' results have been influenced by the income component. Dnb and Medicinos banks in the results has had two dominating factors: profit and interest components. Ukio bank's result has been affected mostly by interest income component (coeff. –3,1267) and at the end of the year bank has had more interests' expenses than interest income.

In summary, there have been groups of banks with the same dominating components in 2010, but this trend is not constant during all years in analysis.

Table 9. Principal components influence for each of commercial bank performance results (Source: created by authors)

Row	*Banks*	*Profit component*	*Income component*	*Interest component*
1	*Citadele*	4,73137	–1,52798	0,303517
2	*Danske*	–0,644846	4,80238	–0,204254
3	*DnB*	–1,21485	–0,331548	1,33782
4	*Medicinos*	2,43217	0,53504	2,17584
5	*Nordea*	–4,37345	–1,71385	0,734035
6	*SEB*	–1,3039	–0,945824	–0,624917
7	*Swedbank*	–0,485315	–1,15363	0,0546086
8	*Siauliu*	–0,0514031	1,0105	–0,649941
9	*Ukio*	0,910222	–0,675087	–3,1267

3.4. 2011 year analysis

Table 10. Lithuanian banks' performance ratios in 2011 (Source: created by authors using data obtained from LBA Statistics)

	Ratios																		
Banks	Gross interest income margin	Interest expenses to assets ratio	NIM	Total operating income to assets ratio	Non - interest income to assets ratio	Non - interest expenses to assets ratio	Profit margin	Non - interest expense ratio	Interest expense ratio	The provisions for loan losses ratio	Cost – income ratio	Overhead efficiency ratio	Leverage ratio	Assets to equity ratio	ROA	ROE	Total loans to total deposits ratio	The funding gap	Profit to employee ratio
Citadele	0,040	0,016	0,024	0,056	0,017	0,041	0,115	0,735	0,276	0	1,015	0,398	0,155	6,44	0,007	0,042	0,911	-0,089	18,37
Danske	0,087	0,070	0,017	0,092	0,005	0,014	0,195	0,156	0,756	-0,001	0,642	0,36	0,018	0,02	0,018	1	1,333	0,333	186,96
DnB	0,035	0,015	0,020	0,045	0,010	0,017	0,158	0,365	0,338	-0,017	0,551	0,606	0,116	8,59	0,007	0,062	1,735	0,736	61,01
Medicinos	0,058	0,02	0,037	0,070	0,012	0,032	-0,433	0,449	0,309	0	0,649	0,384	0,084	11,85	-0,030	-0,361	0,755	-0,245	-49,98
Nordea	0,026	0,01	0,014	0,031	0,005	0,009	0,124	0,293	0,379	0,007	0,472	0,564	0	0	0,004	0	3,072	2,113	96,48
SEB	0,027	0,014	0,012	0,037	0,010	0,015	0,406	0,413	0,390	-0,006	0,676	0,661	0,084	11,90	0,015	0,177	1,261	0,283	192,97
Swedbank	0,033	0,01	0,020	0,049	0,016	0,021	0,658	0,434	0,249	-0,001	0,578	0,766	0,132	7,57	0,032	0,243	0,890	-0,105	253,6
Siauliu	0,042	0,02	0,018	0,049	0,006	0,015	0,096	0,319	0,497	0	0,634	0,396	0,109	9,16	0,005	0,043	1,070	0,073	25,94
Ukio	0,042	0,030	0,013	0,055	0,012	0,028	-0,020	0,509	0,533	-0,005	1,089	0,448	0,107	9,33	-0,001	-0,010	0,627	-0,373	-7,01

Lithuanian banks performance results of 2011 year are presented in Table 10.

PCA process by steps

Analysis is standardised and the extracted are 4 components. There are 4 significant components with the 92,207 cumulative percentages.

The graphical view of the components significance is presented in Figure 4 where the curve reflects eigenvalues on y axis and components on x axis. The each dot on the curve shows each significant component above the line and the curve under the line shows all other components which are not a part of the analysis.

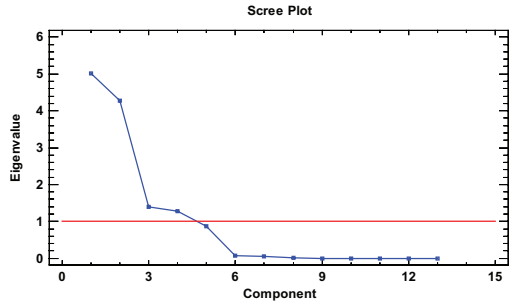

Fig. 4. Graphical view of the principal components (Source: created by authors)

The each of the principal component has coefficient for each commercial banks' performance ratio (see Table 11). This table represents the equations of the principal components.

Table 11. Component weights of ratios (Source: created by authors)

Ratios	*Non-interest expenses component*	*Income component*	*Profit component*	*Gross interest component*
gross interest income margin	–0,233495	0,390026	0,0114223	0,231356
interest expenses to assets ratio	–0,315934	0,32242	0,186372	0,021997
NIM	0,181984	0,223599	–0,46024	0,497066
total operating income to assets ratio	–0,152233	0,421843	0,0802469	0,280069
non-interest income to assets ratio	0,389486	0,0635801	0,276004	0,194909
non-interest expenses to assets ratio	0,344521	0,28463	–0,00009	–0,016867
non-interest expense ratio	0,412177	0,0793285	0,0848733	–0,185612
interest expense ratio	–0,356502	0,217013	0,186412	–0,247879
cost – income ratio	0,219549	0,273363	0,305253	–0,482068
overhead efficiency ratio	0,0786427	–0,398974	0,329201	0,282904
assets to equity ratio	0,304298	0,0205162	0,0318539	0,127845
total loans to total deposits ratio	–0,212859	–0,309104	–0,348139	–0,175043
profit to employee ratio	–0,172343	–0,21831	0,552246	0,356228

For example, the first principal component has the equation:

– 0,233495 gross interest income margin – 0,315934*interest expenses to assets ratio + 0,181984*NIM – 0,152233* total operating income to assets ratio + 0,389486* non-interest income to assets ratio + 0,344521* non-interest expenses to assets ratio + 0,412177* non-interest expense ratio – 0,356502* interest expense ratio + 0,219549*cost – income ratio + 0,0786427* overhead efficiency ratio + 0,304298* assets to equity ratio – 0,212859* total loans to total deposits ratio – 0,172343* profit to employee ratio.*

Table 12. Principal components influence for each of commercial bank performance results (Source: created by authors)

Row	*Label*	*Non-interest expenses component*	*Income component*	*Profit component*	*Gross interest component*
1	*Citadele*	3,09741	1,60537	0,0936985	–0,728816
2	*Danske*	–4,64777	2,65775	0,789118	0,527637
3	*DnB*	0,135004	–1,34806	–0,630019	0,332195
4	*Medicinos*	1,55563	2,16452	–1,7998	1,40895
5	*Nordea*	–1,8452	–3,01428	–1,37241	–0,913329
6	*SEB*	0,369552	–1,9655	1,14516	–0,065018
7	*Swedbank*	1,17969	–1,7058	1,47749	1,76246
8	*Siauliu*	–0,818695	0,107774	–0,710837	–0,556185
9	*Ukio*	0,974385	1,49822	1,0076	–1,76789

According to the analysis results (see Table 12), commercial bank's Citadele results has been affected by non – interest expenses component (coeff. 3,09741) – operating expenses took the largest part of total expenses in the bank in 2011. Danske bank branch results has been also affected by non – interest expenses component (coeff.–4,64777) and income component (coeff. 2,65775). Income component has been a dominating factor in SEB, Medicinos, Dnb and Nordea banks performance results. It means that dominating negative coefficients level in this group of banks and these commercial banks has had a profit at the end of the 2011 except for Medicinos bank (positive coefficient 2,16425) with the loss of –24,340 million litas. Swedbank's results have been influenced by income and gross interest components and this bank has had the highest profit in Lithuania in 2011. Siauliu bank has no single significant component with high level of coefficients, but the gross interest component has been a dominating factor in Ukio bank's results.

Summarizing 2011 analysis results, PCA model analysis explains the main dominating components in banks, which determine banks results. This conclusion could be an advisory one for the banks' boards or administration in order to achieve banks performance guidelines. The bank's management can make decisions and change their tasks based on this analysis to achieve better results.

3.5. 2012 3Q year analysis

Table 13 presents commercial banks performance ratios in Lithuania. The principal components method is applied for a large sample reduction for an easier explanation of data.

Table 13. Lithuanian banks' performance ratios in 2012 3Q (Source: created by authors using data obtained from LBA Statistics)

	Ratios																		
Banks	Gross interest income margin	Interest expenses to assets ratio	NIM	Total operating income to assets ratio	Non - interest income to assets ratio	Non - interest expenses to assets ratio	Profit margin	Non - interest expense ratio	Interest expense ratio	The provisions for loan losses ratio	Cost – income ratio	Overhead efficiency ratio	Leverage ratio	Assets to equity ratio	ROA	ROE	Total loans to total deposits ratio	The funding gap	Profit to employee ratio
Citadele	0,029	0,010	0,019	0,035	0,006	0,029	0,352	0,820	0,276	0	1,134	0,221	0,179	5,59	0,012	0,070	0,880	-0,118	32,72
Danske	0,061	0,05	0,012	0,065	0,004	0,010	0,254	0,156	0,752	-0,004	0,627	0,397	0,017	60,44	0,017	1	1,253	0,253	178,16
DnB	0,024	0,009	0,016	0,033	0,008	0,016	0,205	0,483	0,266	-0,020	0,658	0,529	0,123	8,12	0,007	0,055	1,651	0,652	55,17
Medicinos	0,036	0,02	0,020	0,052	0,016	0,024	0,133	0,467	0,317	0	0,685	0,642	0,089	11,27	0,007	0,078	0,751	0,249	10,89
Nordea	0,017	0,01	0,010	0,020	0,003	0,006	0,188	0,299	0,353	0	0,462	0,539	0	0	0,004	0	3,089	2,165	109,34
SEB	0,020	0,010	0,009	0,029	0,009	0,012	0,157	0,417	0,394	-0,007	0,688	0,746	0,100	10,02	0,005	0,046	1,276	0,296	56,52
Swedbank	0,021	0,01	0,013	0,034	0,012	0,014	0,329	0,424	0,256	0,003	0,569	0,865	0,141	7,10	0,011	0,079	0,840	-0,155	93,35
Siauliu	0,032	0,02	0,014	0,039	0,007	0,012	0,099	0,306	0,463	0	0,569	0,571	0,110	9,11	0,004	0,035	0,978	-0,020	22,94
Ukio	0,028	0,02	0,010	0,037	0,009	0,020	-0,315	0,535	0,486	0	1,041	0,444	0,099	10,07	-0,012	-0,118	0,619	0,221	-73,34

PCA process by steps

There are 4 significant components (1 component with 5,0057 eigenvalue and 35,755 percent of variance; 2 component with 3,86423 eigenvalue and 27,602 percent of variance etc.) with the 93,831 cumulative percentages. The detailed graphical view of the components' significance is presented in Figure 5 where the curve reflects eigenvalues on y axis and components on x axis. The each dot on the curve shows each significant component above the line and the curve under the line shows all other components which are not a part of the analysis.

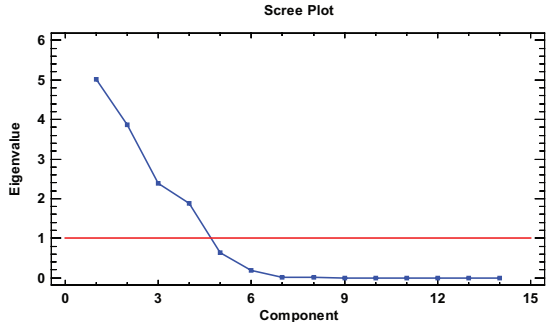

Fig. 5. Graphical view of the principal components (Source: created by authors)

In 2012 3Q period 4 components have been extracted and the each of the principal component has weight for each commercial bank's performance ratio (see Table 14).

Table 14. Component weights of ratios (Source: created by authors)

Ratios	*Non-interest expenses component*	*Income component*	*Profit component*	*Non-interest income component*
gross interest income margin	0,250636	0,418821	0,0401439	–0,0236722
interest expenses to assets ratio	0,323229	0,344936	–0,0464747	–0,0360985
NIM	–0,235623	0,261628	0,318936	0,0327176
total operating income to assets ratio	0,179329	0,434926	0,0784786	–0,206918
non-interest income to assets ratio	–0,226169	0,0630035	0,0954947	–0,585734
non-interest expenses to assets ratio	–0,355387	0,291719	–0,0257112	0,0405123
profit margin	0,0098069	0,00690669	0,603656	0,215418
non-interest expense ratio	–0,412553	0,0931513	–0,0532553	0,219192
interest expense ratio	0,359912	0,231954	–0,21918	–0,00354652
cost – income ratio	–0,271273	0,264921	–0,300024	0,220525
overhead efficiency ratio	0,0102366	–0,278528	0,18329	–0,557513
leverage ratio	–0,383819	0,101337	0,0858912	–0,0408521
ROA	0,1104	0,151582	0,569756	0,145366
total loans to total deposits ratio	0,185857	–0,339697	0,0876572	0,364433

This table explains the equations of the principal components, where the values of the variables in the equation are standardised by subtracting their means and dividing by their standard deviations.

Table 15. Principal components influence for each of commercial bank performance results (Source: created by authors)

Row	*Banks*	*Non-interest expenses component*	*Income component*	*Profit component*	*Non-interest income component*
1	*Citadele*	–3,27822	1,98155	0,612499	2,4276
2	*Danske*	4,61949	2,91188	0,431825	0,388468
3	*DnB*	–0,908059	–0,703688	0,683382	0,471592
4	*Medicinos*	–1,19663	1,47848	0,920808	–1,77732
5	*Nordea*	1,85742	–3,42174	–0,056569	1,59047
6	*SEB*	–0,00934875	–1,58187	–0,239495	–0,627671
7	*Swedbank*	–0,928561	–1,14542	1,61449	–1,49796
8	*Siauliu*	0,752222	–0,0670096	–0,160023	–0,464695
9	*Ukio*	–0,908314	0,547815	–3,80692	–0,510485

Citadele and Danske banks performance results in 2012 3Q has had dominating non-interest expenses component (coeff. –3,27822 and 4,61949), whereas DnB has had no single component with significant weight of influence. Medicinos bank's performance results have been affected by non-interest income component. SEB and Swedbank have not had high weight levels as in the analyzed years before, though income component has influenced SEB result with coeff. –1,58187 and profit component has dominated in Swedbank with coeff.1,61449. Siauliu commercial bank's performance has had no structure with these components. Ukio bank performance has been affected by profit component (coeff. –3,80692) and this trend is visible in bank's loss result in 2012 3Q, when this bank has been the only bank in Lithuanian banking sector with the loss more than –47 million litas. Due to this, Ukio bank has had its license revoked in the beginning of 2013.

Summarizing 2012 3Q analysis results, PCA model analysis explains the main dominating components in banks which determine banks' results. One of the clearest highlighted examples in this analysis is Ukio bank's result when Lithuanian bank has revoked its license.

4. Conclusions

Analysis of financial ratios is important not only for a decision making process in the bank's plans, but it is also significant in shaping the strategy. It is possible to evaluate and to improve the company's efficiency, profitability and viability of describing the findings and conclusions based on the financial analysis and it creates a possibility to develop and implement new projects in a bank. Bank financial reports' analysis provides valuable information for bank managers in assessing current and future debt quality and it determines relationship process between the lending bank and the customer. Banking financial ratio analysis and assessment helps customers to select the right bank and to form an opinion about its reliability.

The main method for this analyze is PCA. The method is successfully applied to the analysis of the banks' performance in all over the world.

The results of the analysis which has been carried out during the five years period, including the global financial crisis and the results for each of commercial bank in Lithuania has not been not similar. First of all, every year each bank has had different components which affected their performance results and different structure of these components. Citadele bank (or Parex) has had a loss in performance results during crisis period and the profit during the last two years, however, despite this fact, bank has been affected by non – interest expenses factor before and after crisis period and income factor has been a dominating during the financial crisis period. Danske bank branch's performance results have been influenced by different factors before the financial crisis and during the last three years of analysis, the bank has had income and non – interest expenses component as dominating ones. DnB bank has been the only analysed bank

with really low level of components' weight and has had no strong structure of factors comparing with other commercial banks. Medicinos bank, Lithuanian capital commercial bank has its one - dimensional structure in performance results. Scandinavian capital banks, Nordea bank branch, SEB, Swedbank results have been more or less affected by income of profit components, except the pre-crisis year, when all these banks have been affected by non – interest expenses component. Siauliu bank's results have been influenced by expenses factors during pre-crisis and after crisis period and income component during crisis period. Ukio bank (with its license revoked in 2013) during almost the whole analysis period has had a loss in performance results and its performance has been influenced by interest income and profit components.

Summarizing all these banks performance results and dominating components, it can be concluded that Scandinavian capital (SEB, Swedbank, Nordea branch) banks have more similar components structure and better performance results comparing with Lithuanian banks. All these results of analysis could help banks' boards to improve their competitiveness and financial results, thus help them to make appropriate decisions and change the direction of determinant factors. It is also useful for an academic community to understand the structure of main components in banking sector in Lithuania.

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