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ASSESSMENT OF PROFITABILITY AND RISK OF BANKS LISTED ON THE WARSAW STOCK EXCHANGE IN 2004-2009

Paweł Perz[1]

Abstract

Proper evaluation of banks' activity requires an analysis of profitability and risks undertaken by these institutions. For the purposes of internal reporting banks use Risk Adjusted Performance Measures (RAPM). Brief review of those indicators is presented in the article. Author pointed out the difficulty in determining these indicators by external entities. In authors opinion simple approach based on ROE volatility analysis may be treated as complementary method. In this article the author using ROE volatility analysis assessed the profitability and risk for a group of banks listed on the Warsaw Stock Exchange in 2004-2009.

JEL classification: G10, G21, G32
Keywords: RAPM, risk, banking industry

Introduction

In economic terms efficiency involves the relationship between the effects obtained and the effort needed to obtain them. The higher ratio of the obtained effects to the efforts, the more efficient the object may be perceived as. More efficient objects need less effort to achieve the effect, or obtain higher results with the same effort. In the case of bank assessment, financial indicators which show how efficiently banks use their capital (ROE) or assets (ROA) are typically used. Due to the special nature of financial institutions, risk should also be taken into consideration in the process of assessing bank activity. The disadvantage of indicators like ROA and ROE is that they do not provide for assessment of the risk faced by the banks. Therefore, it has become common practice to use modifications of the above performance indicators in such a way that they take risk into account. Risk Adjusted Performance Measures (RAPM) are now commonly used in financial institutions. From the perspective of external institutions attempting to assess the efficiency of banks using RAPM indicators, the basic problem is lack of access to multiple data enabling them to calculate the indicators. The aim of this paper is an attempt to show a simple method which takes into account the risks in the ROE analysis. Using this method, banks listed on the Warsaw Stock Exchange were examined.

Risk Adjusted Performance Measures

In assessing the financial performance of a bank, absolute indicators can be used, which provide an illustration of the size of the different elements of the profit and loss account, or

[1] Paweł Perz, Ph.D., Institute of Financial Research and Analyses, University of Information Technology and Management in Rzeszów, ul. Sucharskiego 2, 35-225 Rzeszów, pperz@wsiz.rzeszow.pl.

relative indicators, which show the bank's ability to generate profit. The most frequently used indicators characterizing the bank's profitability are ROA and ROE. In order to fully assess the quality of bank operations, both profitability and risk should be analyzed. That is the goal of the risk adjusted performance measures (RAPM). In the economic literature much space is devoted to issues related to the use of such indicators for assessing the effectiveness of enterprises, including financial institutions (Merton & Perold, 1993; STULZ, 1996; Culp, 1999; Matten, 2000; Perold, 2001; Tumasyan, 2009). There are many different techniques for determining RAPM, all based on the revision of existing indicators, so as to take into account the risk taken by the bank. The most important indicators for assessing a bank, taking into account the risk it takes, are (Matten, 2000):

1) return on risk-adjusted assets (RORAA),
2) risk-adjusted return on assets (RAROA),
3) return risk-adjusted capital (RORAC),
4) risk-adjusted return on capital (RAROC).

The surge of interest of commercial banks in implementing the different varieties of the RAPM model can be explained with two main reasons (Saunders, 2001):

1) increasing pressure from shareholders to maximize the value of the bank, which leads to growing pressure to improve the efficiency and performance of the company,
2) dynamic growth of financial conglomerates in which individual specialized units operate on the principle of profit centers.

All the above indicators are modifications of the classic indicators showing the effectiveness of a bank: ROE and ROA. To assess the degree of risk associated with achieving a given level of profitability, indicators of profitability are adjusted in a certain way. The adjustments allow to take into consideration the risk involved in achieving a certain financial result (for example, by measuring the level of variability in this result). Such adjustment is made in the RAROA and RAROC indicators. Indicators like RORAA and RORAC take into consideration the degree of risk associated with achieving the particular financial results through an appropriate adjustment of assets or the capital needed (in terms of proper risk management) to develop the financial result. There is no single universal way of calculating these indicators. Leading global banks develop and implement their own systems of counting RAPM. The general formula that to calculate RORAC is as follows:

$$RORAC = \frac{Z}{K_S} \qquad (1)$$

where Z = net profit
K_s = Risk- adjusted capital

Both in the economic literature, as well as in business practice, there are various ways of calculating risk-adjusted capital. A popular way of determining the economic capital is as follows:

$$K_S = \frac{K_{E_i}}{K_E} \times K_W \qquad (2)$$

,

where K_E = economic capital for the entire bank
K_{Ei} = economic capital for the i-th activity

K_W = sherholders' equity of bank

The presented formula means that the total available shareholders' equity is allocated among the various activities of the bank in such proportion as the ratio of the economic capital devoted to the specific economic activity to the economic capital for the entire bank. This means in practice that the bank allocates the equity to each of its business divisions in proportion to the risk that is incurred in them. To calculate RAROC, the profit from a specific business division should be adjusted. The general formula is as follows:

$$RAROC = \frac{Z_i - E(S_i)}{K_E}, \quad (2)$$

where Z_i = profit from i-th bank business unit

$([E(S)]_i)$ = the expected amount of losses associated with i-th bank's unit

RAROC and RORAC indicators give a more complete picture of the actual performance of banks. Therefore, external institutions would be interested in their use. The basic problem which arises when people not employed in a bank try to calculate these factors is very difficult access to data which provide a way to determine the economic capital from various types of activity and calculate the expected level of losses. These difficulties lead to the situation where RAROC and RORAC indicators are typically used for analyses performed by the financial institutions. According to research conducted in 2007 by the Professional Risk Managers' International Association (Campbell, 2007), RAPM indicators were used in almost half of the financial institutions. According to the respondents they are especially useful in interest rate risk management. External institutions not having access to detailed data to allow a determination RORAC and RAROC analysis may use ROE volatility analysis as a simple method that reflects both the efficiency and profitability of banks.

Evaluation of effectiveness and risks of the banks listed on the Warsaw Stock Exchange

The indicator which best assesses the degree of efficiency of bank shareholder equity use is return on equity. In order to assess risk taken by the banks, the variability of quarterly financial results was calculated. Standard deviations were used as the measure of variability. Evaluation of the risk-adjusted effectiveness was made on the basis of investigation of the relation between the profitability achieved by the banks' shareholder capital and its volatility.

Table 1 presents the average annual return on equity ratios for the studied group of banks, calculated at two-year intervals, starting from the period of 2004-2005, through the period of 2008-2009. The average return on equity for the entire period of analysis, that is for 2004-2009, is also calculated. The average indicators are calculated on the basis of quarterly financial performance of banks. Analyzing the data in Table 1, it can be seen that the highest average ROE for the entire period was achieved by the two largest banks: PKO BP and Pekao SA, as well as by Bank Millennium. The impact of the financial crisis on the banks' efficiency can be clearly seen: in the period of 2008-2009, only two banks (out of 12 analyzed) improved their average ROE in comparison to the period of 2006-2007. These were DZ Bank and Nordea Bank Poland.

Table 1: Average ROE for banks listed on the WSE (calculation based on quarterly results)

Years	2004-2005	2006-2007	2008-2009	2004-2009
Bank Handlowy w Warszawie	9.4%	13.3%	11.1%	11.3%
Bank Millennium	18.6%	26.9%	12.6%	19.4%
Bank Ochrony Środowiska	6.9%	6.8%	2.6%	5.4%
Bank Polska Kasa Opieki Spółka Akcyjna	17.9%	21.1%	18.8%	19.3%
Bank Zachodni WBK	15.0%	19.8%	19.3%	18.0%
BRE Bank	-2.4%	18.7%	12.7%	9.7%
DZ Bank Polska	5.0%	4.3%	8.7%	6.0%
Fortis Bank Polska	14.4%	15.3%	-15.5%	4.8%
ING Bank Śląski	13.6%	16.2%	12.4%	14.1%
Kredyt Bank	21.0%	21.0%	9.6%	17.2%
Nordea Bank Polska	3.4%	9.9%	13.1%	8.8%
PKO BP	19.6%	23.5%	19.9%	21.0%

Source: Author's calculation based on the banks' quarterly financial reports

Table 2 presents the basic data characterizing the distribution of the average rate of return on equity for the banks surveyed. The greatest efficiency of banks was reached in 2006-2007, the weakest in terms of effectiveness were the years 2008-2009. Noteworthy is the very significant (almost by 100%) increase in the first quartile distribution of ROE for the period of 2006-2007 against 2004-2005. This means that the weakest group of banks (in terms of efficiency) managed to significantly increase their return on capital.

Table 2: Characteristics of the distribution of the average ROE for banks listed on the WSE

Years	2004-2005	2006-2007	2008-2009	2004-2009
first quartile	6.4%	12.4%	9.4%	8.1%
median	14.0%	17.5%	12.5%	12.7%
third quartile	18.1%	21.0%	14.5%	18.3%

Source: author's calculation based on the banks' quarterly financial reports

Table 3 contains data on the volatility of ROE for banks listed on the Warsaw Stock Exchange. The data on variability were counted for identical periods of time as in Table 1 (presenting the average ROE). Variability was counted based on the bank's quarterly financial results; the indicator used to describe the variation is the standard deviation. Variability of ROE is an indicator which synthetically describes the risk that the bank undertook in order to achieve a given value of ROE. Lower variability of ROE means lower risk of its activities. The greatest variability in return on equity for the period of 2004-2009 characterized the following banks: Fortis Bank Poland (23.4%), BRE Bank (22.6%) and Bank Millennium (21%). The variability of these banks was more than twice that of Kredyt Bank (10.3%) which

was next in the ranking. The lowest level of variability of ROE throughout the period was achieved by two banks: Bank Handlowy in Warsaw (4.2%) and PKO BP (4.8%). Only these two banks achieved a variability of less than 5%. It is noteworthy that PKO BP earned the highest average ROE at such a low volatility among all the surveyed banks.

Table 3: Variability of ROE for banks listed on the WSE (measured by standard deviation)

Years	2004-2005	2006-2007	2008-2009	2004-2009
Bank Handlowy w Warszawie	2.9%	3.4%	5.0%	4.2%
Bank Millennium	16.9%	27.7%	13.0%	21.0%
Bank Ochrony Środowiska	1.4%	2.9%	7.2%	5.0%
Bank Polska Kasa Opieki Spółka Akcyjna	1.9%	5.0%	6.8%	5.2%
Bank Zachodni WBK	3.6%	6.3%	9.1%	7.1%
BRE Bank	30.9%	8.0%	16.4%	22.6%
DZ Bank Polska	3.1%	4.8%	6.9%	5.5%
Fortis Bank Polska	2.0%	2.0%	31.9%	23.4%
ING Bank Śląski	3.8%	5.9%	12.6%	8.5%
Kredyt Bank	9.3%	7.0%	9.6%	10.3%
Nordea Bank Polska	4.7%	2.8%	2.6%	5.3%
PKO BP	2.7%	2.0%	6.9%	4.8%

Source: Author's calculation based on the banks' quarterly financial reports

In table 4 quartiles were counted and the median of distribution of the ROE volatility for banks listed on the Warsaw Stock Exchange in various intervals. All parameters of the distribution have grown steadily in subsequent test periods. Median distribution increased from 3.4% (2004-2005) through 4.9 (2006-2007) until the level of 8.2% in 2008-2009. This shows an increase in the level of risk which was characterized by the activities of the studied group of banks.

Table 4: Characteristics of ROE distribution for the volatility of banks listed on the WSE

Years	2004-2005	2006-2007	2008-2009	2004-2009
first quartile	2.6%	2.8%	6.8%	5.1%
median	3.4%	4.9%	8.2%	6.3%
third quartile	5.9%	6.5%	12.7%	12.9%

Source: Author's calculation based on the banks' quarterly financial reports

Table 5 contains numbered coefficients of variation for the distribution of the average rate of return on equity in the group of banks. The coefficient of variation provides for an assessment of the strength of dispersion of the distribution; the lower the coefficient of variation, the

smaller is the dispersion of the distribution. The table shows the coefficient of variation as the percentage ratio of standard deviation and average value of ROE. The data contained in the table below, together with the data describing the average value of ROE provide for a comparison of the efficiency of banks, taking into account the risks taken. They can also form the basis for comparing the effectiveness of the functioning of the risk management systems in the banks, one of the main purposes of which is to maximize this relationship. In the case of comparisons between two banks, if one of the banks compared has a lower coefficient of variation than the other, while the former bank has a higher ROE, it can be clearly stated that the first bank is more effective than the other. More complicated is a situation in which a bank reaches a lower coefficient of variation and also a lower ROE than the other. It can then be said that in terms of the risk – earnings relationship this bank is in a better situation than the other. However, important for the evaluation of such banks is also the absolute level of the attained ROE. From the perspective of bank owners, a situation when a bank has a very low coefficient of variation and low value of ROE may be less effective than with a bank with a slightly higher value of the variation coefficient and higher ROE value. Evaluation of bank effectiveness has to take into account also the degree of implementing the policy and strategy of the bank's risk management. The bank may determine its policy as regards the risk as follows: achieving a minimum ROE of X on the condition of not exceeding a certain size of risk. With such formulation of the bank' policy, in addition to maintaining a proper risk-return relationship, to gain effectiveness, also a given return on equity must be achieved.

Table 5: Coefficient of variation of ROE for banks listed on the WSE

Years	2004-2005	2006-2007	2008-2009	2004-2009
Bank Handlowy w Warszawie	31.4%	25.9%	45.3%	37.5%
Bank Millennium	90.8%	102.9%	103.4%	108.5%
Bank Ochrony Środowiska	20.1%	42.2%	280.4%	922%
Bank Polska Kasa Opieki Spółka Akcyjna	10.5%	23.6%	36.0%	26.8%
Bank Zachodni WBK	24.3%	31.7%	47.3%	39.2%
BRE Bank	-	42.7%	129.3%	233.5%
DZ Bank Polska	62.0%	113.7%	78.9%	92.2%
Fortis Bank Polska	14.2%	13.1%	-	492.2%
ING Bank Śląski	28.1%	36.6%	101.6%	60.4%
Kredyt Bank	44.4%	33.3%	100.4%	59.6%
Nordea Bank Polska	137.7%	28.1%	20.0%	60.6%
PKO BP	14.0%	8.6%	34.9%	22.9%

Source: Author's calculation based on the banks' quarterly financial reports

The lowest coefficients of variation (less than 30%) characterize two banks: PKO BP and Pekao Bank Poland SA. The worst risk / return ratio was achieved by Fortis Bank Poland (492.2%). The only bank which managed to steadily improve the coefficient of variation in all studied periods was Nordea Bank Poland. Thanks to that in the last analyzed period (2008-2009) it was characterized by the lowest coefficient of variation among all the surveyed banks.

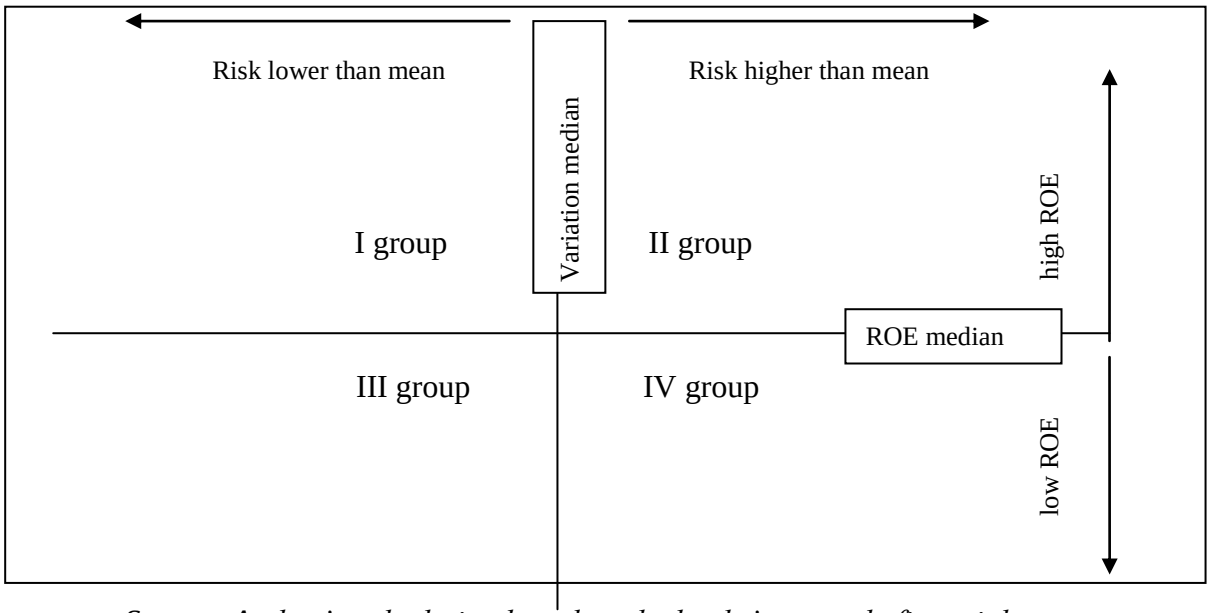
Table 6: Characteristics of the distribution of the ROE coefficient of variation for banks listed on the WSE

Years	2004-2005	2006-2007	2008-2009	2004-2009
first quartile	14.1%	25.4%	35.7%	38.8%
median	26.2%	32.5%	63.1%	60.5%
third quartile	48.8%	42.3%	102.1%	96.2%

Source: Author's calculation based on the banks' quarterly financial reports

Table 6 contains the basic data characterizing the distribution of the coefficient of variation in the group of banks in certain time periods. In the period of 2008-2009 the first quartile of the distribution of the coefficient of variation compared with the first quartile distribution in the period of 2004-2005 increased by 21 percentage points, the median distribution increased by 36.9 percentage points, and the third quartile increased by over 53 percentage points. This demonstrates the systematic deterioration of the risk-return relationship in the examined group of banks. Relationships between the effects obtained (measured by ROE), and the risk taken (measured by the standard deviation of ROE) provide for a definition of the following four groups of banks surveyed (figure 1).

Figure 1: Diagram of defining the four groups of banks



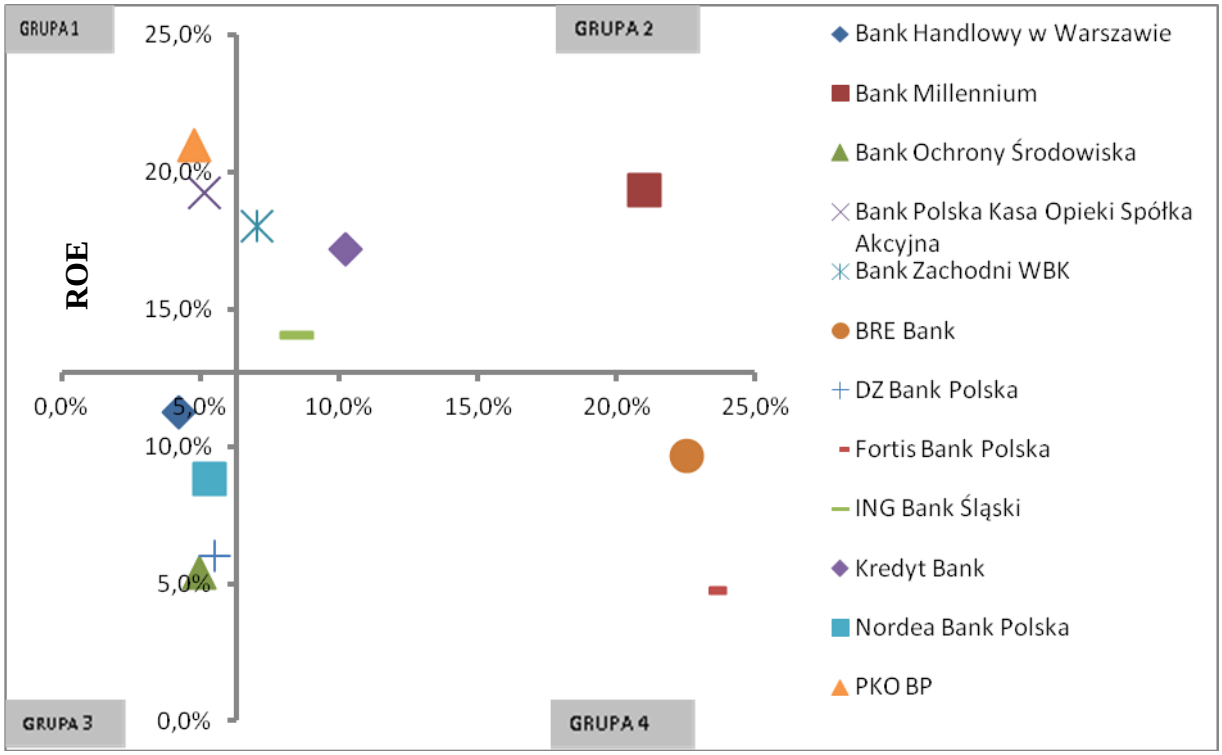
Source: Author's calculation based on the banks' quarterly financial reports

1) Group 1 – the best banks in terms of RAPM, they achieve a ROE above average, and have a below-average volatility of ROE (PKO BP, Bank Polska Kasa Opieki Spółka Akcyjna (Pekao SA)),

2) Group 2 – banks that achieve an above-average ROE, and have a variation of this ratio above the average (Bank Millennium, Bank Zachodni WBK, ING Bank Śląski and Kredyt Bank),
3) Group 3 – banks that achieve a below-average ROE and have a volatility below average (Bank Handlowy w Warszawie, Nordea Bank Polska, DZ Bank Polska and Bank Ochrony Środowiska),
4) Group 4 – the least efficient banks considering risk, they have a ROE below average and an above-average volatility of ROE (BRE Bank and Fortis Bank Polska).

The matrix shown below reflects the above ratio for banks listed on the Warsaw Stock Exchange. Profitability of banks was expressed by means of return on equity, risk was calculated as the standard deviation of this ratio. Return on equity and risk were counted based on the quarterly results obtained by the banks in the years 2004-2009. Coordinate system axes are designated by the ROE median and the median of the standard deviation of the ratio.

Figure 2: Matrix depicting the relationship between risk and profitability of banks listed on the Warsaw Stock Exchange in 2004-2009



Source: Author's calculation based on the banks' quarterly financial reports

Banks belonging to the first group can be considered as the most effective. Banks in this group achieve a return on capital higher than the average in the study group, while the risk they take in order to achieve such profitability is lower than the average for banks listed on the Warsaw Stock Exchange. This group of banks includes: PKO BP and Pekao Bank Polski

SA. The second group, i.e. institutions achieving a return on capital higher than the median and higher than average volatility of ROE, are: Bank Millennium, Bank Zachodni WBK, ING Bank Śląski and Kredyt Bank. This group of banks can be defined as low risk averse banks, taking high risk in order to achieve a high return on equity. The third group are banks that achieve return on capital below the average in the study group and generate risk lower than average. These entities are characterized by high risk aversion, resulting in a conservative policy in risk management. This group of banks includes: Bank Handlowy w Warszawie, Nordea Bank Polska, DZ Bank Polska and Bank Ochrony Środowiska. The fourth group of banks achieve a return on equity lower than average and also take above-average risk. In terms of risk-return relationships these institutions are the weakest among all the banks analysed. This group includes the following financial institutions: BRE Bank and Fortis Bank Polska.

Table 7 presents data showing to which group particular banks belonged in different periods covered by the analysis. Calculations were made based on quarterly data at different times, beginning with the period of 2004-2005 through the period of 2008-2009. Analyzing the data in the table below, it can be concluded that many of the banks remained in the same group throughout the period under study – this applies to six out of 12 surveyed banks. Among the banks which often changed their affiliation to a particular group two stand out: Nordea Bank Polska and Fortis Bank Polska. In the first case, analysis of the situation of the Nordea bank in particular two-year periods shows a clear positive trend. First, the bank reduced the risk (transition from group 4 to 3), then at a low risk it managed to increase ROE above the median (transition from group 3 to 1). An opposite trend occurred in the case of Fortis Bank Polska, which moved from the best group of banks (first group in the period of 2004-2005) to the weakest group (group 4 in the period of 2008-2009).

Table 7: Overview of which groups particular banks belonged to during different periods of analysis due to profitability and the risks they took

Years	2004-2005	2006-2007	2008-2009	2004-2009
Bank Handlowy w Warszawie	3	3	3	3
Bank Millennium	2	2	2	2
Bank Ochrony Środowiska	3	3	3	3
Bank Polska Kasa Opieki Spółka Akcyjna	1	2	1	1
Bank Zachodni WBK	2	2	2	2
BRE Bank	4	2	2	4
DZ Bank Polska	3	3	3	3
Fortis Bank Polska	1	3	4	4
ING Bank Śląski	4	4	4	2
Kredyt Bank	2	2	4	2
Nordea Bank Polska	4	3	1	3
PKO BP	1	1	1	1

Source: Author's calculation based on the banks' quarterly financial reports

Based on the above characteristics, recommendations can be formulated for future changes to be carried out in the banks belonging to different groups. Banks from group 4 should carry out a comprehensive study of their risk management systems. These banks should carefully examine the reasons for their high volatility of financial results. It is advisable for banks belonging to this group to carefully formulate their risk policy. Depending on the adopted assumptions, they may seek to take action to reduce the risk taken (if they adopt a policy of low risk) or attempt to increase the return on equity (a more aggressive policy, aimed at taking high risk in order to achieve above-average earnings).

Conclusions

Risk adjusted analysis of bank efficiency provides for analysis and assessment of the overall situation in bank in a comprehensive way. It makes possible to evaluate the ratio of undertaken risk to the financial effects produced by financial institutions. Such analysis may be interesting for both the owners (shareholders) of a bank and for bank managers. Based on the above characteristics, recommendations for future changes in banks can be formulated. The analysis of Risk Adjusted Performance Measures can also be used to evaluate a bank's risk management system.

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