

# THE NEW CAPITAL ADEQUACY FRAMEWORK (BASEL III) OPTIONS AND ISSUES IN COMMERCIAL BANKS OF LITHUANIA

Filomena Jasevičienė\*, Daiva Jurkšaitytė

*Vilnius University, Lithuania*

---

**Abstract.** *Currently, banking is one of the most regulated activities in the world, because banks are the most important institutional units engaged in financial intermediation and affects not only the whole national economy of the country, but the global financial market as well. One of the key components of banking regulation are requirements expected for the bank capital, which prevent the bank from various unforeseen risks incurring substantial losses and are a sort of guarantee to maintain the financial system stability. For this reason, it is useful to find out what factors affect the capital adequacy ratio, and what measures the banks are going to take in order to meet the new capital requirements. The present research reveals the options of the implementation of the new system and the main problems faced by banks. The paper consists of four main parts: review of theory and literature, the research methodology of the factors influencing the capital adequacy, the study of factors influencing the capital adequacy ratio, and the capital adequacy management problem areas according to the Basel III requirements and conclusions.*

**Key words:** *banks, supervision, capital adequacy rates, capital structure, accepted risks*

---

## Introduction

The global financial crisis of 2008 highlighted weaknesses in the banking system. It turned out that the capital adequacy framework of the Basel II directive provides no effect: while banks met the requirements for the capital of supervisory institutions, this was not enough for the banks to maintain the financial stability. Banks of many countries, including European banks, which had invested in the United States mortgage market, were strongly affected. In order to avoid bank bankruptcies, particularly governments of the EU countries gave the unprecedented support to the banking sector. In the light of this discouraging situation, and in order to avoid similar problems in the future, more stringent capital strengthening measures, i.e. the so-called Basel III, were adopted.

The Basel Committee, with regard to the economic situation and the structure of banks' capital, decided that the new capital adequacy requirements should be gradually implemented from 2013 at the latest and finally enter into force in 2019. So, the

\* *Corresponding author:*

Vilnius University, Saulėtekio Ave. 9., Vilnius LT-10222, Lithuania. Phone: 869851290.

E-mail: filomenaak@gmail.com

whole year of 2013 can be described as a new, special capital adequacy framework implementation phase – totally, there are seven such phases. Detailed examination of the scientific literature has revealed that the new capital adequacy framework may affect bank activities in the areas such as loan issuance volumes, the level of risk assumed by the investment rate, capital attraction. The study helps to assess what are the key factors in the Lithuanian banking system, that could have an impact on the capital adequacy ratio for the implementation of the Basel III requirements. It also revealed the main challenges in implementing the Basel III.

**Subject of the article.** Factors affecting the capital adequacy ratio. **Objective.** To analyze the new capital adequacy framework and to identify the factors affecting the capital adequacy ratio. The main tasks are to identify the key factors that would be able to determine the capital adequacy ratio changes; to identify the key issues facing the Lithuanian banking system while implementing the new requirements. The logical and graphical analysis of statistical data; correlation and regression analysis the results of which were obtained by using Microsoft Excel and mathematical calculations in order to perform the research.

## **Review of theory and literature**

One of the first scientists to be called the pioneers of the empirical researches of banks' capital and risk-taking addiction are R. E. Shrieves and D. Dahl (1992). The aim of the study conducted by the researchers was to clarify the dependence of capital and risk and to determine the deposit insurance system impact on banking decisions. Researches were continued later. K. A. M. Al-Tamimi and S. F. Obeidat (2013) made the research which analyzed the other main factors affecting the banks' capital adequacy ratio.

According to the Basel III Directive, the banks' capital adequacy ratio at the end of the period should be at least 10.5 percent. However, some scientists favor a much larger size: Hellwing M. (2010) suggests that the bank's capital ratio, associated with some undervalued assets, should be increased significantly by over 10 percent. D. Miles et al. (2012) think that the optimal regulatory capital levels should be between 16 and 20 percent for capital assets in accordance with the risks involved, and according to C.A.E Goodhart (2012) the optimal marginal social benefits are when the capital adequacy ratio is about 20 percent when the capital is measured by the riskiness of the assets.

As of 2019, in most European countries a minimum total capital (plus conservation buffer) of 10.5 percent will be necessary. In Switzerland, as of about 2019, big universal full-service banks will be obliged to have a capital charge of 19 percent (of the risk-weighted assets); 9 percent can be in the form of CoCo-Bonds. Table 1 shows the timeline for the capital charge (the capital charge is shown as the percentage of RWA) (Wernz, 2014).

**TABLE 1. Capital ratios according to the Basel III**

Year	Minimum common equity capital	Minimum common equity plus capital conservation buffer	Minimum total capital plus conservation buffer
2013	3.5	3.5	8
2014	4.0	4.0	8
2015	4.5	4.5	8
2016	4.5	5.125	8.625
2017	4.5	5.75	9.125
2018	4.5	6.375	9.875
2019	4.5	7.0	10.5

Sources: Wernz (2014).

On the 26th of June in 2013 there was approved a new EU law – the fourth Capital Requirements Directive (which is broadly in line with the Basel III), which must be transposed into countries' national laws. In view of the fourth Capital Requirements Directive, there is envisaged an opportunity of capital conservation buffer of the previous applications and the need to ensure adequate banking sector resilience to adverse changes. It is scheduled that the Lithuanian banks' capital conservation buffer will be introduced from the start of 2015 by setting a 2.5 percent ratio.

So, the capital adequacy requirement, which is in force since 1 January, 2015, would be 10.5 percent. It should be noted that for the banks that are in default of 2.5 percent capital conservation buffer requirement, the distribution of profits to pay dividends or other reward measures (Bank of Lithuania, 2014) would be limited.

Jasevičienė F. (2013) points out that the implementation of the new capital adequacy framework should be a real benefit for both depositors and borrowers as well as for banks and taxpayers.

As it is known, most of the banking market of Lithuania consists of a subsidiary bank controlled by foreign banks and parent banks. Their role in shaping the Lithuanian capital of subsidiary banks is essential. One of the most recent empirical researches was conducted by Mili M. with colleagues (2014) who identified the factors affecting foreign banks' subsidiaries' capital adequacy ratio, taking into account the parent bank policies. These researchers presented two models. The first model was used to explain the level of capitalization of a bank by using only specific variables: the size of the bank, total deposits to assets ratio; loans to assets ratio and net interest margin. The second model was designed to explain the capitalization level of the bank using only economic variables: gross domestic product growth, the real interest rate, the real exchange rate.

When the scientists mentioned above performed the research, it revealed that the foreign banks subsidiaries' capital adequacy ratio is affected by different factors

depending on whether the subsidiary bank is located in a developed country or in a developing one.

It is important to note that foreign capital parent banks that have influence on their significant branches in Lithuania also must increase their capital base with regard to the new requirements. Thus, the supervisory authorities of host countries should have the right to carry out, on the case-by-case basis, inspections of the activities of branches of institutions on their territory and request information from a branch about its activities for statistical, informational, or supervisory purposes, where the host countries believe it is important for the reasons of stability of their financial system (Europos..., 2013).

Scientists discuss the effectiveness of the Basel III and the new capital adequacy framework for the impact on the bank's activities. Some scientists support the new requirement (Admati et al., 2013) and argue that they should be more stringent (Hellwing, 2010, Miles 2012, Goodhart, 2012), the others enter into polemics with other supporters of the new system. In their view, the banks themselves, taking responsibility for their actions and wishing to remain on the market, can best foresee what amount of capital they need, and the new system will have only a negative impact on economic growth (Capie, Wood, 2013). So, this time it is very important to understand how banks are responding to the new capital requirements embodied in the Basel III directive.

Some authors examine the factors that determine the size of the establishment of the capital. One of the factors influencing the determination of the amount of bank capital is the amount of the costs necessary to restore the capital. Banks, which are seeking to avoid the costs associated with the reconstruction of the capital in a very short period of time, tend to hold more capital than it is required by the supervisory authorities (Peura, Keppo, 2006). This capital in the scientific literature is named a buffer capital. The buffer capital theory argues that banks are trying to maintain a higher level of capitalization than required by the banking supervisory authorities in order to hedge against the possible risk of capital adequacy norms' failure and to gain flexibility (Groppa, Heider, 2009). Some authors emphasizing the importance of capital distinguish some of its functions. Л. В. Варода (2013) argues that one can distinguish as many as 12 bank capital functions: protective, distributive, regulatory, indicatory, operational, start, renewal, promotional, investment, mobility, and control. One of the most important functions, according to the author mentioned above, is the renewal and promotional functions. The renewal function is primarily related to the continuous creation of value added, which allows the bank's capital to maintain an optimal level, to support the functioning of the banking institution, to gain profit. Another function – the promotional one – is also important, because the bank's capital must not only work on a particular level that ensures the recovery, but also creates conditions for bank's development, for the economic actors to feel the highest satisfaction.

Thus, the bank's capital exercising its functions helps to mitigate unexpected losses and to ensure the bank's business continuity and reliability. Still, it is worth noting that the importance of the functions of the bank capital to the banking activities depends on economic changes. When there is an economic crisis, operational, renewal and promotion functions, which have a great impact on the bank's activities in post-crisis period are moved to the background, giving priority to security – regulatory function (Volkov, 2010).

### **The methodology of the research of factors, influencing capital adequacy**

In this chapter the research done by the scientists K.A.M Al-Tamimi and S. F. Obeidat (2013) is developed. While applying the multiple linear regression models it would be aimed to identify the key factors which could determine Lithuanian bank's capital adequacy ratio changes.

Formation of the regression model starts from the collection of observation data. Given the fact that the capital adequacy ratio of the bank is very important and analyzed on a quarterly basis, the author of the work collected six years (2008–2013 m.) quarterly data.

The six-year period was selected because of the bank AB “Finasta” which started its activities only in 2008. The default examined period includes crisis and post-crisis period. The significance of the data is also tested through correlation matrix. In general, multiple linear regression model that was used in the research, can be written down by the following formula (Boguslauskas, 2010):

$$y = \beta_0 + \sum \beta_j \varphi_j(x_1, x_2, \dots, x_k) + \varepsilon, \quad (1)$$

where  $y$  is the dependent variable,  $x$  are independent standardized variables,  $\beta_0$  and  $\beta_j$  are regression parameter estimates, and  $\varepsilon$  is the size of a random error.

Two linear regression models were formed. Due to the fact that after the financial crisis the capital base requirements are being tightened and the percentage points for the first level capital are increased, the *first model* is used to find out the impact of the capital base structure on the capital adequacy ratio. So, the author of the work has identified two relevant variables for this model:

- 1) 1 level capital;
- 2) 2 level capital.

Nevertheless, a linear regression analysis showed that neither level 1 nor level 2 capital affect the capital adequacy ratio of the analyzed period (2008–2013). It could be assumed that such a result is obtained because the banks operating in Lithuania during the critical period increased 1 level capital while reducing the level 2 capital. So, generally,

the structure of banks' capital base has improved, and its individual components have no impact on the bank's capital ratio.

*The second model* is designed to explain the capitalization level of a bank using specific six variables of the empiric research, which were selected after examination of the scientific literature and in the light of other researches conducted by the scientists:

- 1)  $x_1$  – ROA (net income / assets \* 100 per cent)
- 2)  $x_2$  – loans / assets (percent)
- 3)  $x_3$  – asset growth (in percent)
- 4)  $x_4$  – assets assessed according to the risk / assets (percent)
- 5)  $x_5$  – impact of the bank management (if the capital adequacy ratio < median (capital adequacy ratio) is 1, otherwise 0)
- 6)  $x_6$  – size (if the property < the average assets of the banking market, it is 1, otherwise 0).

The regression model equation would look like this:

$$CAR = \beta_0 + \beta_1 ROA + \beta_2 (P/T) + \beta_3 \text{Asset growth} + \beta_4 (RT/T) + \beta_5 BVI + \beta_6 \text{Size} + \varepsilon, \quad (2)$$

where CAR is the capital adequacy ratio, ROA is the return on assets,  $P / T$  are loans / total assets; asset growth is estate asset growth;  $RT / T$  is risk-weighted assets / total assets,  $BVI$  is the influence of management, size is the size of the bank;  $\beta_0$  and  $\beta_j$  are regression parameter estimates;  $\varepsilon$  is the size of random errors.

When the model is made, then it is verified on the basis of the Fisher criterion: the hypothesis of equality of the obtained coefficients to zero is raised. If  $F > F_{\alpha; k; n-k-1}$ , the null hypothesis is rejected, and the claim is composed of multiple regression model fitness.

Also, it is recommended to verify all those received values of the coefficients by Student's criterion. Again, in the first place, there is the hypothesis of the equality of the coefficient to zero. If  $|t| > t_{\alpha; n-k-1}$ , the null hypothesis is rejected and the statement about the significance of the resulting coefficient is confirmed (Krikštolaitis, 2006). Removing irrelevant exogenous variables using the selected computer program, the new values of the coefficients are found, and the final multiple regression model is concluded. The accuracy of the model is tested using the coefficients of determination (Boguslauskas, 2010):

$$R^2 = \frac{ESS}{TSS}, \quad (3)$$

where  $R^2$  is the coefficient of determination;  $ESS$  – the sum of regression squares;  $TSS$  – gross sum of squares.

The more the determination coefficient is closer to one, the more accurate is the regression model. The percentage coefficient of determination shows what part of the measured values the regression model evaluates. When the coefficient of determination is calculated, it is necessary to test the hypothesis about its equality to zero. For this purpose, the Fisher criterion is calculated using the following formula (Boguslauskas, 2010):

$$F = \frac{R^2}{1-R^2}(n-k-1), \quad (4)$$

where  $F$  is Fisher's criterion,  $R^2$  is the coefficient of determination,  $n$  is the sample size,  $k$  is the number of factor levels.

If  $F > F_{\alpha; k, n-k-1}$ , the null hypothesis of the coefficient of determination equality to zero is rejected and the fact is approved that the completed multiple linear regression model is appropriate.

### The research of the factors affecting the capital adequacy ratio

Before revealing the results of an empirical research, in this section the most important descriptive statistics characteristics of the data used in the research are provided. These characteristics will allow a more detailed access to the examination of factors determining changes of the capital adequacy ratio (see Table 2).

TABLE 2. Basic descriptive statistics of the characteristics of the 2008–2013 period

	Big banks <sup>1</sup>					Small banks <sup>2</sup>				
	CAR	ROA	P/T	Asset growth	RT/T	CAR	ROA	P/T	Asset growth	RT/T
Average	14.73	0.96	79.64	0.20	71.47	18.05	-0.83	56.71	6.47	76.62
The minimum rate	9.45	-6.12	61.63	-6.60	57.13	0.99	-9.07	12.98	-54.56	0.87
The maximal rate	20.69	9.11	91.68	14.12	96.72	52.38	3.2	98.92	342.46	153.97
The average square deviation	2.59	2.76	8.16	3.64	8.88	8.80	2.78	21.75	45.53	23.28
The number of observations	71	71	71	71	71	95	95	95	95	95

Sources: compiled by authors.

As one can see in the data of Table 2, the capital adequacy ratio varies considerably in large and small banking sectors. It is important to note that this result is obtained because in the list of small banks there is the bank “Finasta”. The bank's capital adequacy ratio in

<sup>1</sup> Big banks with regard to the market share are AB SEB, AB “Swedbank”, AB DNB banks.

<sup>2</sup> Small banks with regard to the market share are AB Šiauliai, AB Citadele, “AB Finasta” Medical Bank.

2008 second quarter was as high as 52.38 percent, but the bank rates were very affected by the bank AB Snoras bankruptcy, and in 2011 the rate was lower than the permissible 0.99 percent.

It also can be seen that the major bank's minimum capital ratio average of the analyzed 6-year period is less than of the small banks, and its standard deviation is lower. Thus, the major banks not only have a lower average buffer capital, but this capital fluctuations are smaller, because the standard deviation is 2.59 percent. This could be based on the fact that for large banks with strong parent banks it is easier to raise capital. With higher human and financial resources they can better identify potential risks.

Analyzing the return on assets of the banking, one can see that the smaller banks' return on assets is below zero and of the big ones it reaches barely 0.96 percent. This means that during the analyzed period the financial crisis had a significant impact on both small and large banks. Among the smaller banks, an especially rapid decline in return on assets had the bank "Finasta": in 2010 it was -0.03 percent and in 2011 -9.03 percent. As for the big banks, we can distinguish Swedbank AB; its return on assets during the year decreased 3 times: in 2008 it amounted to 1.9 per cent and in 2009 to -5.87 percent.

The analysis of the quarterly 2008–2013 asset growth data revealed a stronger decline than growth of banks' assets. Nevertheless, it is important to emphasize that the average asset growth rate of the small banks was significantly influenced (6.47 percent) by the AB bank "Finasta" assets growth of 342.46 percent when it got part of the AB Snoras Bank nationalized assets and the funds which were also directed to the capital growth.

Analyzing loans, it is significant to note that the large banks' loans with the total assets ratio is considerably larger than of the small banks (23.93 percent.). Such an outcome is influenced by the banks' financial position. As large banks have more money than little ones, they can provide a higher volume of loans to individuals, finance larger projects.

Table 3 shows that loans to the total assets ratio is 79.64 percent and 56.71 percent, respectively. It can be argued that this ratio of the larger banks is higher because their financial capacity, as mentioned above, is larger than that of the small banks, so they can finance major investment projects, provide more loans to both legal entities and individuals.

During analysis of assets evaluated according to risk-weighted assets to total ratio, the problem of data collection was faced, as not all banks provide a detailed calculation of risk-weighted assets. For this reason, it might be the subject of error. The result of the risk-weighted assets to total assets ratio of the large and small banks is very similar; on average, smaller banks 76.62 percent and major ones 71.47 percent. However, small banks tend to take greater risks.

The first step in making the regression analysis is the determination of whether the variables of the chosen model 2 are collinear because, if they were, it would adversely

affect the model and its performance. When the correlation coefficient is greater than 0.7 or less than  $-0.7$ , then this factor must be removed from the model (Leonavičienė, 2007) (see Table 3).

TABLE 3. The correlation matrix of the interaction among factors affecting capital adequacy ratio

	ROA	P/T	Assets growth	TR/T	Size	BVI
ROA	1					
P/T	0.13	1				
Assets growth	-0.03	-0.27	1			
TR/T	0.01	0.53	-0.12	1		
Size	-0.01	0.03	0.11	0.03	1	
BVI	-0.18	-0.38	0.08	0.14	-0.16	1

Sources: compiled by authors.

Table 3 shows that for none of the variables chosen the correlation coefficient exceeds  $-0.7$  or  $0.7$ . Much higher is the correlation between the ratio of loans to assets and property, measured by the ratio of risk assets  $-P/T$  and  $TR/T$  ( $0.53$ ). Still, it does not exceed  $0.7$ , so all variables are included in the second model in the analysis.

The next step is the initial regression analysis using the MS Excel Performance Regression function. Thus, after an initial analysis of the data presented in Table 4, we can see that the results are rather moderate: the coefficient of determination  $R^2$  reaches  $0.58$ . This means that the developed model explains about  $0.58$  percent of the capital adequacy ratio.

TABLE 4. Initial results of the regression analysis in the banking sector

	coefficient	St. error	t -statistics	P-value (probability)
Intercept	11.718	2.006	5.843	3E-08
$x_1$ – ROA	-0.405	0.144	-2.807	0.006
$x_2$ – P/T	0.016	0.03	0.536	0.592
$x_3$ – Assets growth	0.027	0.013	2.012	0.046
$x_4$ – TR/T	-0.077	0.03	2.580	0.011
$x_5$ – BVI	-6.284	0.777	-8.090	1E-13
$x_6$ – Size	-2.859	0.937	-3.517	0.03
<b>Regression statistics:</b>				
R Square				0.58
Standard error				4.89
Observations				166

Sources: compiled by authors.

Given the findings, the authors of the work created the initial model of multiple regression, inserting the received t numbers into the second formula:

$$CAR = 11,72 - 0.41x_1 + 0.02x_2 + 0.03x_3 - 0.08x_4 - 6.28x_5 - 2.86x_6.$$

The model was drawn up based on the Fisher criterion (see Table 5). As we can see from the information given in the table, the null hypothesis  $H_0$  is rejected, since  $F > F\alpha, k, nk-1$  ( $15.5 > 2.16$ ), suggesting that the multiple regression model is appropriate.

The next step the author of the work has carried out is the multiple regression coefficients  $\beta_0$  and  $\beta_j$  checked by Student's eligibility criteria (see Table 6).

Data in Table 6 show that  $H_0$  is rejected because  $|t| > t\alpha, n-k-1$  ( $5.84 > 1.97$ ), suggesting that the coefficient estimate of  $\beta_0$  is notional. After checking out the other significances of estimates of the  $\beta$  coefficients it was found that five factors ( $\beta_1, \beta_3, \beta_4, \beta_5, \beta_6$ ) in coefficient estimates are significant.

Since the five factors are important in view of the initial results, we further applied the elimination method, rejecting the least significant factor according to the P-value value (when the P-value  $> 0.05$ , a factor is not significant). The total banking sector regression analysis results are presented in Table 7.

TABLE 5. The appropriateness of the initial regression model according to the Fisher criterion

$H_0 : \alpha = \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = 0$	
$H_1 : \alpha = \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 \neq 0$	
$F_{\alpha; k; n-k-1}$	2.16
$F$	15.5
$MSR$	369.88
$MSE$	23.87

Sources: compiled by authors.

TABLE 6. Testing the  $\beta_0$  coefficient value by Student's inspection criteria

$H_0 : \beta_0 = 0$	
$H_1 : \beta_0 \neq 0$	
$t$	5.84
$t_{\alpha; n-k-1}$	1.97

Sources: compiled by authors.

TABLE 7. Total banking sector regression analysis results

Variables	Coefficient	St. error	t-statistics	P-value (probability)
Intercept	12.361	1.762	7.015	6E-11
$X_1$ – ROA	-0.422	0.141	-2.993	0.003
$X_3$ – Assets growth	0.026	0.013	2.052	0.042
$X_4$ – TR/T	-0.090	0.023	3.967	1E-04
$X_5$ – BVI	-6.416	0.759	-8.451	2E-14
$X_6$ – Size	-2.979	0.837	-3.417	0.03
<b>Regression statistics:</b>				
R square				0.55
Standard error				4.87
Observations				167

Sources: compiled by authors.

TABLE 8. Testing the eligibility of the coefficient of determination based on the Fisher criterion

$H_0: R^2 = 0$	
$H_1: R^2 \neq 0$	
$F_{\alpha; k; n-k-1}$	2.43
$R^2$	0.55
$F$	198

Sources: compiled by authors.

From the information presented in Table 7, one can see that there are five variables: *ROA*, asset growth, *TR / T* and bank size. Also, assessing the significance of the whole model, it was found that the model explains 55 percent of capital adequacy ratio changes. Although the theory states that if the coefficient of determination ( $R^2$ ) is greater than 0.25, it is possible to speak about the significance of the model in order to finally make sure that the multiple regression analysis model is suitable, the hypothesis of equality of the determination coefficient to 0 is pointed out (see Table 8).

Whereas, according to data in Table 8, the null hypothesis  $H_0$  is rejected (because  $F > F_{\alpha; k; n-k-1}$ ), suggesting that the multiple regression model is appropriate. Also, the received determination coefficient suggests drawing a conclusion that 55 percent of a bank's capital adequacy ratio is explained by the growth of assets, weighted by risk ratio of loans to total assets, return on assets, the bank's management influence, and the size of the bank.

### The generalization of the research results of key factors determining Lithuanian banks' capital adequacy ratio changes

From the final results discussed in the previous section, it could be noticed that the choice of the second model explains 55 percent of changes in capital adequacy in the banking sector. This section will present the possible interpretations of these results.

After a multiple regression analysis the following factors remained statistically significant:

- 1) return on assets;
- 2) asset growth;
- 3) assets weighted by the risk–assets ratio;
- 4) the influence of management;
- 5) the size of the bank.

From the factors mentioned above, one of the most important is the size of the bank: bank size change of one percentage point declines the capital adequacy ratio of – 2.98 percent. The big banks generally keep less capital in excess of the required limit. This is due to the large bank's ability to restore the missing capital easier.

Of course, the latter explanation is more suitable for countries with a highly developed financial sector. Both in the United States and in most European countries, the major banks are competing at the international level, which influences the larger financial and human resource demand in order to maintain their competitive power. On

the other hand, in these countries it is easier for a bank to rebuild capital by issuing new stock emissions, or simply taking advantage of a wider range of instruments such as subordinated loans.

As for Lithuania which does not have a well-developed financial sector, the abilities of big banks to restore the missing capital are related with the belonging to the foreign parent banks. Also, Lithuanian banking shares are not traded on the Vilnius Stock Exchange.

However, by far the largest impact on the capital adequacy has the bank's management decisions in view of the conditions existing in the market. The bank management influence on the banks' capital adequacy ratio is negative. When a capital adequacy ratio is close to the median of the market, it does not take any action for rebuilding the capital base. This means that bank profit is used to finance risky projects or to grant loans to the "lower class" lenders.

The latter statement is illustrated by the negative impact of return on assets on the capital ratio. Such a result could also be explained by the fact that in the recent years (the financial crisis period), although some banks had losses, they worked to improve their quality of capital, and the capital adequacy ratio at the time has been increasing. So, the banks are increasing the level of capital using other sources rather than profit.

Another factor affecting the banking capital adequacy ratio is the assets weighted according to the risk-assets ratio. This result is anticipated, because when risk assets grow, capital adequacy ratio decreases. Moreover, the country's banking control institution foreseeing capital demand leans on the EU directives and recommendations presented by the Basel Committee. This proves once again that in the country capital regulation is effective.

In Lithuania, banks try to reconcile the two indicators. Since the assets of the risk-weighted assets ratio can be interpreted as the level of risk assumed by the bank, which reflects the riskiness of the portfolio, it is important to emphasize that the banks, in order to maintain an adequate level of capital, are likely to reduce risky assets. Banks, after analysis and evaluation of the effects of the global financial crisis, began operating more conservatively – they began to reduce risky assets. Banks more carefully give loans (which accounted for most part of the assets weighted by risk) and tighten the conditions of lending (especially real estate, acquisition of land, construction, financing). In addition, the Bank of Lithuania, following the adoption of responsible lending requirements, increased the collateral requirements for loans and the residual income of the borrower under the loan service.

The final factor affecting the behavior of Lithuanian banks is asset growth. Although the latter factor is statistically significant, its effect is relatively modest: bank assets increased by one percentage point increase the capital adequacy ratio by 0.03 percent.

This result could be explained by the fact that in the recent years the growth of bank assets was very dynamic: sometime the assets grew, sometimes they declined. Also, banks have reduced the riskiness of the assets.

### **Capital adequacy management problem areas implementing the Basel III requirements**

In determining the capital demand, the authors of the work will perform mathematical calculations, arguing that the assets of banks operating in Lithuania, evaluated according to the risk during all analysis period, is constant and equal to 40.38 billion Lt (Status quo). Thus, knowing the risk-weighted asset amount and the Basel III required capital percentages, the capital demand was calculated. The results are presented in Table 9.

TABLE 9. Calculated capital demand according to the Basel III requirements and the resolutions adopted by Bank of Lithuania (in billion Lt)

Criteria	2013	2014	2015	2016	2017	2018	2019
Minimum common equity capital ratio	1.41	1.62	1.82	1.82	1.82	1.82	<b>1.82</b>
Capital conservation buffer			1.01	1.01	1.01	1.01	<b>1.01</b>
Minimum capital plus capital conservation buffer	1.41	1.62	1.82	2.07	2.32	2.58	<b>2.83</b>
Countercyclical buffer				0.25	0.5	0.76	<b>1.01</b>
Minimal tier 1 capital	1.82	2.22	2.42	2.42	2.42	2.42	<b>2.42</b>
Minimal total capital	3.23	3.23	3.23	3.23	3.23	3.23	<b>3.23</b>
Minimal total capital plus conservation buffer and plus protection buffer	3.23	3.23	4.24	4.45	4.74	4.99	<b>5.25</b>

Sources: compiled by authors.

Table 9 shows that in 2014 there is a significant increase in the minimum level 1 capital demand (23 percentage points), which means that banks will have to pay more attention to improving the structure of the capital base. The largest capital demand growth is foreseen in 2015. In 2015, in Lithuania after the approval of banks' mandatory reserve for the protection of possession, the capital demand is expected to grow by over 31 percentage points, i.e. 1.01 billion Lt, so, especially in 2014, it will be important for banks to attract (to have) the more top-level capital because personal capital demand will increase by 12.35 percent.

It is also important to note that since 2018 the weighted indicator with the percentage of 3 percent will be calculated. Thus, wealth the more the banks will have, the more they will have to hold capital. The main characteristic of this application is to increase possibilities to withstand potential losses and maintain stable and sound banking operations.

Finally, we can see that in 2013 compared to 2019 the capital demand increased by 63 percentage points, and in Lithuanian banks during the period of 6 years, without a change in bank assets weighted according to the size of the risk, their capital should be increased to 2.02 billion Lt. In Lithuania, however, the operating banking system's capital base is applied calculating the capital adequacy ratio in July 2013 when the assets of the banks assessed according to the risk amounted to 40,38 billion Lt and almost all of the capital base consisted of level 1 capital (Bank of Lithuania, 2013) So, considering the capital demand in view of the Basel III requirements, it could be stated that Lithuania's banking system is now ready to meet more stringent capital adequacy requirements.

However, after the analysis of the experience of other countries and individual Lithuanian commercial banks (not the entire banking system), some barriers on the way of the successful implementation of the new capital adequacy framework were identified:

- 1) structure;
- 2) human resources;
- 3) technical implementations;
- 4) the shortage of capital.

In terms of human resources, a lot of human potential is included in the research and implementation activity; this is inevitable when introducing improved capital adequacy frameworks such as involvement according to the new CVA (credit valuation adjustment) system. Implementing the command scale will depend on the size of the bank in question and the chosen implementation model.

In addition, each bank will have to implement technical changes involving the processing of data and application of new models. This will require not only human resources but financial resources as well.

First of all, Lithuanian banks are exposed to the information gathering and systematizing problem, because the majority of banks still use the standardized approach to credit risk assessment, and the Basel III directive increasingly offers to move to the internal ratings-based approach. Not all banks carefully collected data in order to perform a comparative analysis of asset classes using the internal ratings-based approach.

Furthermore, the availability of data directly affects the way how banks will be modeling risk assessment. As for the small and medium-sized businesses, large banks have thousands of such clients many of whom have experienced bankruptcy or were on the line. Thus, it is not only easier but also more accurate to design properly the method of the credit risk assessment. On the other hand, most of the Lithuanian industry branches are dominated by only a few large companies.

So, in this case also the major banks are faced with restricted opportunities for modeling credit risk assessment. Despite the availability of financial and human resources, there is not a single bank in the country which can feel calm about the proper evaluation of the risks, including all the risks involved in the development of their business.

Given the fact that the capital demand for each subsequent year will continue to increase, some banks may face the capital shortage problem. So, some banks willing to meet the new capital requirements will have to raise more capital (but capital preservation is very expensive) or to reduce their risky assets. As a capital-intensive activity is lending it may become less attractive to banks. Banks can start to develop more other activities and other services, such as financial management, payment, counseling, etc.

## **Conclusions**

Multiple regression analysis has shown that there are five statistically significant variables that have an impact on banks' capital adequacy changes: the influence of management, the bank's size, return on assets, assets weighted by risk assets ratio and all assets ratio, and asset growth. However, by far the largest impact (negative) on the capital adequacy has the bank's management decisions in view of the conditions existing in the market. So, most banks could devote a higher proportion of their profits to increase their capital adequacy ratio and to meet the new Basel III requirements.

The influence of the size of the bank on the capital adequacy ratio once again proves how important in the Lithuanian banking sector is systemic risk management. With dominating in the market several large banks whose management decisions may adversely affect the capital adequacy ratio, and the market discipline still remaining weak, it is important that banks, especially large ones, properly assess the risks and maintain appropriate capital levels. The country's banks implementing the new capital adequacy framework (Basel III) will be forced to comply with the standards laid down and to assume the level of risk, which is adequate to the capital base. A study has shown that banks will have to pay more attention to the improvement and strengthening of the structure of the capital base. In 2013 compared with 2019 the capital demand increased by 63 percentage points. During the period of 6 years, without a change in bank assets weighted according to the size of the risk, the capital of Lithuanian banks should be increased to 2.02 billion. So, considering the capital demand according to the Basel III requirements, it could be stated that Lithuania's banking system is ready to carry out more stringent capital adequacy requirements.

There are several obstacles to the successful implementation of the new capital adequacy framework. They include structure, human resources, technical implementations, the lack of capital. How to effectively manage the implementation of the new capital framework depends on the banks themselves, their adaptation to the risk management methodology, the conversion of the structure, the ability to implement technical changes and raise capital or reduce risky assets.

## REFERENCES

- AB „Citadele“ bankas (2008–2013). Finansinės ataskaitos.
- AB „FINASTA“ bankas (2008–2013). Finansinės ataskaitos.
- AB „Swedbank“ bankas (2008–2013). Finansinės ataskaitos.
- AB DNB bankas (2008–2013). Finansinės ataskaitos.
- AB Medicinos bankas (2008–2013). Finansinės ataskaitos.
- AB SEB bankas (2008–2013). Finansinės ataskaitos.
- AB Šiaulių bankas (2008–2013). Finansinės ataskaitos.
- Admati, R., Demarzo, M., Hellwing, F., Pfleiderer, P. (2013). Fallacies, irrelevant facts, and myths in the discussion of capital regulation: why bank equity is not expensive. *Rock Center for Corporate Governance at Stanford University Working Paper*. No. 161, p. 8.
- Al-Tamimi, D. K., Obeidat, S. F., (2013). Determinants of Capital Adequacy in Commercial Banks of Jordan an Empirical Study. *Academic Research in Economics and Management Sciences*. Vol. 2, No. 4, p. 48-53.
- Bank of Lithuania (2013). Banku veiklos apžvalga 2013 m. II ketvirtis.
- Bank of Lithuania (2014). Finansinio stabilumo apžvalga 2014 m.
- Boguslauskas, V. (2010). *Ekonometrija*. Mokomoji knyga. Kaunas: Technologija, p. 115, 116, 154.
- Capie, F., Wood, G. (2013). Do we need regulation of bank capital? Some evidence from the UK. *IEA Current Controversies*. No. 40, p. 15, 16.
- Europos Parlamento ir Tarybos 2013 m. birželio 26 d. direktyva Nr. 36 „Dėl galimybės verstis kredito įstaigų veikla ir dėl riziką ribojančios kredito įstaigų ir investicinių įmonių priežiūros“, p. 7.
- Goodhart, C.A.E. (2012). Ratio controls need reconsideration; p. 5.
- Gropp, R., Heider, F. (2009). The determinants of bank capital structure. *Working paper series*. No. 1096, p. 3–10.
- Hellwing, M. (2010). Capital Regulation after the Crisis: Business as Usual? *Preprints of the Max Planck Institute for Research on Collective Goods*, p. 3.
- Jasevičienė, F. (2013). *Komercinė bankininkystė: Analizė ir vertinimai*. Vilnius: Vilniaus universiteto leidykla, p. 166.
- Leonavičienė, T. (2007). *SPSS programų paketo taikymas statistiniuose tyrimuose*. Vilnius: Vilniaus pedagoginis universitetas, 126 p.
- Miles, D., Yang, J., Marcheggiano, G. (2012). Optimal bank capital. *The Economic Journal*, Vol. 123, issue. 567, p. 27. doi: 10.1111/j.1468-0297.2012.02521.x.
- Mili, M., Sahut, J. M., Trimeche, H. (2014). Determinants of the Capital Adequacy Ratio of a Foreign Bank's Subsidiaries: The Role of the Interbank Market and Regulation of Multinational Banks, p. 1, 4, 5.
- Peura, S., Keppo, J. (2006). Optimal bank capital with costly recapitalization. *Journal of Business*, Vol. 79. No. 4.
- Shrieves, R. E, Dahl, D. (1992). The relationship between risk and capital in commercial banks. *Journal of Banking & Finance*, Vol. 16, issue 2, p. 439–457.
- Volkov, I.V. (2010). transformation of the functions of bank capital in contemporary economic system. *Herald of the Samara State University of Economics*, Vol. 8, issue 70, p. 6, 7.
- Wernz, J. (2014). Bank management and control. Strategy, Capital and Risk Management Control. Springer, Heidelberg, New York, Dordrecht, London.
- Варода, Л.В. (2013). Банковский капитал: сущность, функции и цели формирования. *Экономика и социум*, No. 4 (9), стр. 8–11.