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## Methodology and Results in Bank Capital Assessment

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E.A. Posnaya<sup>1</sup>, S.V. Tarasenko<sup>2</sup>, I.G. Vorobyova<sup>3</sup>, E.V. Dobrolezha<sup>4</sup>

**Abstract:**

*In the context of the present financial and economic environment, bank capital assessment requires new methods adapted to current situations. So, the selective model of bank capital assessment has been developed and proposed, which aims at the selection of the most important indices of capital's structure.*

*The main groups of indices are outlined, which are reasonable and practical to be used in the selective model: a group of liquidity indices, a group of bank reliability indices, a group of risk indices, a group of capital sufficiency indices and an index of IT-implementation level. Moreover, a notion of the bank capital factor is introduced.*

*For the key index – bank capital factor – calculation values are structured according to the integral principle, i.e., by summing all reasonable values with the use of normalization, which contributes to the qualitative capital assessment. The calculation is carried out for the main banks of Crimea, which provide open information on the results of their activity. Bank activity data is taken from open sources.*

*The data is ranked in the summary Table according to the value of the bank capital factor. The banks operating in Crimea have been found to work successfully, however, some problematic banks have been identified, which are advised to reconsider their capital management policy.*

**Keywords:** *Selective method, capital assessment, bank capital factor, risk, liquidity, reliability, information technologies, capital sufficiency.*

**JEL Classification Codes:** *F60, F63, O35, O44.*

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<sup>1</sup>Ph.D., Associate Professor, Institute of Finance, Economics and Management, Sevastopol State University, Sevastopol.

<sup>2</sup>Ph.D., Associate Professor, Institute of Finance, Economics and Management, Sevastopol State University, Sevastopol.

<sup>3</sup>Ph.D., Associate Professor, Rostov State University of Economics, Rostov-on-Don, e-mail: [iv.pochta@mail.ru](mailto:iv.pochta@mail.ru)

<sup>4</sup>D.Sc., in Economics, Associate Professor, Rostov State University of Economics, Rostov-on-Don.

## **1. Introduction**

At present, the rhythm of banking operations on capital assessment requires not only basic assessment methods, but also methods that are more comprehensive and adapted to current situations. Relying on the developed, improved and previously suggested selective model of bank capital assessment, the present study proposes capital factor calculations aiming at the identification of banks in an unsatisfactory condition according to the key indices, which influence their capital's condition and structure.

The values are calculated based on the data of those Crimean banks which provided information as of 01.01.2018, but such calculations are proposed to be carried out for all banking organizations of Russia in order to identify outsider banks on the suggested scale, to prevent their bankruptcy, and in general, to avoid crisis situations in the banking sector. All this aims to improve functioning of the Russian banking system, as it helps to timely elicit economically and financially "weakened" banks and to restore them to a healthy state (Ivanova *et al.*, 2017).

In general, it can be noted that the task of a more detailed assessment of quality and effect of bank capital, process automation and a simplified procedure of decision-making by the Central Bank regarding each commercial bank on a separate matter.

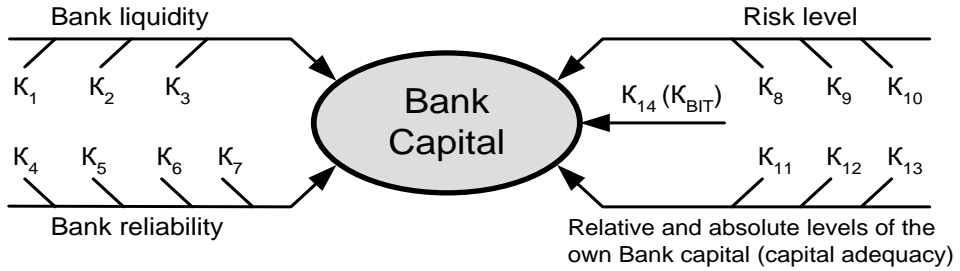
## **2. Theoretical, Empirical and Methodological Grounds of the Research**

The selective method of bank capital assessment is suggested for better monitoring and control of the Central Bank of the Russian Federation over commercial banks' activities. The characteristic feature of the proposed method consists in grouping indices in accordance with economically feasible approaches and defining the relevance of each single group, which will allow to identify the most problematic banks in terms of capital insufficiency or capital's improper use and to define a possibility of a bank's financial rehabilitation when needed (Mahboud, 2017).

The study proposes a range of indices in the following areas; liquidity, risk level, relative and absolute level of owners' capital, bank reliability, as well as bank's IT-implementation level. The values of the liquidity group define financial constituent necessary for successful functioning of the bank's capital. Reliability indices describe the level of cost-efficiency, financial stability and influence of the bank's market size on its performance. Assessment of risk levels aims at providing more security to bank capital flow and reveal maximum single-client concentration, maximum major credit risks, and aggregate risks for the bank's insiders. Banking activity is closely connected to various risks resulting from interaction with outside world. One of the fundamental factors of a bank's successful credit policy is defining and minimizing credit risk. The group of IT indices enables to assess bank capital with the use of innovative approaches, which will affect both assessment

quality and efficiency of bank capital work. Figure 1 shows the above said groups of indices used in bank capital assessment.

**Figure 1.** The model of bank capital assessment



In previous studies, a notion of bank capital factor K<sub>0</sub> was introduced. It characterizes a banking establishment’s stability through indices influencing bank capital’s condition. Once finalized, the bank capital factor K<sub>0</sub> equation is transformed into the following:

$$\begin{aligned}
 K_0 = & X_I \left( \frac{1}{K_{10}} |K_1 - K_{10}| + \frac{1}{K_{20}} |K_2 - K_{20}| + \frac{1}{K_{30}} |K_3 - K_{30}| \right) + \\
 & + X_{II} \left( \frac{1}{K_{40}} |K_4 - K_{40}| + \frac{1}{K_{50}} |K_5 - K_{50}| + \frac{1}{K_{60}} |K_6 - K_{60}| + \frac{1}{K_{70}} |K_7 - K_{70}| \right) + \\
 & + X_{III} \left( \frac{1}{K_{80}} |K_8 - K_{80}| + \frac{1}{K_{90}} |K_9 - K_{90}| + \frac{1}{K_{100}} |K_{10} - K_{100}| \right) + \\
 & + X_{IV} \left( \frac{1}{K_{110}} |K_{11} - K_{110}| + \frac{1}{K_{120}} |K_{12} - K_{120}| + \frac{1}{K_{130}} |K_{13} - K_{130}| \right) + \\
 & + X_V \frac{1}{K_{140}} |K_{14} - K_{140}|,
 \end{aligned}$$

where X<sub>I</sub> is a weight function of liquidity indices; X<sub>II</sub> is a weight function of reliability indices; X<sub>III</sub> is a weight function of risk indices; X<sub>IV</sub> is a weight function of capital sufficiency indices; X<sub>V</sub> is a weight function of IT implementation level indices; K<sub>1</sub> is a quick liquidity ratio; K<sub>2</sub> is a current liquidity ratio; K<sub>3</sub> is a long-term liquidity ratio; K<sub>4</sub> is equity ratio; K<sub>5</sub> is overall liquidity ratio; K<sub>6</sub> is return on equity ratio; K<sub>7</sub> is financial stability index; K<sub>8</sub> is maximum single-client concentration; K<sub>9</sub> is maximum major credit risk; K<sub>10</sub> is aggregate risk for the bank's insiders; K<sub>11</sub> is Tier I capital adequacy ratio; K<sub>12</sub> is fixed capital adequacy ratio; K<sub>13</sub> is own capital adequacy ratio; K<sub>14</sub> is K<sub>BIT</sub> ratio introduced in previous studies and showing the bank’s level of IT implementation; K<sub>io</sub> are reference values of the corresponding

indices, some of which are defined by rigid threshold values of statutory requirements, set by the CB of RF, and others are obtained as minimum values from the complex of indices of the banks under analysis. The main idea is to identify a deviation of this or that index from the reference value. However, in order to balance the input of every component, normalization of deviation is carried out by the corresponding threshold value (i.e.  $\Delta K_i/K_{i0}$ ). After simplification the equation takes the following form:

$$\begin{aligned} K_0 = & X_I \left( \left| \frac{K_1}{K_{10}} - 1 \right| + \left| \frac{K_2}{K_{20}} - 1 \right| + \left| \frac{K_3}{K_{30}} - 1 \right| \right) + \\ & + X_{II} \left( \left| \frac{K_4}{K_{40}} - 1 \right| + \left| \frac{K_5}{K_{50}} - 1 \right| + \left| \frac{K_6}{K_{60}} - 1 \right| + \left| \frac{K_7}{K_{70}} - 1 \right| \right) + \\ & + X_{III} \left( \left| \frac{K_8}{K_{80}} - 1 \right| + \left| \frac{K_9}{K_{90}} - 1 \right| + \left| \frac{K_{10}}{K_{100}} - 1 \right| \right) + \\ & + X_{IV} \left( \left| \frac{K_{11}}{K_{110}} - 1 \right| + \left| \frac{K_{12}}{K_{120}} - 1 \right| + \left| \frac{K_{13}}{K_{130}} - 1 \right| \right) + X_V \left| \frac{K_{14}}{K_{140}} - 1 \right|. \end{aligned}$$

In compact form the formula can be presented as follows:

$$K_0 = \sum_{i=1}^{14} X_i \left| \frac{K_i}{K_{i0}} - 1 \right|,$$

where  $X_i$  are weight functions of indices groups, and  $X_1=X_2=X_3=X_I$ ,  $X_4=X_5=X_6=X_7=X_{II}$ ,  $X_8=X_9=X_{10}=X_{III}$ ,  $X_{11}=X_{12}=X_{13}=X_{IV}$ ,  $X_{14}=X_V$ .

It is proposed to set the weight functions using an expert method, because it is understood intuitively that contribution of every group of indices into bank capital assessment is different, but until now no one has identified the values of such contributions. In future, these values can be corrected either by an expert council or automatically, depending on the situation on both micro level (one of the bank) and macro level.

### 3. Results

Model calculation of capital factor was carried out for those Crimean banks, which provide open information on the results of their activity in open sources. For this purpose, proportions of the indices' weight functions were defined according to their relevancy in capital base stability, as follows:  $X_I=0,6$ ;  $X_{II}=0,15$ ;  $X_{III}=0,04$ ;  $X_{IV}=0,17$ ;  $X_V=0,04$  with overall balance  $X_I + X_{II} + X_{III} + X_{IV} + X_V = 1$ . The calculations also

conditionally accept that  $K_8=20\%$  and  $K_{14}=50\%$ , because there is no data on these indices yet.  $K_8$  can be calculated according to the existing methodology of the Crimean Banks of the Russian Federation (the ratio was cancelled on 23.04.2005), and  $K_{14}$  a future investment index.

It must also be noted that the calculation does not take into account banks, which do not comply with compulsory regulatory ratios. Initial values as of 01.01.2018 and results of calculations are presented in Table 1. Here, names of all real banks are replaced with Latin letters (A, B, C, D etc.).

**Table 1.** Calculation results for the data as of 1.01.2018\*

Bank Name	$K_1$	$K_2$	$K_3$	$K_4$	$K_5$	$K_6$	$K_7$	$K_8$	$K_9$	$K_{10}$	$K_{11}$	$K_{12}$	$K_{13}$	$K_{14}$	$K_0$
Bank A	167,5	136,5	79,9	13,3	51,4	1,00	13,3	20,0	359,7	0,92	8,78	8,78	13,2	50,0	<b>10,0</b>
Bank B	34,7	118,9	26,4	25,8	37,5	3,30	34,9	20,0	56,6	0,23	45,2	45,2	47,8	50,0	<b>8,99</b>
Bank C	144,9	82,1	55,7	12,7	9,91	6,67	16,2	20,0	604,2	1,62	6,58	9,22	50,0	50,0	<b>7,83</b>
Bank D	48,4	87,0	42,2	20,2	58,1	7,47	45,7	20,0	328,9	1,74	13,4	13,4	18,2	50,0	<b>7,70</b>
Bank E	19,5	121,0	77,3	7,20	83,3	4,70	7,20	20,0	84,96	1,12	12,1	12,1	15,9	50,0	<b>5,63</b>
Bank F	67,9	92,1	73,7	5,38	54,4	1,00	5,38	20,0	270,1	0,67	6,44	14,7	15,9	50,0	<b>5,35</b>
Bank G	55,1	117,4	40,4	9,10	5,70	8,00	14,5	20,0	534,8	0,20	7,77	8,43	12,0	50,0	<b>4,68</b>
Bank H **	15,0	50,0	118,8	9,73	4,88	1,00	9,73	20,0	677,7	0,59	7,80	7,80	8,06	50,0	<b>0,57</b>
$K_{io}, \%$ →	15,0	50,0	120,0	5,00	4,00	1,00	5,00	25,0	800,0	3,00	4,50	5,50	8,00	50,0	

\* values of indices  $K_1 - K_{14}$  (%) are taken from open source data; bank capital factor  $K_0$  is a rating integral attribute (non-dimensional value);

\*\* bank H had not reached ratios  $K_1$  and  $K_2$  by 01.01.18, but in calculations values of  $K_1$  and  $K_2$  were taken as equal to reference values (threshold values). Bank H was included into calculations as a comparative example.

The results in Table 1 reveal the following: most banks (A, B, C, D) are operating quite successfully, their capital condition is good, depositors and lenders are safe. The top bank of the list – bank A – owes its leading position to a small volume of operations, which lowers risk levels; funds are located inside the banking institution, as well as to the fact that this bank has a small number of offices.

Banks E, F, G have a lower value of capital factor due to a closer connection with state institutions and, in some cases, implementation of certain government programs. Thus, profitability of these institutions is not high, but their work is stable. Unlike other banks, bank G has a much wider range of offices all over Russia, that is why in general its calculated value may not reflect the picture of its performance in the region of Crimea only.

Despite failure to reach two obligatory ratios of the Crimean Banks of the Russian Federation, bank H was included in calculations for a side-by-side comparison with

other banks. One can see from Table 1 that the capital factor of bank H has an unsatisfactory value compared to other banks, and thus, the Crimean Bank (CB) of the Russian Federation (RF) and Deposit Insurance Agency need to send their agents to the bank for a more detailed analysis and prevention of bankruptcy.

Usually, the CB of the RF fines banks, which don't fulfill requirements of obligatory ratios, and if the tendency is steady, their license can be revoked. The study proposes to anticipate such situations. If selective method assessment is negative, Deposit Insurance Agency has the right to carry out anti-bankruptcy measures to prevent bankruptcy of the banks participating in individuals' deposit insurance system of the banks of the Russian Federation. The reasons for anti-bankruptcy measures to be taken by Deposit Insurance Agency are:

- signs of unsteady financial condition of banks;
- identification of situations, threatening stability of the banking system and interests of depositors and lenders.

These reasons are justified by capital factor calculations proposed in this study.

#### **4. Conclusions and recommendations**

It can be concluded that, calculations using selective method of capital assessment help to identify economically "weakened" banks, to prevent their bankruptcy and to introduce the procedure of financial rehabilitation. Thus, the main aim of calculations conducted with the use of selective method is to prevent bankruptcy situations in the banking sector, as well as early identification of situations potentially harmful for the whole banking system of the Russian Federation, its legitimacy and interests of depositors and lenders. To carry out a more detailed assessment of the financial condition the CB of the RF and Deposit Insurance Agency have the right to deploy their representatives to the "problem" bank with a full access right to all premises of the bank, to any of its documents and information systems, having the right to request and receive any information from the bank employees (including operating, business and banking confidential information and documents), which will enhance efficiency of the selective method and enable correct anti-bankruptcy measures.

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