

Statistical Analysis of the Use an Internal Capital Adequacy Assessment Procedure in the Monitoring of Banks Stability

Victoria V. Baronova¹⁾, Alexander N. Nizov^{1,2, a)}, Viktoria F. Turygina^{1, b)},
Marina A. Medvedeva^{1, c)}, T.O. Zagornaya³⁾, Natalia D. Panteleeva^{1, d)},
Yana V. Silacheva¹⁾

¹⁾Ural Federal University, Mira Street, 19, Yekaterinburg, Russia, 620002

²⁾Ural State University of Economics, March 8 Street, 62, Yekaterinburg, Russia, 620144

³⁾Department of Economic Cybernetics, Donetsk National Technical University, Artema Street 131, Ukraine, 83015

^{a)}strategan@yandex.ru;

^{b)}v.f.volodina@urfu.ru

^{c)}Corresponding author: marmed55@yandex.ru

^{d)}nataliapanteleeva1999@mail.ru

Abstract. To increase the stability of the banking system, it is necessary to use effective systems of risk management and monitoring of banks. One of these systems is the internal procedure for capital adequacy assessment (IPCAA). The purpose of this study is to assess, using a statistical analysis, the impact of the IPCAA procedure on changes in the value of banks' capital adequacy ratios. Some results of monitoring data are presented on risk-weighted assets, level 1 and 2 capitals, and capital adequacy ratios (CAR) for two foreign (2008 - 2018) and three Russian banks (2014 - 2018). The study showed the direct effect of increasing the risk-weighted assets on the level of capital adequacy (CAR). The results obtained allow concluding that there is a direct significant connection between the IPCAA procedure use and the stability of banks. This procedure provides a comprehensive assessment of the overall capital adequacy of banks, taking into account the existing risks in order to maintain an adequate and stable forecast level of capital. The study also revealed the needs of banks in creating adequate structures to ensure proper management of financial and operational risks, which will simplify the IPCAA process and ensure more effective capital planning and decision-making to provide the stability of both individual banks and the entire banking system.

Keywords: statistical analysis, assessment of capital adequacy, stability of the banking system, internal assessment procedures.

INTRODUCTION

It is known that consequences of the financial crises happened in the last 10 years influenced all segments of the international market. The banking sector, which is a basis of the international financial stability and sustained economic growth, suffered most.

Global financial crisis led to the new scenario in the banking sector, having shown to regulators that monitoring of durability of banks and increase in stability of a banking system requires application of effective risk management systems and tools which have to be agreed with practical activities of banks. One of such systems is the internal assessment procedure of capital adequacy (IAPCA).

The purpose of this work is the research and assessment by means of the statistical analysis of existence and significance value of interrelation between stability of a banking system and the IAPCA procedure.

For achievement of the specified purpose it was necessary to receive answers to the following questions:

- How it is possible to use IAPCA for restriction or stimulation of the activity connected with adoption of risk for ensuring constant financial capacity of bank and implementation of regulatory requirements?
- How it is possible to use the IAPCA projective methods for contest of business plans and budgets of banks?

- Whether it is possible to use IAPCA for effective planning of activity of banks on distribution of assets and obligations, stable growth and providing that the risk connected with activity of any bank did not exceed its opportunities and the required capital level?
- How IAPCA can be used for correction of a gap between the current and target risk level in structure of the capital of banks?

THE REVIEW OF THE EXISTING SITUATION

The Financial Stability Forum of the G20 published recommendations for "improvement of financial regulation" through more disciplined, stable and less pro-cyclical financial system which effectively supports balanced and sustained economic growth [1]. In recommendations it is specified that higher requirements for essential requirements, effective quantity and quality of the capital and levels of liquidity in banks represent an asset for ensuring financial stability. It is caused by the fact that the purposes of banks concerning supervision of the capital consist in the following: to observe the needs for the capital established by national regulators; according to national rules to protect ability of banks to work as concern to provide profitability for investors and benefit for shareholders, supporting strong base of the capital; to help development of the business and to provide positive influence on economic growth in general.

Finding of optimum requirements to the capital is of great importance for maintenance of stability of a banking system and readiness for any negative consequences of economic downturn. Approach which needs to be followed is in correctly to estimate quality of assets and risks by means of regulatory tools, such as plans of weighing of risks.

The last global financial crisis showed that the governments and regulators not fully achieve the objectives of observation of banks to provide stability of a financial system. Heads of banks came to a conclusion that they do not see new risks and difficulties in business and therefore do not seek to soften and reduce them properly, in a complex and comprehensively. In this regard, clients of financial services lost trust to banks. In this new situation in a segment of financial services of the government and regulators discussed a new technique of regulation of risks is IAPCA which helps to reveal in due time available shortcomings of activity of banks. This instrument of regulation for the present is practically not used, especially in emerging markets.

The new Basel agreement on the capital "International convergence of indicators and standards of the capital" (Basel III) considerably influenced the organization of conducting banking practice in the field of risk management taking into account various factors.

Basel II [2] and III [3] set as a main objective the agreement creation of more perfect structure which will in addition strengthen reliability of a world banking system and will promote introduction of more advanced methods of management of risks in the bank industry.

Banks have to apply own detailed process of IAPCA to show that they can guarantee satisfactory capital resources with due consideration of all dangers and also have sufficient financing for a covering of additional expenses, out of those risks which are characterized within component I (credit, market and operational risks), such as liquid risk, percentage risk, risk of concentration, strategic risk and also other risks according to categories of component II.

MATERIALS AND METHODS

The main criteria used in given researches, are the documents, instructions and rules published by the Central bank of the Russian Federation (for the Russian banks) and the Basel committee on bank supervision (BCBS), and some others [3, 4]. These documents belong to standards which guarantee reasonable management of requirements to the capital, planning and risks in banks.

For the beginning of 2019 in Russia more than 470 bank organizations were registered. In this work research selection is limited to 5 banks. It is connected with the available difficulties in terms of access to data in the banking sector, especially for those data which have to be used within IAPCA.

The research included the International bank HSBC, (Great Britain), regional bank Samba, KSA to show how application of IAPCA saved both banks from economic and financial blows and instability. 3 Russian banks are also considered.

RESULTS AND DISCUSSION

By means of selection of data for HSBC Holdings plc and Samba Financial Group banks data on the assets (RWA), the capitals of level 1 and 2 and coefficients of capital adequacy (CAR) weighed on risk from 2008 for 2016 were obtained. Two of these banks were chosen for the fullest analysis of data as in Russia banks present calculation of own means (the capital, "Basel III") only since 2014. A main objective of use of the called data is check of influence of IAPCA on final coefficients of capital adequacy of banks by means of the statistical analysis of EVIEWS.

A statistical analysis is a suitable tool for similar problems solving [5 - 10]. According to the conducted statistical analysis the following results are received.

HSBC group: dependent variable: CARH, a method of the smallest squares, selection 2008-2016 included in observations: 9 (Table 1).

TABLE 1. Results of the regression analysis of HSBC.

Variable	Coefficient	Standard error	t- statistics	Problem
C	18.94291	3.69461	5.127174	0.0037
RWAH	-7.35 E-05	5.78 E-06	-12.7153	0.0001
TIER1H	0.000379	5.20 E-05	7.295404	0.0008
TIER2H	0.000386	0.000136	2.844152	0.0361
Determination coefficient	0.993655	Middle value		15.88667
Coefficient of determination (corrected)	0.989849	S.D. dependent var		2.416304
Standard error of regression	0.243451	Akaike info criterion		0.313304
The sum of the remains in a square	0.296343	Schwarz criterion		0.400959
Logarithm of function of credibility	2.590133	F- statistics		261.0255
Durbin-Watson statistics	1.766312	Prob (F- statistics)		0.000007

Samba Financial Group: dependent variable: CARH; method of the smallest squares; selection of 2008 2016; the included observations: 9 (Table 2).

Interpretation of results of the analysis:

1) RWA variable: the coefficient has negative values that means inverse relation from capital adequacy coefficient (CAR = T1 T2/RWAs); 2 negative indicators show positive dependence on the capital (HSBC-7.35 of E-05 and SAMBA-1.14 E-07).

2) Probability: values below of 5% according to all available information are received that means that three chosen variables (RWA, Tier 1 and 2) have an impact on CAR with the level of reliability of the chosen variables more than 95%.

3) R-squared: the coefficient has size more than 99% that means that three the chosen variables (RWA, Tier 1 and 2) influence with a probability of 99% changes in CAR.

4) Durbin-Watson stat (DW): the following DW values are received: HSBC - 1.766312 and Samba - 2.138418.

TABLE 2. Results of the regression analysis of Samba Financial Group.

Variable	Coefficient	Standard error	t- statistics	Problem
C	16.85307	1.081239	15.58682	0
RWAH	-1.14 E-07	6.38 E-09	-17.93654	0
TIER1H	6.10 E-07	2.03 E-08	30.10083	0
TIER2H	1.75 E-06	4.49 E-07	3.893299	0.0115
Determination coefficient	0.996652	Middle value		19.00556
Adjusted R-squared	0.994643	S.D. dependent var		2.315092
Standard error of regression	0.169453	Akaike info criterion		-0.41138
The sum of the remains in a square	0.143571	Schwarz criterion		-0.32373
Logarithm of function of credibility	5.851221	F- statistics		496.0795
Durbin-Watson statistics	2.138418	Prob (F- statistics)		0.000001

Thus, as the main conclusion of the regression analysis, it is possible to note that IAPCA shows significant communication with stability of banks by means of complex assessment of the general capital adequacy of banks concerning their profiles of risk for maintenance of adequate and stable expected level of the capital.

CONCLUSIONS

In this research the interrelation between stability of a banking system and the internal assessment procedures of capital adequacy (IAPCA) is considered.

The received results allow drawing a conclusion on existence of direct significant link of use the IAPCA procedure and stability of banks. This procedure provides complex assessment of the general capital adequacy of banks taking into account the available risks for the purpose of maintenance of adequate and stable expected level of the capital.

The research also revealed requirements of banks for creation of adequate structures for ensuring appropriate management of financial and operational risks that will allow to simplify process of IAPCA and to provide increase in efficiency of planning of the capital and decision-making for the purpose of ensuring stability, both separate banks, and all banking system.

The IAPCA procedure has to be used for achievement of reasonable management of the capital, in view of strategy and business plans of banks. IAPCA allows providing the stable level of capital adequacy in the medium and long term perspective.

In general, it is possible to draw a conclusion that banks have to apply IAPCA to show that they use all necessary methods, systems and processes to guarantee satisfactory capital resources with due consideration of all available risks and also to have adequate financing for a covering of additional risks.

REFERENCES

- [1] Basel committee on bank supervision (1996). The amendment to the Agreement on the capital taking into account market risk. Basel: Bank for International Settlements.
- [2] Basel committee on bank supervision (2000). Principles of management of credit risk. Basel: Bank for International Settlements.
- [3] *Financial instruments: disclosure and submission of information: IFRS (IAS) 39/lane* (M.: Askeri-Assa, 2009).
- [4] Bauducco S. Bulir A. & Cihak M. (2008). Rules of monetary policy with financial instability. Working materials of the Czech national bank.
- [5] Anna Kolomytseva, Helen Kazakova, Marina Medvedeva, "Interaction Risk Assessment in Partner Entrepreneurial Networks", [AIP Conference Proceedings](#) 1978, 440013 (2018).
- [6] M.A. Medvedev, A. Timofeeva, A.N. Nizov, T.O. Zagornaya, D.V. Nalivayko, "About some economic applications of cohort analysis", [AIP Conference Proceedings](#) 2048, 060015 (2018).
- [7] Helen A. Iskra, Marina A. Medvedeva, and Anastasiya V. Apanasenko, "An integrated model of efficiency analysis of companies' network interaction", [AIP Conference Proceedings](#) 2040, 050019 (2018).
- [8] Ayshan Gasanova, Alexander N. Medvedev, Evgeny I. Komotskiy, Kamen B. Spasov, and Igor N. Sachkov, "On the use of data mining methods for money laundering detection based on financial transactions information", [AIP Conference Proceedings](#) 2040, 050021 (2018).
- [9] T.A. Ovchinnicova, M.A. Medvedeva, A.A. Taubayev, "Comparative Analysis of Transactions Networks Structure in Local Payment System", [AIP Conference Proceedings](#) 2116, 200028 (2019).
- [10] Helen Kazakova, Ivan Zayarsky, Maxim Medvedev, "Forecasting of Financial Flows in Business Systems Taking into Account the Risk and Uncertainty of Interaction", [AIP Conference Proceedings](#) 2116, 430021 (2019).