European Science Review 2025,
No 3–4
ISSN 2310-5577

PREMIER Publishing
ppublishing.org

Section 2. Economic and management

DOI:10.29013/ESR-25-3.4-22-26

ANALYSIS OF RISK-BASED CAPITAL MODELS AND THEIR APPLICABILITY TO THE INSURANCE MARKET OF UZBEKISTAN

Ergasheva Farangiz Sherzod qizi [1]

[1] The Banking and Finance Academy of the Republic of Uzbekistan

Cite: *Ergasheva F.Sh. (2025). Analysis of Risk-Based Capital Models and Their Applicability to the Insurance Market of Uzbekistan. European Science Review 2025, No 3–4.* https://doi.org/10.29013/ESR-25-3.4-22-26

Abstract

This article explores the applicability of the Risk-Based Capital (RBC) framework to the insurance market of the Republic of Uzbekistan. Drawing upon international best practices, especially the APRA model from Australia, the study empirically assesses the capital structure comprised of premium, claims liability, and asset risks. The analysis revealed the dominant role of insurance-related risks in capital requirements and emphasized the need to transition from rigid normative regulation to a more risk-sensitive and adaptive supervisory approach. The paper provides policy recommendations for a phased implementation of RBC, including the development of a localized model, creation of a national actuarial database, and modernization of regulatory frameworks.

Keywords: *risk-based capital, insurance market, Uzbekistan, regulatory reform, prudential supervision, actuarial analysis*

Introduction

The modern economy demands high resilience and adaptability from insurance market participants amid an unstable macroeconomic environment, increasing regulatory pressure, and growing risks of various nature. This is particularly relevant for the Republic, where, despite positive development trends, the insurance sector still faces a range of institutional, regulatory, and financial challenges. Against the backdrop of rising competition, market volatility, and shifting client expectations, insurance companies are tasked with effectively managing capital to ensure their long-term solvency and stability.

The concept of Risk-Based Capital (RBC) is increasingly recognized as a tool for both risk assessment and active management. In the context of globalization, establishing risk-sensitive capital adequacy systems has become essential. Practices in countries like the United States, Canada, the United Kingdom, and Australia show that flexible RBC models better align insurers' risk profiles with capital requirements.

As Uzbekistan's risk-based regulatory framework continues to develop, adapting international RBC practices has gained scientific and practical relevance. Insurance risks are multi-layered, including underwriting, claims, and investment risks; inadequate assessment may lead to insolvency and systemic sector instability.

This article examines capital management mechanisms in insurance companies using a risk-based perspective. It analyzes key risks, their evaluation methods, and the applicability of foreign RBC models to Uzbekistan's market, with particular attention to catastrophic risks, climate change, and emerging threats such as terrorism.

Literature Review

The Risk-Based Capital (RBC) approach to insurance capital management has been extensively studied internationally, though less so nationally. This section reviews key literature on the theoretical foundations, global practices, and adaptation of RBC models in emerging markets, including Uzbekistan.

F. H. Knight's Risk, Uncertainty and Profit (1921) laid the groundwork for insurance risk assessment and capital requirements. RBC models became widespread in the 1990s, beginning in the U.S. with the NAIC framework, which assesses asset, credit, reserve, and premium risks with covariance adjustments.

Similar models have been adopted in Canada (OSFI), the United Kingdom (FSA, Solvency I and II), Australia (APRA), and the European Union under Solvency II, which applies a two-tier system (MCR and SCR) calculated via standard formulas or internal models.

Among the relevant scientific publications exploring RBC concepts and their impact on insurance company resilience are:

- Cummins, J.D., & Phillips, R.D. (2009). Capital Adequacy and Insurance Risk-Based Capital Systems. Journal of Insurance Regulation, 28(1).
- Eling, M., & Schmeiser, H. (2010). Insurance and Financial Stability. Geneva Papers on Risk and Insurance – Issues and Practice, 35(3). DOI: 10.1057/gpp.2010.19.

These works emphasize the need for a balanced approach between strict regulatory standards and capital management flexibility, especially under conditions of market volatility.

At the national level, theoretical and practical aspects of insurance capital and risk management are represented in a more limited body of literature. Notable publications on the stability of Uzbekistan's insurance market include:

- Yusupov, I.R. (2021). Improving the Regulation System of Financial Stability of Insurance Organizations in Uzbekistan. Journal "Finance and Banking", No. 3, pp. 45–52.
- Akhmedova, Sh.S. (2020). Risk Assessment and Capital Management in Insurance Organizations. Scientific and Practical Journal "Economics and Innovative Technologies", No. 6.

It is also important to note the increasing reform activity by the regulator. In 2022, a new draft law on insurance activities was adopted, introducing principles of risk-based supervision and a differentiated approach to capital assessment.

Research Methodology

The methodological framework of this study relies on systematic, comparative, and quantitative analyses of insurance company risks and their impact on capital structure. It is based on the Risk-Based Capital (RBC) concept, tested in advanced markets, with the goal of adapting its elements for Uzbekistan.

A factor-based approach to capital assessment is used, following the methodology outlined by the Australian Prudential Regulation Authority (APRA) in Risk-Based Capital in General Insurance (2002). According to this approach, the total capital requirement is defined as the sum of required capital amounts across the following key risk categories:

Underwriting Risk – reflects the likelihood that incoming insurance premiums may be insufficient to cover expected claims and expenses;

Claims Risk – captures the probability that actual claims payments will exceed expected values, particularly in the presence of catastrophic or cumulative events;

Asset Risk – includes risks associated with declines in the market value of assets and credit risk related to issuer defaults;

Operational Risk – encompasses losses arising from internal errors, management failures, fraud, or external events.

Each of these risk categories is modeled using statistical coefficients (e.g., coefficients of variation), assumptions about loss distributions, and covariance matrices reflecting the interrelationships between different risk components. The overall capital requirement is calculated using a formula that integrates these components, adjusted for their respective weights and covariance effects, where:

$$\textbf{Total Risk-Based Capital} = \sqrt{(RP^2 + RC^2 + RA^2 + RO^2 + 2Cov)},$$

RP represents capital for underwriting risk, RC for claims risk, RA for asset risk, and RO for operational risk.

Additionally, within the framework of this study, the presented model is adapted to the specific conditions of Uzbekistan. In particular, the following local features are proposed for consideration:

- A low level of reinsurance coverage, increasing sensitivity to large losses;
- Limited access to highly liquid and diversified investment instruments;
- Underdeveloped information databases and actuarial analytics;
- Currency risks associated with investments in foreign assets.

The collection and processing of empirical data were based on publicly available statistical sources from the Agency for the Development of the Insurance Market under the Ministry of Finance of the Republic of Uzbekistan, as well as annual reports of the country's leading insurance companies. Scenario analysis and stress testing methods were employed to validate the reliability of calculations by simulating the impact of catastrophic events and market shocks on insurers' capital resilience.

The methodological novelty of this study lies in the development of an adapted risk-based capital model tailored to the Uzbek context, integrating elements of international standards while accounting for national specificities.

Analysis and Research Results

This research stage aimed to empirically test the factor-based Risk-Based Capital (RBC) model proposed by the Australian Prudential Regulation Authority (APRA) for potential adaptation to Uzbekistan's insurance market. The analysis focused on risk components, their interrelationships, and their influence on overall capital requirements.

Using data from Risk-Based Capital in General Insurance, the study examined a typical RBC structure, covering premium risk, claims liability risk, and asset risk – allowing for a comprehensive evaluation of capital adequacy and insurer vulnerability.

Table 1. *Example of Capital Requirement Calculation Based on the RBC (APRA) Model*

Capital Component	Calculation Formula	Result (in units)
Premium Risk (PR)	0.15 × Earned Premium	45
Claims Liability Risk (CL)	0.15 × Net Outstanding Claims	30
Asset Risk (AR)	∑ (Risk Weight × Asset Value for Each Asset Class)	20
Total RBC Requirement	$\sqrt{(PR^2 + CL^2 + AR^2 + 2 \times \text{Covariance})}$	≈ 58.3

Note: The calculations apply the covariance adjustment method, where the correlation between premium risk and claims liability risk is assumed to be 0.5, and between these risks and asset risk, 0.25. The asset risk weights are differentiated, ranging from 0% for cash to 40% for equities

Based on the presented model calculation, it can be concluded that premium and reserve risks have a significant impact on the overall capital requirement of an insurance company. This calculation structure provides a more realistic view of risk distribution and the insurer's potential exposure to both external macroeconomic factors and internal business decisions.

In Uzbekistan, where the insurance sector has been undergoing rapid liberalization in recent years, the component of asset risk is of particular importance. Given the limited range of investment instruments and the dominance of short-term bank deposits in insurers' portfolios, exposure to market and credit risks remains relatively low; however, as investment portfolios diversify, this exposure is likely to increase substantially.

Furthermore, the system for managing liabilities and premium policies in most Uzbek insurance companies remains insufficiently aligned with international standards. This is reflected in weak pricing practices, the lack of advanced actuarial analysis, and the limited role of reinsurance as a risk transfer tool. Under the current regulatory framework managed by the National Agency for Prospective Projects (NAPP), such deficiencies could create systemic risks to sector stability, particularly in the event of a sharp rise in claims payouts caused by catastrophic events or macroeconomic shocks.

The analysis of the RBC model suggests that its implementation in Uzbekistan could potentially enhance the resilience of individual insurers and strengthen overall system supervision. However, this would require:

- Developing a national risk weight scale for assets and liabilities;
- Establishing a centralized actuarial data system;
- Building human capacity in risk management and prudential regulation;
- Updating the regulatory framework by shifting from static capital norms to dynamic, risk-based standards.

Conclusions and Recommendations

The study confirms the importance of implementing a Risk-Based Capital (RBC) system as a sustainable regulatory tool for the insurance market. A factor-based model assessing premium, reserve, and investment risks allows better alignment of capital levels with actual financial threats.

For Uzbekistan, where the insurance sector is rapidly growing and transforming, adopting RBC principles is key to improving transparency, reliability, and investment appeal. Key findings include:

– Insurance risks, especially claims liabilities, exert the greatest pressure on capital, requiring stronger actuarial assessment and reinsurance;

– The current fixed minimum capital model inadequately reflects risk exposure, risking undercapitalization or over-reserving;

– Although asset risk is currently low, it will become increasingly significant as investment portfolios diversify amid currency liberalization and foreign investment growth.

Based on the findings, the following measures are recommended for the phased introduction of RBC in Uzbekistan's insurance sector:

– Develop a national RBC model tailored to macroeconomic conditions and institutional maturity, based on a simplified APRA or Solvency II framework with gradual calibration;

– Create a centralized actuarial database at the regulator (NAPP) to support reliable risk assessments;

– Implement training and certification programs in risk management and actuarial science, engaging international organizations (e.g., IAIS, ADB, GIZ);

– Gradually shift from rules-based to risk-based regulation, starting with voluntary adoption by major insurers and moving toward mandatory standards;

– Integrate stress testing and scenario analysis into supervisory practices and internal capital management.

Implementing RBC is essential for the sustainable growth of Uzbekistan's insurance sector and its integration into the global financial system. Achieving this requires institutional reforms, regulatory flexibility, and collaboration among regulators, insurers, and academia, laying a foundation for a more resilient, adaptive, and trusted insurance industry.

References

National Association of Insurance Commissioners (NAIC). (2023). Risk-Based Capital Overview.
Cummins, J. D., & Phillips, R. D. (2009). Capital Adequacy and Insurance Risk-Based Capital Systems. Journal of Insurance Regulation, – 28(1).

Australian Prudential Regulation Authority (APRA). (2022). Prudential Standard GPS 110: Capital Adequacy. Retrieved from: https://www.apra.gov.au

Yusupov, I. R. (2021). Improving the System of Regulating the Financial Stability of Insurance Organizations in Uzbekistan. Finance and Banking, – No. 3. – P. 45–52.

Akhmedova, Sh. S. (2020). Risk Assessment and Capital Management in Insurance Organizations. Economics and Innovative Technologies, – No. 6. Retrieved from: https://journal.tsue.uz

National Agency for Prospective Projects (NAPP). (2023). Presentation of the Insurance Market Reform Concept for Uzbekistan. Retrieved from: https://napp.uz

Nomozova K. I. Improvement of Capital Requirements in Insurance Companies of Uzbekistan. – Tashkent: Banking and Finance Academy of the Republic of Uzbekistan, 2024. – 26 p. (In Russian)

Yuldashev A. K. Building Consumer Trust through Personalization: A Case Study of Uzbekistan's Digital Insurance Market. – Tashkent: KIMYO International University in Tashkent, 2024. – 24 p. – [Electronic resource]. (In Russian)

submitted 15.04.2025;
accepted for publication 29.04.2025;
published 31.05.2025

Contact: Farangizsherzodovna1@gmail.com