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FINANCIAL AND INSURANCE INSTRUMENTS AS A MECHANISM FOR THE DEVELOPMENT OF THE AVIATION INDUSTRY

Scientific Specialty 5.2.3. "Regional and Sectoral Economics"

ABSTRACT

of the dissertation for the degree of
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Relevance of the Research Topic.

Over the past two decades, the aviation industry has grown significantly and undergone profound transformation, driven by technological advancements and rising demand for air transportation. In Russia, the aviation sector is traditionally classified among the most knowledge-intensive, high-tech, and systemically important industries of the national economy. It ensures air connectivity across the country's regions and supports population mobility.

In February–March 2022, the air transport industry of the Russian Federation confronted severe geopolitical challenges and unprecedented sanctions pressure, including airspace closures, bans on aircraft maintenance, repair, and overhaul (MRO), prohibitions on the sale of airplanes and helicopters, and restrictions on the supply of components, equipment, and systems. Furthermore, several industry organizations were subjected to blocking sanctions that restricted their access to goods, services, and foreign markets. This generated a complex of systemic problems: a contraction of the modern aircraft fleet and corresponding transportation volumes, declining airport revenues due to reduced passenger traffic, acute financial deficits among airlines, and threats to flight safety amid an insufficiently rapid pace of import substitution.

Under these circumstances, the strategic objective of the industry is an accelerated transition to domestic aviation technologies. Achieving this goal is impossible without deep modernization—a capital-intensive process requiring long-term capital ("long money") and associated with high risks. The success of technological renewal directly depends on the effectiveness of the financial and insurance toolkit, which ensures capital inflows and risk mitigation. Traditionally, market participants rely on a wide spectrum of such mechanisms: ranging from aircraft financing instruments (bank loans, operating and finance leases, export credit financing) and capital market instruments to hedging tools (for instance, against fuel price volatility) and insurance instruments (aircraft hull insurance, liability insurance, and credit insurance).

At the same time, new economic realities necessitate rethinking and expanding the existing toolkit. A detailed analysis and search for new combinations of available financial and insurance instruments capable of ensuring maximum efficiency in the use of production factors by enterprises are required. This underpins the high relevance of the present study, the objective of which is—by utilizing effective financial and insurance instruments and their combinations—to develop mechanisms capable of becoming a driver for the modernization and sustainable development of the Russian aviation industry.

Degree of Scientific Elaboration of the Problem.

The analysis of aviation industry challenges, including production financing, aircraft hull insurance, and operator liability insurance, involves aspects that require rigorous theoretical and practical substantiation. The author built upon the findings of researchers in economics, production planning and organization, aviation, transport, and logistics (A.G. Siluanov, D.V. Manturov, V.V. Klochkov, E.Yu. Khrustalev, et al.), as well as works on transport economics and actuarial methods. The aviation industry possesses substantial sectoral specificity and requires a specialized methodological toolkit—primarily in matters of financial provision, risk management, and insurance within the sector. Amid volatile market conditions and adaptation to new strategic challenges, issues concerning the quantitative assessment of the impact of financial and insurance instruments on industry efficiency under sanctions restrictions remain insufficiently explored. This predetermined the choice of the goal and objectives of the present study.

Object of the Study — the aviation industry and the economic relations among entities involved in the manufacturing, maintenance, and operation of aviation equipment, including financing mechanisms (leasing, lending, bond issuance) and insurance mechanisms (aircraft hull, liability, and cargo insurance), as well as institutional interaction with state regulators.

Subject of the Study — the aggregate of financial and insurance instruments, methods for their optimization, and state support mechanisms

ensuring the economic efficiency of the Russian aviation industry under conditions of sanctions and import substitution.

Information Basis of the Study — statutory and regulatory acts of the Russian Federation, constituent entities of the Federation, and foreign countries; monographs and periodical publications; data from Rosstat (Federal State Statistics Service), the Federal Air Transport Agency (Rosaviatsia), and the Ministry of Industry and Trade of the Russian Federation; as well as reports by independent research agencies and financial statements of Russian and foreign companies.

Scientific Hypothesis of the Study.

In the context of the Russian aviation industry's accelerated transition to domestic technologies, intensifying sanctions pressure, and the need for large-scale fleet renewal, the research hypothesis posits that the existing financial and insurance toolkit does not fully meet the new challenges, and that its systemic expansion, adaptation, and development will have a direct positive impact on the pace and quality of industry modernization—ultimately achieving technological sovereignty and sustainable industry development—while providing for:

- A reduction in the capital intensity of manufacturing and operating aviation equipment by optimizing the capital structure (including the issuance of state-guaranteed infrastructure bonds) and lowering the cost of borrowed funds.
- Minimization of operational and financial risks through the formation of specialized insurance pools, the implementation of actuarial pricing models adapted to sanctions restrictions, and risk redistribution among market participants.
- Indirect subsidization of the industry through the synergy of insurance premiums, tax incentives, and state guarantees, thereby enhancing airline profitability.

The hypothesis assumes that implementing these mechanisms will not only compensate for losses resulting from restricted access to international capital and

insurance markets—reducing dependence on foreign reinsurers—but also establish a sustainable financing model that secures the technological sovereignty of the industry.

The hypothesis is verified through:

- Correlation analysis of the impact of the Bank of Russia key rate on the bond yields of aviation issuers.
- Econometric modeling of the relationship between insurance rates and reinsurance pool capacity.
- Scenario forecasting upon the implementation of the proposed instruments.
- Actuarial modeling of loss reserves based on development triangles (the Chain-Ladder and Bornhuetter–Ferguson methods) in accordance with the methodology of Bank of Russia Regulation No. 858-P, including sensitivity analysis of loss development factors to the volume of accumulated statistics and catastrophic outliers.

Goal and Objectives of the Study.

The goal of the study is to examine the prospects for modernizing the Russian aviation industry and the existing financial and insurance toolkit, as well as to expand this toolkit in order to enhance the economic efficiency of industry enterprises through the optimal utilization of financial and insurance market instruments alongside targeted state support and subsidization measures.

To achieve this goal, the following objectives were formulated:

1. Diagnose the current state of the industry by identifying systemic problems (import dependence, rising capital intensity, and restricted access to global capital markets).
2. Conduct a comparative analysis of modernization instruments by examining domestic and international experience in applying financial and insurance tools and mechanisms in aviation.

3. Evaluate the impact of financial and insurance instruments on the economic efficiency (profitability) of airlines using regression analysis and operational/strategic impact assessment.
4. Develop an adapted financial and insurance toolkit: propose mechanisms for reducing capital intensity (state-guaranteed infrastructure bonds) and managing risks (a sectoral insurance pool covering sanctions and technological risks).
5. Formulate recommendations and a methodology for indirect subsidization via tax incentives and tariff preferences.
6. Assess international cooperation strategies under restrictions and substantiate pathways for collaboration with "friendly" jurisdictions in aircraft leasing, technology transfer, and alternative insurance/reinsurance markets.

Scientific Novelty of the Study.

The scientific novelty of the dissertation research lies in the development and substantiation of a comprehensive methodology for modernizing the aviation industry of the Russian Federation that integrates an expanded financial and insurance toolkit to enhance the sector's economic efficiency, resilience, and technological sovereignty under structural constraints.

Within the framework of the conducted study, the following scientific results possessing elements of novelty were obtained:

1. Systemic dysfunctions in the financial and insurance provision of the Russian aviation industry under structural constraints have been systematized and characterized using quantitative indicators; specifically, the high elasticity of the cost of capital with respect to the Bank of Russia key rate has been statistically confirmed, and the critical dependence of industry resilience on the deficit of reinsurance capacity has been established.
2. Methodological approaches have been developed to construct a hybrid financing model for the aviation industry based on integrating infrastructure

bonds, insurance mechanisms, and tax incentives to achieve synergy between state support and private investment for the modernization of the sector. A distinctive feature of this model is the creation of a closed-loop capital circulation contour, wherein infrastructure bonds, sectoral insurance mechanisms, and targeted tax incentives act as mutually complementary elements that reduce reliance on direct budgetary funding.

3. A comprehensive mechanism for developing an applied sectoral insurance toolkit has been proposed and substantiated, encompassing:

- the formation of international insurance and reinsurance pools involving BRICS+, EAEU, and other partner countries;
- the standardization of insurance products to lower transaction costs;
- the deployment of blockchain-based digital platforms to manage insurance mechanisms and overcome the deficit of institutional trust among participants from different jurisdictions by ensuring transparency, automating settlements via smart contracts, and reducing transaction costs on the basis of standardized insurance products.

4. As part of a unified two-tier framework for mobilizing institutional and retail capital, methods have been developed to advance the aviation industry's investment toolkit for mobilizing retail investor capital ("people's" aviation bonds, sectoral mutual investment funds, and infrastructure bonds). These instruments are distinguished by built-in risk mitigation mechanisms (state guarantees, targeted project financing) and are oriented toward creating a new, non-bank source of long-term financing for import substitution and aircraft modernization programs. Within this framework, the applicability of bond financing directly to aircraft as immovable income-generating assets (Article 130 of the Civil Code of the Russian Federation) is substantiated.

5. A methodological approach has been proposed for the quantitative assessment of the impact of the developed financial and insurance toolkit on

key industry parameters: risk reduction, lowering the cost of capital, and increasing the availability of modernization financing.

6. A concept for transforming the system of financial and insurance provision and state support for the aviation industry has been substantiated, entailing a paradigm shift from direct subsidization to the state's role as an architect of an adaptive financial and insurance system, wherein the primary instruments are the establishment of development institutions (insurance pools, funds), the provision of state guarantees, and regulatory incentives to mobilize domestic private investment and ensure long-term sustainability under external economic restrictions.

The aggregate scientific and applied significance of the research results lies in establishing the foundation for an effective state support mechanism for the aviation industry oriented toward mobilizing domestic resources and fostering international cooperation under sanctions constraints.

Theoretical and Practical Significance.

The theoretical significance of the study lies in advancing the provisions of sectoral economics regarding the formation of crisis management mechanisms in strategically vital industries. The work contributes to the theory of applied finance and sectoral (aviation) insurance by developing concepts of financial engineering and risk management amid external shocks and structural economic transformation. The concepts, mechanisms, methods, and models developed in the study, as well as its conclusions and practical recommendations, can be applied to design development and support mechanisms for the aviation industry of the Russian Federation, and can serve as a theoretical basis for further research into ensuring the economic security and sustainable development of the transport complex. In particular, they are valuable when analyzing investment projects, evaluating the feasibility of state support (subsidization), and addressing issues of industry deregulation at the level of profile ministries and public administration bodies.

The practical significance of the study is determined by the high degree of readiness of its results for implementation. The proposed methodologies and models can be utilized by:

- Public authorities (the Ministry of Transport of Russia, the Ministry of Industry and Trade of Russia, and the Federal Air Transport Agency) in drafting and adjusting aviation industry development strategies and regulatory legal acts governing financial, leasing, and insurance activities.
- Development institutions (VEB.RF), the State Transport Leasing Company (GTLK), and commercial banks in assessing risks and structuring transactions to finance deliveries of domestic aircraft.
- Airlines and insurance companies to optimize financial strategies, manage risks, and develop new competitive products.
- Higher education institutions in the educational process when training specialists in the fields of "Regional and Sectoral Economics," "Economics," "Finance and Credit," and "Transport Management."

Methodology and Research Methods.

The methodological foundation of the study comprises fundamental economic theories (J. Schumpeter's theory of economic development, F. Knight's theory of risk and uncertainty, and institutional economics), as well as general scientific and specialized methods: methods of analysis and synthesis, systemic and situational analysis, economic and mathematical modeling, correlation and regression analysis, and actuarial methods for estimating insurance reserves (the Chain-Ladder method and the Bornhuetter–Ferguson method, including their regulatory implementation under Bank of Russia Regulation No. 858-P).

Approbation of the Research Results.

The main provisions of the study were presented and received positive evaluations at meetings of the Department of Finance and Insurance at RANEPA and at the specialized conference "Spring Actuarial School 2024" (Saint

Petersburg State University of Economics, April 22–23, 2024). In total, since 2013, the author has published 8 scientific papers on the dissertation topic, including 7 articles in peer-reviewed scientific journals indexed in the VAK (Higher Attestation Commission) list of the Ministry of Science and Higher Education of the Russian Federation—of which 2 articles were published in journals recommended by the RANEPA Academic Council—and 1 paper in other academic publications and conference proceedings, with a total volume of 8.81 author's sheets (including 6.0 author's sheets contributed personally by the author). The research findings have been tested and implemented in the operational activities of the airline JSC PO "Kosmos" and the insurance company LLC IC "TIT".

Structure and Volume of the Work.

The dissertation consists of an introduction, three chapters, a conclusion, and a list of references. The main text of the dissertation spans 237 typewritten pages (excluding appendices) and is illustrated with 13 figures and 19 tables; the work also includes 4 appendices spanning 19 pages, containing 10 tables. The list of references comprises 102 sources.

Keywords.

aviation industry, modernization, financial instruments, insurance instruments, aviation insurance, infrastructure bonds, insurance pools, reinsurance, risk management, actuarial methods, technological sovereignty, state support for the aviation industry.