Risk management of innovative Russian companies in the context of interregional integration

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Abstract. The paper discusses the formation of national competitiveness, including its determinants. The role of an integrated business risk insurance system for a competitive national economy, as well as public-private partnerships for the harmonious development of venture financing, is substantiated. A hedging financial instrument is seen as a means of mitigating the risks of venture capitalists and project developers. An analysis of the degree of risk is proposed as a necessary step prior to the decision to hedge. The stage of fixing the market follows the adoption of such a decision. Correlation-regression analysis allows establishing how indicators of price dynamics for the spot instrument and the corresponding futures are interrelated. The probabilistic nature of the variant development of investment and innovation projects in the course of economic activity of market entities should be taken into account when assessing the risk caused by material, labor, financial and other losses. Financial guarantees are subject to compulsory insurance in case of risks associated with transactions with financial assets.

1. Introduction
A review of foreign studies in the field of risk management of innovative companies revealed the main trends and directions of such research. Today, a relevant and quite promising direction is the development of scenario models of stochastic programming for hedging the risks of international portfolios using options. These models provide increased level of integration in the management of market and currency risks. [1] Some scholars [2] pay attention to the study of asymmetric reactions of hedge fund profitability times, measured by the asymmetry rate of return and the excess coefficient, to macroeconomic and financial turmoil depending on the phase of the business cycle. A number of authors [3] are engaged in research of how activity of hedge funds influences corporate innovations. Companies targeted by activists increase their innovative effectiveness over a five-year period after the intervention of a hedge fund. Despite the tightening of research and development (R&D) costs, target companies increase innovation output measured both by the number of patents and citation, which has a stronger effect on companies with more diversified innovation portfolios.

Nevertheless, in all these works, the issue of the role and mechanisms of the formation of an integrated system of business risk insurance for a competitive national economy, based on large innovative companies that are actively introducing interregional integration, is not addressed.

2. Materials and methods
The processes of globalization of the economy have led to an increase in the role of innovative activities of the organization, and, as a result, of an innovative process that has specific characteristics,
such as the content of the process, its essence and forms of interaction of subjects. According to the forecasts of scientists, mid-XXI century will be marked by toughening geopolitical competition, the basic comparative advantages of which are beginning to form today. In a new emerging world, such spheres of human activity as education and health improvement, scientific and technological progress, information infrastructure, and environmental safety will come to the fore. The individual becomes a priority, which is a combination of creative and intellectual abilities, the development of which should be directed by the state and private companies, as well as the standard of living of this individual. Also, an important role in the nascent technological order should be played by innovative production and technical systems.

Today's Russian financial market is characterized by growing imbalances, under which companies are forced to use financial engineering tools to reduce and insure the risks caused by the imbalance of costs and cash flows. The methodology of financial engineering can be attributed to relatively new developments in risk management and, as a result, aims to increase the investment activity of companies in various sectors of the economy. From one point of view, it is considered as a mechanism for managing cash flows in an organization, and, on the other hand, as a tool for such management. The state of the domestic economy and the prospects for its development are determined by the indicator of national competitiveness, which, under the current conditions, should be understood as the ability of the Russian economy to create and implement innovative technologies. Today, these processes are significantly affected by scientific and technological progress, which is gaining accelerated pace of development, as well as a significant movement of financial capital across the border, globalization processes related to the transformation of financial and commodity markets, the manufacturing sector, and other economic and non-economic environmental factors. [4]

The analysis of the structure of investments in fixed assets by sources of financing in the Russian Federation in 2013-2017 in order to determine their ratio in terms of own and attracted resources (table 1) allows tracing the impact of sectoral sanctions imposed by Western countries (and, above all, the USA) against Russia.

**Table 1.** Structure of investments in fixed assets in the Russian Federation by sources of financing in 2013-2017, %.

| Indicator | 2013 | 2014 | 2015 | 2016 | 2017 |
|-----------|------|------|------|------|------|
| Investments in fixed assets - total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| including: | | | | | |
| 1. Own funds | 45.2 | 45.7 | 50.2 | 51.0 | 52.1 |
| 2. Raised funds | 54.8 | 54.3 | 49.8 | 49.0 | 47.9 |
| among them: | | | | | |
| - bank loans | 10.0 | 10.6 | 8.1 | 10.4 | 10.9 |
| - borrowed funds of other organizations | 6.2 | 6.4 | 6.7 | 6.0 | 5.1 |
| - foreign investments | 0.8 | 0.9 | 1.1 | 0.8 | 0.7 |
| - budget funds | 19.0 | 17.0 | 18.3 | 16.4 | 16.3 |
| including: | | | | | |
| - federal budget funds | 10.0 | 9.0 | 11.3 | 9.3 | 8.2 |
| - budget funds of the constituent entities of the Federation | 7.5 | 6.5 | 5.7 | 6.0 | 6.8 |
| - funds of local budgets | 1.5 | 1.5 | 1.3 | 1.1 | 1.3 |
| - funds of state extra-budgetary funds | 0.3 | 0.2 | 0.3 | 0.2 | 0.2 |
| - funds of organizations and the population for shared construction | 2.9 | 3.5 | 3.2 | 3.0 | 2.7 |
| including: | | | | | |
| - funds of the population | 2.3 | 2.7 | 2.4 | 2.3 | 2.2 |
| - other | 15.6 | 15.7 | 12.1 | 12.2 | 12.0 |
| including: | | | | | |
| - funds of higher organizations | 13.0 | 13.2 | - | - | - |
funds from issuing corporate bonds & 0.02 & 0.1 & - & - & -
- funds from the issue of shares & 1.0 & 1.1 & - & - & -

The analysis of table 1 showed that the ratio between own and attracted sources of investment in fixed assets for the analyzed period has changed. Equity financing from own funds increased from 45.2% in 2013 to 52.1% in 2017. And financing from raised funds decreased from 54.8% in 2013 to 49.0% in 2017. Thus, there was a shift in the ratio of funds, which indicates that companies began to experience problems with the adequacy of credit resources for an active investment policy.

Among the factors limiting the investment activity of innovation-oriented companies, one of the most important is the investment risk factor associated with the activities of such companies. This determines the high relevance of the search for new mechanisms and tools to reduce the risks of investment activity of innovation-oriented companies in the context of interregional integration.

The solution of the tasks set in the work was carried out on the basis of the application of general scientific research methods within the framework of literature analysis on the research problem, generalization, comparison and systematization of empirical and theoretical data, comparative, logical and statistical analysis, as well as through the analysis of structure and dynamics, graphical interpretation of information, etc.

Financial engineering can be considered as a tool to ensure insurance and reduce business risks of innovative Russian companies. If we consider financial engineering as a mechanism to ensure the financial sustainability of an innovative company, then in this case, it is based on financial instruments that provide a comprehensive financial sustainability management system. Thus, Russian and foreign scholars, when considering conceptual approaches to determining the specific features of financial instruments of the mechanism under consideration, identify two fundamental theoretical aspects of the development of financial stability management technology.

Financial engineering, when considering it in accordance with the first aspect, is defined as a system for constructing financial instruments that ensure effective management of the corporate financial portfolio of an innovation-oriented company. Another aspect is that financial engineering is considered as a system designed to form a portfolio of derivative securities and ensure their quality management.

It can be stated that financial engineering in the last decade of the last century was focused on enhancing the innovative characteristics of basic and derivative securities with the aim of attracting investment in innovation-oriented Russian companies.

In domestic and foreign literature, the problems of the formation of national competitiveness have been studied in sufficient detail, and, in particular, issues relating to factors affecting its formation. In his works, Professor of Harvard Business School M. Porter studies the systematic phenomenon of competitiveness, considering the main factors (determinants) that have a decisive influence on the formation of competitiveness at the level of an individual state. Most of the economically developed countries of the world, when developing their economic policies, used the basic calculations of Porter's theory. Its international recognition is also evidenced by the fact that Porter's theory is used (and further developed) in the annual reports of the World Economic Forum (WEF). In particular, the so-called competitiveness rating based on a group of indicators is used in the activities of this organization. Despite some disadvantages, this rating is by far the most representative.

Today, Russia faces urgent tasks to increase national competitiveness. For this, a meaningful state policy is needed, including, among other things, the formation of an integrated system of business risk insurance, the creation of an enabling environment for the formation of venture capital funds and firms, including with the participation of state-owned companies aimed at providing the necessary assistance to business entities in implementing innovative business projects. [5, 6]

A competitive national economy requires developed infrastructure and a sufficient amount of scientific knowledge, which, in turn, will enable venture capital firms and foundations to contribute to the implementation of high-tech projects. Capital circulating in the field of risk financing and a system of insurance of entrepreneurial risks are necessary to support organizations of small and medium-sized businesses that organize the production of innovative goods and services. [7] At the same time, access
To foreign capital invested in innovative goods and technologies may be significantly limited due to the fierce competition observed in the relevant world markets.

The raw material sectors of the domestic economy are attractive to foreign investors, since there investment projects provide a higher rate of return and are characterized by relatively short payback periods. Moreover, venture capital funds are also not a desirable investment target for domestic investment entities, due to the fragmentation of legislation in the relevant sphere of economic relations, as well as the absence of a state guarantee system. Therefore, we can conclude that most likely the Russian venture business will be in the nature of public-private partnership.

Public-private partnership involves interaction at the institutional level between large and medium-sized domestic private companies and authorities at all levels, from the federal to the municipal level. [8] It is about creating full-fledged commercial organizations that would transparently distribute public funds. Their task will be not only to simply support real business projects, but also to take part in the distribution of profits that will be generated by the implementation of such business projects. At the same time, the role of hedge funds will be to reduce the risks of venture capitalists and project developers themselves at various stages of the implementation of business projects.

A financial hedging instrument assumes the existence of two basic criteria that are at its core. Firstly, the criterion of price changes, and secondly, the effectiveness of hedging. An example is hedging of risk by an entity investing in corporate bonds. For him, apparently, hedging will be advisable if prices will decline in the future.

The costs associated with hedging should not exceed the insurance premium that the investor is willing to pay in order to avoid losses from investment in bonds. In other words, in this case we can talk about using the risk management methodology.

Risk management is a multi-stage process that includes analytical procedures as well as analysis of the risk extent. At the same time, within the framework of these procedures, the degree of risk in rubles is calculated, and the forecast change in interest rates is estimated. When hedging is not applied, it is also necessary to quantify the risk. The ability to determine when it is impossible to do without hedging is very valuable for a venture analyst.

Before making a decision on hedging, it is necessary to analyze the degree of risk in comparison with the amount of capital of the organization under study. The decision to refuse hedging is made when a small amount of risk is observed in a large company. The next step after making a decision on hedging should be the stage of fixing the market where this financial instrument will be used. Using correlation and regression analysis reveals the relationship between the price perspective of the spot instrument and the corresponding futures. Each manager himself determines the level of correlation that corresponds to the investment policy of the company. For example, when spot prices are subject to significant changes, hedging is economically feasible even with a low correlation.

The decision to hedge should be accompanied by monitoring changes in the basis, the stability of which is assessed by means of a correlation analysis. In order to determine the basis and build a forecast of its dynamics, regression is used.

Based on practical experience, it can be concluded that hedging does not allow obtaining futures contracts. On the contrary, existing futures are used, for which price dynamics are similar to changes in the prices of a hedged financial instrument. Due to the fact that there are significant differences between the available futures and hedged financial instruments, some deviations in the dynamics of prices for futures are possible. Nevertheless, the use of cross-hedging can reduce the costs associated with changing the basis, relative to their value in the event of a complete abandonment of this financial instrument. [9]

The potential effectiveness of using a financial hedging instrument can be estimated using the method of correlation analysis. It can be stated that the presence of a significant positive correlation between the prices of a hedged instrument in the spot market and futures contract indicates a potentially high hedge effectiveness. This is because losses associated with the price of a spot instrument are covered by profits in the futures market.
All expenses associated with the use of a hedging instrument can be conditionally divided into two types: those arising during the execution of a futures contract and the so-called transaction costs. The first type of cost can be defined as the difference between market selling and buying prices. It should also be noted that the deviation of the basis from a favorable trend can serve as a source of potential losses.

For effective risk management, innovative financial instruments are used. In turn, their use can cause a variety of risks for the functioning of financial market entities. Thus, the success in the economic activities of an organization is largely determined by how much the risk manager is aware of the importance of various risks and what are his professional abilities to effectively reduce them. Effective risk management in an organization is impossible without the widespread use of financial instruments such as hedging and insurance against possible losses. Innovative methods of insurance are presented today by such type of insurance as hedging that involves the use of various financial instruments. Thus, we can conclude that the choice of a risk management tool of various nature by a risk manager in the organization significantly affects the performance indicators of its activities.

The fixed and working capital of the organization, in particular the value of fixed and working funds, can be selected as a basis for determining the relative value of risk. Also, as such a basis, the expected total costs of the organization associated with a certain type of economic activity can be used. At the same time, both operating costs and capital investments or projected income (profit) should be taken into account. In the case when it comes to insurance of investment risks, the choice should be made in favor of the indicator, the calculation of which is carried out with a significant degree of reliability.

When analyzing risk, the task of studying potential losses comes to the forefront, which means a decrease in actual financial results compared with their forecasted (planned) values. Thus, by losses that are probabilistic in nature and associated with entrepreneurial activity, it is necessary to understand the stochastic decrease in the profit indicator, characterized by a certain degree of risk.

The main task to be solved during the entrepreneurial risk assessment procedure is to analyze and predict the probable losses of economic resources by business entities. According to G. B. Kleiner, it is necessary to build forecasts that would be aimed at assessing random, unforeseen losses associated with differences in the actual and conceived scenarios of the business course. To do this, first of all, it is necessary to select a complete list of entrepreneurial losses, calculate them and determine their probable forecast values.

The probabilistic nature of the scenarios in the course of entrepreneurial activity can have both a positive and an adverse effect on the economic and financial results of economic activity, the consequence of which may be an increase in the cost values of some calculation items, in some cases, a decrease in these values, in other cases. It is also possible that there is an increase in some costs due to the use of a specific type of economic resources, and, at the same time, a decrease in other costs associated with the use of other resources. Thus, the risk manager deals with the situation of the multidirectional influence of an accidental event on the results of the economic and financial activities of the company, and is obliged to calculate the degree of risk taking into account all (both positive and negative) consequences of this stochastic event. In other words, forecasting the total losses should be carried out taking into account the accompanying gain. This should happen by subtracting the results of the positive consequences or gain from the total losses.

Losses arising in entrepreneurial activity during an unfavorable development of the situation are usually divided into material, labor, financial, time losses, special types of losses. Material losses include losses associated with additional costs or direct losses of production equipment, property complex, products, raw materials, energy resources, etc. Each of these types of losses can be measured using individual units.

Financial losses include direct expense or shortfall in cash in connection with the onset of probabilistic adverse events. Such expenses may include payments not included in the entrepreneurial project; fines paid in case of violation of contractual obligations and in other cases; additional taxes; loss of money and securities. This type of loss also occurs in case of shortage or non-receipt of funds
from the foregoing sources, in case of violation of obligations by debtors, etc. There is a close relationship between economic categories such as entrepreneurship and insurance, which is expressed in the fact that entrepreneurial activity is carried out in order to generate profit and increase capital invested in an entrepreneurial project.

As a rule, each effective entrepreneurial project needs the introduction of new equipment and technologies, the ability of the manager to take reasonable risks in the search for innovative solutions aimed at solving problems of increasing production productivity and its intensification. Gradually, Russian entrepreneurs realize the importance of this thesis as the market economy in Russia evolves and takes the form of a developed market economy. As a result, more and more new risks arise that require their effective management, which can be carried out both by attracting insurers and using alternative ways to reduce them. Recently, special type of insurance companies based on PPPs and providing investment insurance services against risks associated with changing political conditions have become popular.

In the case of commercial risks, insurance covers the commercial activities of the insured, which involve investments in various assets with the aim of increasing investment capital after a certain period of time.

Insurance against commercial risks is extremely important for business entities in view of their desire to minimize possible losses in the initial stages of business development. At the same time, this type of insurance can be classified as one of the most complex, since, in many respects, the information base for it is the forecast data on changes in market conditions and other factors of the external environment of the insured.

The insured amount, the economic essence of which is the limit of liability of the insurer, is prescribed in the statement of the insured, with the unconditional approval of the insurance company. The sum insured can be calculated on the basis of two alternative options: within the investment costs of the insured organization and in the amount of capital investments and potential margin (forecast profit) from these investments.

Risk insurance of commercial activities is carried out in order to compensate for potential losses in case if the return on investment in the framework of the commercial activity that is the subject of insurance does not occur at an economically feasible time. The amount due to insurance compensation is determined as the difference between the sum insured and the actual financial results of the commercial activity that is the subject of the insurance contract.

The content of insurance is also determined by the approach used in determining the insured amount: if the costs of the insured are reimbursed, we are talking about investment insurance; in case of reimbursement of expenses of the insured organization and regulatory profit, there is insurance of profit (income). One of the conditions for effective insurance is to establish a deductible (for example, 10%). In this case, the insured organization must be granted the right to increase the size of the deductible. It also seems economically feasible to constrain the lower limit of the recoverable amount (for example, to 90% of the damage).

When setting tariffs for insurance of risks of commercial activity, various factors must be taken into account that may affect the likelihood of an insured event. These factors, first of all, include the following: the type of activity and specialization of the insured, the term of insurance, the variability of the external environment, etc. Each organization is individual in terms of the degree of risk associated with its commercial activities. Thus, the timing of payments should also be selected individually. The tariffs used for such insurance are, to a large extent, interconnected with the rates at which credit insurance is carried out. This is due to the fact that the market mechanism has a significant influence on these processes.

Financial guarantees are also subject to insurance. Such insurance is one of the varieties of investment insurance of a financial nature. The essence of such insurance lies in the fact that the insurer provides guarantees for the fulfillment of financial obligations that are the subject of an agreement between the investor and the borrower. Thus, such insurance acts as a special type of guarantee, in which there is insurance coverage associated with the risks of financial transactions.
Guarantors may include banks and non-banking financial institutions, special investment funds and agencies, and insurance companies. There are national features of state regulation of guarantee operations. An example is the national legislation of countries such as Japan and France, which stipulate a banking monopoly on conducting surety transactions. In the USA, on the contrary, banks carry out corresponding business activities on a very limited scale. Great Britain and Italy are known for providing equal opportunities to banks and insurers in these countries for guaranteeing operations. In Germany, special agencies deal exclusively with guarantees, competing with other financial institutions in this business. In most cases, national legislatures grant equal rights to banks and insurance companies to conduct surety transactions. In accordance with the Civil Code of Russia, a surety agreement is not identified with a bank guarantee agreement. The surety agreement provides for the obligation of the guarantor to the third party creditor to guarantee the fulfillment by the latter of his obligations in full or in part.

A bank guarantee is drawn up with the help of an agreement stating that the guarantor undertakes (in writing) to make a cash payment in favor of a third party creditor (principal) in case the beneficiary issues a written request for payment of the corresponding amount.

Recently, in developed countries, new types of insurance of entrepreneurial activities for the provision of financial guarantees began to actively appear and rapidly develop. [10, 11] This situation is often caused by insufficient competence of corporate and private investors, which does not allow them to carry out a detailed analysis of investment risk. Thus, minimizing the corresponding risks is possible in case of concluding an insurance contract with a financially stable insurer with a good reputation in the market.

Insurance guarantees for financial transactions include insurance of: various securities, including bonds; short-term loans and investments with a long-term repayment period; mortgage bonds; leasing, rental payments, etc.; calculations for equipment supplied to the buyer. There are short-term types of insurance (the term of the insurance contract does not exceed 8 years), medium-term (insurance period of at least 8 and no more than 30 years), and long-term.

One of the classifications of insurance contracts provides for such a classification feature as the category of policy holders. Here we can highlight the contracts in which the legal entity acts as the insurer and the insurance contracts of private individuals. One of the features of this insurance is that when it is carried out, the insurer sets the task to ensure almost break-even operations (i.e. to prevent the payment of insurance compensation), since the applicable tariff rates stipulate that the probability of occurrence of insurance events and the amount of losses from them should be minimal.

3. Results
The study made it possible to justify a comprehensive system of business risk insurance for innovation-oriented Russian companies, including the creation of conditions for the emergence of venture funds and organizations, including those with state participation, that can help innovative businesses develop non-trivial business projects.

The main task of venture capital and the business insurance system should be to support small and medium-sized enterprises that organize the production of consumer goods based on new technologies. We are talking about the institutional interaction of large and medium-sized national business with federal, regional and municipal authorities.

An integrated business risk insurance system should include as its mandatory element a hedge fund system whose main task will be to minimize the risks of venture companies and the innovation-oriented enterprises themselves when launching business projects.

As part of the risk management system, hedging costs are justified, and it is concluded that they should not exceed the amount that the securities holder prepared to pay for insurance against losses on bonds. It also provides some recommendations for improving the methodology for analyzing the extent of risk. In particular, it consists that this analysis should include an economic analysis of the prospects for interest rate movements with an estimate of the value of their possible changes.
An analysis of the correlation of changes in the price of a spot instrument is proposed as one of the effective tools in making a decision on hedging. Regression is considered as a tool to establish the likely trend of a significant change in the basis, which is also important when deciding on a hedge.

As a basis for determining the relative risk value, it is advisable to take the cost of fixed assets and current assets of the company or the estimated total costs for this type of entrepreneurial activity, bearing in mind both current costs and investment or estimated income (profit). When insuring investment risks, an indicator determined with a high degree of reliability should be preferred.

4. Conclusion
The categorical meaning of the financial engineering mechanism lies in the project management system for the formation of innovative financial products used by commercial financial institutions for the formation and redistribution of liquidity, as well as the creation of risk management technologies in the system of producing financial flows. If by financial engineering we mean the process of financial designing additional tools that ensure the creation and promotion of innovative financial instruments, then the financial engineering mechanism can be represented as a complex structured financial management system for investment and financial instruments aimed at ensuring financial stability and insurance of business risks of Russian innovative companies.

At its present stage of development, Russia is characterized by the stage of formation of a full-fledged system of insurance of entrepreneurial activity. The formation of an effective, efficient legislative framework for hedging entrepreneurial projects, including those with an innovative component, and the creation of really functioning venture companies in Russia can and should be the topic of joint efforts of organizations representing the interests of large, small and medium-sized businesses [9, 10] as well as specialized ministries and departments - the Ministry of Finance, the Ministry of Economic Development and Trade, which oversees technology parks of the Ministry of Digital Development, Communications and Mass Media.

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