
The Model Determination Of Buffer Of Systemic Strategic Risk Of Borrower For Hedging Force Major Circumstances

Burdina Anna Anatolievna¹, Bondarenko Anna Victorovna²

¹*Doctor of Economics, Professor, Department 505 «Innovative economics, finance and project management», Institute of Engineering Economics and Humanities, Moscow Aviation Institute (National Research University), Moscow, Russia*

²*PhD in Economics, Senior lecturer, Department 505 «Innovative economics, finance and project management», Institute of Engineering Economics and Humanities, Moscow Aviation Institute (National Research University), Moscow, Russia*

Email : ¹BurdinaAA@mai.ru, ²BondarenkoAV@mai.ru

ORCID: <https://orcid.org/0000-0002-8585-6777>

ORCID: <https://orcid.org/0000-0001-8982-7992>

ABSTRACT.

The study substantiates the concept of systemic strategic risk of borrower and buffer of systemic strategic risk of borrower for hedging force major circumstances in order to improve monetary policy. There is analysis of rules and regulations for the analysis of credit risk of bank. The authors studied the existing approaches to assessing the creditworthiness of borrowers and the credit risk of a bank. The factors, which influence on the level of credit risk of borrower, are identified. Quantitative and qualitative parameters of borrower's creditworthiness, used in banking risk management, are determined. An economic and mathematical model is proposed for determining the systemic strategic risk buffer of borrower for force major circumstances hedging. Considering the level of losses during default, the probability of default of borrower and strategic risk. It is proposed to use the developed technology for creating a systemic strategic risk buffer for borrower for force major circumstances hedging as a monetary policy tool and include Basel III in the requirements of the banking agreement.

Keywords: *Borrower rating; credit risk; methodology for assessing creditworthiness; systemic strategic risk of borrower; systemic strategic risk buffer.*

1. INTRODUCTION

The modern economic system, the monetary system, as practice shows, is exposed, along with others, to the risks of force major circumstances (for example, the coronavirus pandemic COVID-19 caused by the SARS-CoV-2 coronavirus). In difficult isolation conditions, it is complicated for enterprises to maintain not only the competitiveness of products and services, but also to ensure the reproduction process. An issue of improving monetary policy instruments and lending at rates effective for the economy is particularly actual. In these conditions, banks are forced to roll over loans and issue them at zero interest rates, but no liquidity buffer has been created for these processes. In accordance with the requirements of Basel III and the Central Bank of Russian Federation (CBRF), the banks are required to assess the creditworthiness of borrowers in order to form a reserve for possible losses on loans to minimize the credit risk of the bank. The main purpose of credit risk assessment is to assess the quality of capital, assets, assess the profile and size of the main banking risks accepted by the credit institution, the quality of their management, as well as the ability of the credit institution to carry out effective activities. Risk is a possible event, expected or unforeseen, that could have a negative impact on the capital and profit of a credit institution.

Bank risk management approaches, the adoption of which by credit institutions is not directly limited by the supervisor, are contained in the letters of recommendation of the Bank of Russia and in the documents of the Basel Committee on Banking Supervision (BCBS) (Collection of documents issued by the Basel Committee on Banking Supervision, Bank for International Settlements, Basel, Switzerland, 1997). The same applies to the questions of the borrowers being connected with each other, lending procedures for persons associated with a credit institution, assessing the quality of liquidity management and a number of other aspects of the activities of a credit institution.

During assessment of the activities and financial stability of a credit institution, the supervisor determines the risks that are inherent in its activities, measures (evaluates) their magnitude, including identifies their concentration, evaluates the adequacy and degree of compliance with restrictions (for example, limits) established by the credit institution, evaluates the quality and effectiveness of these risk management systems and internal control systems operating in a credit institution.

The aim of the study is to design a technology for determining the systemic strategic risk buffer of the borrower for hedging force major circumstances situations.

This article is seven out of seven sections. The first section reflects a review of the literature on the research topic. The second section presents an analysis of credit risk and methods for its assessment, substantiates the need to create a buffer of systemic strategic risk of the borrower for emergencies. The hypothesis of the research and the stages of technologies for determining the buffer of the systemic strategic risk of the borrower for hedging of extraordinary circumstances and the model of the values of risk-weighted credit claims to the borrower, taking into account the systemic strategic risk of hedging of extraordinary circumstances, are proposed. The fourth section presents the results of a quantitative and qualitative analysis of creditworthiness using the example of the Russian company JSC RSK

MIG. The rest of the article is devoted to a discussion of the results obtained, conclusions and a review of the literature.

2. LITERATURE REVIEW

The works of many Russian and foreign researchers are devoted to the mechanisms of analysis of the bank's credit risk: Achkasov, A.I., Sheremet A.D. Olshany A.I. Sevruk V.T., Kabakov V., Murakaev I.M., Zaripov R.N., Murakaev I.M., Ryapukhin A.V. The credit risk analysis mechanism for borrowers and banks is presented in the Basel III agreement. However, there are no recommendations on the formation of a security buffer from the returned loans and interest for such extraordinary circumstances as, for example, the coronavirus infection pandemic COVID-19, which led to defaults of borrowers and defaults of national economies. Therefore, it is necessary to review the rules for assessing the credit risk of borrowers and banks at the international level.

3. MATERIALS AND METHODS

During analyzing credit risk, its impact on the economic situation of a credit institution, the following factors should be considered:

1. Credit risk exists when a credit institution conducts almost any active transaction, as well as when a credit institution assumes contingent liabilities that involve the occurrence of credit risk in the performance of these obligations, and in the conclusion of forward transactions;
2. Possibility of deterioration in the financial condition of a credit institution as a result of the implementation of credit risk should be assessed with the concentration of credit risk, including by economic sector, business lines, volume of credit transactions with related borrowers, persons associated with a credit organization, including owners of a credit institution;
3. Assessment of the quality of assets of a credit institution from the standpoint of the level of credit risk and measures of realized credit risk in most cases is crucial for making a judgment on the financial condition of a credit institution.

Credit risk can also accompany such transactions of a credit institution for which, at first sight, it is not discernible due to the fact that the credit institution has not provided and does not undertake to provide funds. Credit risk analysis is carried out on the basis of statements of credit organizations submitted to the Bank of Russia. The concentration of credit risk of a credit institution should be considered in relation to (Decree of the Government of the Russian Federation of 06.08.2015 №483-P, 2015; Decree of the Government of the Russian Federation of 06.06.2017 №590-P, 2017; Collection of documents issued by the Basel Committee on Banking Supervision, Bank for International Settlements, Basel, Switzerland, 1997):

- credit transactions with one borrower or a group of related borrowers;
- credit operations with persons associated with a credit institution, including the owners of a credit institution;

–the presence of specialization in lending to enterprises of a certain industry (sectors) of the economy and (or) a certain region and (or) on a particular loan product;

–loans granted to borrowers in foreign currency, if the sources of funds through which the borrower intends to repay these loans are denominated in Russian rubles.

At determining the concentration of credit risk per borrower, it needs to pay attention for determining the ultimate beneficiary of funds provided by a credit institution, i.e. a real borrower of a credit organization. If it follows from the substantive of a credit transaction that a loan agreement has been concluded with a person who is essentially an intermediary in lending to another person (a real borrower of a credit organization), and the probability of a loan repaying by a borrower under a contract depends on the loan being repaid by a real borrower, the credit risk assessment should be carried out both in relation to the direct (intermediate), and in relation to the real (final) borrower of the credit organization. At the same time, risks in relation to direct and real borrowers should be considered in conjunction (Decree of the Government of the Russian Federation of 28.06.2017 №180-I, 2017; Decree of the Government of the Russian Federation of 17.01.2005 №2-T, 2005; Troshin A.N. et al., 2016; Burdina A.A., Bondarenko A.V., 2020; Shabaltina L.V. et al., 2020).

Similarly, it is necessary to analyze revent transactions concluded on the disposal of securities by a credit institution with the provision of a deferred payment right to the counterparty. At considering such transactions, it should be based on the fact that, if it follows from the available information about the history of the relationship between the credit organization and the counterparty (counterparties) on such transactions, that there are facts when money is not received from the counterparty to the credit organization and «alienated valuable securities», it is necessary to assess the credit risk on the issuer of these securities (drawer) during the period of the formal absence of these securities on the balance sheet of the credit institution. It is also necessary to identify the presence of legal and economic relationships between borrowers of a credit institution, which may serve as a basis for considering a group of such borrowers from the standpoint of concentration of credit risk as a single borrower and apply a 25% capital limit on all credit transactions with borrowers, belonging to a group of related (Collection of documents issued by the Basel Committee on Banking Supervision, Bank for International Settlements, Basel, Switzerland, 1997; Achkasov A.I., 2014).

In international practice, a group of related borrowers of a credit organization is understood to mean legal entities – borrowers of a credit organization and (or) individuals – borrowers of a credit organization, connected in such a way that a deterioration in the financial situation of one of them may result in failure to fulfill (improper performance) by the other (others) by the borrower (s) of obligations to a credit institution under its credit requirements. Borrowers can be interconnected both on legal and economic grounds.

As mentioned in the Fundamental Principles of Effective Banking Supervision of the BCSE, the related lending (granting loans to individuals or companies associated with a credit institution through property rights or the possibility of direct or indirect control), in the absence of proper control by the credit institution and supervision by the regulator, can lead to serious problems, as the borrower's affiliation with a credit institution determines the preferences of such a borrower comparing to others, often biased assessment of its financial

position and, as a consequence, a greater probability of default of the loan (Lavrushin O.I., 2014; Bondarenko A.V., 2019; Sevruk V.T., 2013).

The financial crisis has shown that transactions with owners (owners) and other persons affiliated (connected) with a bank are, in general, substantially more risky than operations with third parties (not affiliated with a bank). An increased concentration of risks on the business of owners (owners) was characteristic of almost all credit organizations that experienced serious shocks during the crisis. Exactly this circumstance, along with the nature of the objects of investment (investment projects) in the vast majority of cases, was the main cause of their financial problems.

In order to conceal the real concentration of risks in relation to the business of owners of credit organizations, as a rule, financing is carried out for companies that are not formally associated with the owners, but actually controlled by them. In this regard, the assessment of the level of risks on the owners of a credit institution should be based on meaningful approaches, that is. not only by the criterion of legal ties or capital ties, but also on the basis of the actual ownership by individuals of a credit institution and related business.

The main target of the supervisor in assessing the quality of assets is to determine the adequacy of the estimates made by the credit institution of the fair value of assets and the accumulated reserves for possible losses on them. It is important to remind that in order to accomplish this task, it is necessary to know and understand the structure of the business of a credit organization, the main areas of credit and other activities related to the allocation of assets by borrowing entities (their groups), sectors of the economy, regions, credit products and had professional judgment in relation to level of credit risk of a credit institution. Assessment of internal documents of a credit institution on credit policy and the formation of reserves for possible losses, its compliance of establishment with the requirements of regulatory acts of the Bank of Russia, as well as the conformity of the practical activities of a credit institution with these internal documents, is carried out on the basis of the formed idea of the credit institution's business structure in the field of allocation of funds and on the level of credit risk of a credit institution.

The basis for assessing the credit risk of a loan is the assessment of the financial position of the borrower and the quality of servicing the debt, other significant factors taken into account when classifying the loan, and for making a judgment on the amount of reserve required to create a loan, there is also high-quality collateral for the loan. At analyzing the financial condition of borrowers of a credit institution, clause 3.3 should be guided. and 3.4. Regulation №590-P, as well as Regulation №626-P. It should be considered that the question of assessing the financial situation of the borrower should be addressed in each specific situation, taking into account the presence in the financial situation of the borrower and its activities of factors that create risks for the loan, including from the standpoint of the materiality of the magnitude of the risks (Decree of the Government of the Russian Federation of 06.06.2017 №590-P, 2017; Olshany A.I., 2014; Tarasova E.V. et al., 2018). It is necessary to verify the extent to which the method used by the credit institution for assessing the financial position of the borrower complies with the requirements of the Bank of Russia regulatory documents listed above, whether it allows a comprehensive and objective analysis of the borrower's activities, taking into account its financial situation, and the quality of the

borrower's debt servicing.

It is also recommended to pay attention to the sufficiency and adequacy of the indicators selected by the credit institution for assessing the financial situation and identifying factors that constitute loan risks in the enterprise, as well as the indicators based on which the quality of debt servicing is assessed. In this case, it is necessary to avoid formal evaluations and pay attention to whether the credit institution takes into account the features of the production and economic activities of each borrower.

In general, it is recommended to pay attention at assessing the financial condition of the borrower and its ability to service loan debt in a timely manner, including such indicators of the borrower's activity as the size of its net assets, financial result, equity ratio, sales revenue, and liquidity indicators. At the same time, at analyzing these indicators, it is necessary to take into account that Regulation №590-P determines general approaches that must be applied in practice, taking into account the specifics of the activities of a particular borrower.

The approaches of a credit institution to assessing the financial situation of borrowers may not be common for all categories of borrowers, since the assessment of the financial situation of borrowers from various industries often has its own specifics. In this regard, when analyzing the financial position of the borrower, it is recommended to consider the following. It should be borne in mind that when a borrower applies for a loan for the purpose of replenishing working capital (usually short-term, less often medium-term), the main source of its repayment is cash receipts resulting from sales proceeds. Redemption of interest and additional expenses is carried out at the expense of cash receipts received as a result of profit from sales and other income.

At analyzing the financial situation of such a borrower, it needs to pay attention to the comparability of the size of the loan and the amount of revenue of the borrower and other sources of repayment of the loan debt for a period, which is comparable to the period for which the loan has been granted, considering the structure and volume of forthcoming receipts and payments of the borrower. In cases where revenue is the only reliable source of repayment of loan debt, the financial position of the borrower cannot be considered good if the amount of payments on the loan is higher than that part of reasonably forecasted revenue and other receipts, which is, based on the structure of the forthcoming payments of the borrower and which can be directed to repayment of a loan without any significant negative impact on the supply chain of the borrower.

At assessing the quality of a loan with using long-term and medium-term financing of a borrower (financing of general capital, investment projects) it needs pay attention if at analyzing the financial situation, receipts and payments of the borrower, the terms of loan repayment were considered; if at analysis and assessment of the profitability of the investment project, an assessment of the financial position of the borrower was done. It is necessary to consider that in the case of long-term and medium-term financing, when assessing the financial situation, including income (revenue), cash flows and other characteristics of the borrower required to assess the quality of the loan, it is necessary to consider the dynamics of indicators in order to determine the directions of their possible changes in the future. In assessing the financial situation, the dynamics of net assets, debt burden, liquidity ratios and security of the borrower's liabilities, the ratio of the effectiveness

of its sales and activity as a whole is of great importance (Collection of documents issued by the Basel Committee on Banking Supervision, Bank for International Settlements, Basel, Switzerland, 1997; Sheremet A.D., 2005).

It should be noted that in this case, from the one hand, the prospects for the development of the borrower's business plays great role, based on the duration of the provision of its activities with contracts (agreements), its expected demand, and from the other hand, the demand for products (services) of this type, as well as the trends in the corresponding economic situation and business climate in this type of activity. At assessing the quality of granted loans to borrowers with pronounced industry characteristics, due, inter alia, to the seasonality of production (for example, an agricultural enterprise, primary processing of agricultural products) or the sale of products (provision of services), as well as to borrowers engaged in the reorganization or modernization of production, it is necessary to take into account the features of their production and financial cycles.

For example, the presence of negative phenomena in the activities of such borrowers during certain periods of the financial year, such as low revenue, low profitability, growth in payables and (or) receivables, and others, if these phenomena are really a consequence of the seasonality factor, reorganization or modernization of production by themselves, do not yet indicate serious problems in the fulfillment by the borrower of loan obligations in the terms stipulated by the contract. In these circumstances, the prospects for improving the financial position of the borrower arising from a comprehensive and balanced analysis of the situation, which make it possible to reasonably assume that at the end of the financial year there are revenues and a positive financial result sufficient to maintain the borrower's current activities and fulfill loan obligations, can be considered by the credit institution as different.

At assessing the quality of loans granted to newly formed legal entities, as well as specialized firms-investors for the construction of commercial real estate, it is necessary to consider the prospects for the development of the borrower's business based on an assessment of the degree of market demand (competitiveness) of its products (services) and the actual dynamics of the business. In this case, the results of marketing research, the information provided in the business plans or development plans of borrowers, data on business development over the elapsed time period from the moment of its organization, can be used. Information should also be assessed critically about the participants (shareholders) of the borrower, their financial situation and the degree of economic connection with the borrower, about the main management (professional experience, results of previous activities and others).

When lending to financial intermediaries (dealers), it is necessary to analyze the nature of their activities, first of all, the situation in the markets in which they operate, the composition and quality of their securities portfolios, as well as the volume of operating income and expenses of financial intermediaries. As an additional source of information on the financial situation of borrowers of a credit organization, it is recommended to request information from the territorial organization of the Federal Tax Department to confirm the accuracy of the statements submitted by the borrower. In case of refusal by the Federal Tax Department at the regional level to provide the requested information, it is recommended to send requests to the Department of Banking Regulation and Supervision for further information to the Federal Tax Department at the federal level under the Agreement on Information Interaction.

It also requires a special assessment and the situation when the start of debt service is moved far enough away from the moment the loan was granted. If at the same time the financial condition of the borrower can be assessed as good, it is necessary to find out whether the information on the financial position of the borrower reflects the real picture, or if the situation is embellished by the borrower and / or the credit organization. As a rule, servicing debt on a loan can be considered good if the borrower services the debt using the expense of funds received from his own business. Debt servicing at the expense of owners (group members) is also acceptable, but it should be considered as an exception. At the same time, the credit institution should be informed with all the details of the receipt of funds by the borrower in all cases when it comes to large loans, and also selectively in relation to significant loans. In some cases, debt service may be deemed good by decision of the authorized body of the credit institution when repaying a loan previously provided to the borrower at the expense of the newly granted loan (see paragraph 3.7.2.1 of Regulation №590-P).

At assessing the adequacy of the created reserves for possible losses on loans with collateral (Chapter 6 of Regulation №590-P), it is necessary to make sure that (Decree of the Government of the Russian Federation of 06.06.2017 №590-P, 2017; Sheremet A.D., 2005; The official website of the Central Bank of the Russian Federation, 2020; Zaripov R.N. et al., 2020):

- a) the credit institution pays attention to the analysis of both the legal aspects related to the possibility of exercising its security rights, and the circumstances regarding the borrower's lack of intentions to prevent this;
- b) if necessary, the credit institution will indeed take timely and effective actions to realize collateral rights;
- c) there are no circumstances that may impede the realization by a credit institution of collateral rights (see clause 6.5 of Regulation №590-P).

Therefore, it is recommended to demand the creation of reserves within the limits provided by the corresponding classification category, even if the quality of collateral, including the possibility of its implementation, is not in doubt. It should also be considered that the risk level of implementing interim measures depends not only on the type of collateral, but also on the degree of good faith of the borrower / pledger. Moreover, the latter circumstance (the integrity of the borrower and / or the persons who provided the relevant security) often plays a more significant role than the quality of the security itself. In addition, in conditions of insolvency (bankruptcy) of the borrower and the presence, for example, of other unsatisfied creditors, the sale of collateral that serves as collateral for loan debt can be associated with serious legal risks and possible operational difficulties. Therefore, a conservative approach to assessing the quality of loan debt proceeds from the priority of the factor of assessing the financial situation and the borrower's integrity over the quality factor of collateral. For example, collateral in the form of third-party guarantees in Russian practice often «does not work» because of the corporate culture of guarantor organizations and the traditions of domestic judicial practice. A pledge of goods in circulation also cannot be regarded as reliable collateral for a loan.

The implementation of collateral rights (rights arising from security) also depends on the

position of the credit institution itself: how realistic is it intending to repay the cost of debt. In certain situations, the lending institution is more likely to suffer losses than inflict them on the person who provided the security. Considering it, when making a judgment on the necessary reserve for possible losses, taking into account collateral, the conservative principle «even good collateral does not make bad debt good» should be adhered to. In this study, the systemic strategic risk of the borrower is considered as the probability of bank losses upon the occurrence of systemic strategic events (pandemic) for the borrower, leading to the inability to repay the loan. We consider it necessary to consider the probability of a systemic strategic risk of the borrower when assessing the complex credit risk of the borrower and the bank. The hypothesis of the study is the need in the present conditions for the formation of a buffer of the systemic strategic risk of the borrower for hedging force major circumstances situations.

Stages of analysis of the systemic strategic risk of the borrower:

- obtaining operational and objective information about the state and size of systemic strategic risk;
- identification and analysis of areas of systemic strategic risk;
- qualitative and quantitative assessment of systemic strategic risk;
- the establishment of interconnections between individual types of risks in order to assess the impact of measures planned to limit one type of risk on the growth or decrease in the level of other risks;
- creation of a system for monitoring and control of systemic strategic risk at the stage of emergence of a negative trend.

In order to adjust the exposure of credit risk, banks are offered to create a buffer of the borrower's systemic strategic risk for hedging force major circumstances situations. The proposed security buffer is a reserve of funds in case the borrower fails to repay loan obligations for economic, political, and medical reasons beyond its control. The size of the buffer should depend on the type of activity of the borrower, the level of its state support. The study proposes to make the size of the loan interest rate dependent on the size of the systemic strategic risk of the borrower, which determines the size of the created security buffer. The main idea of creating a systemic strategic risk buffer for the borrower is the repayment of funds to the borrower reserved for systemic strategic risk in the event of force major circumstances. Thus, in case of full compliance with the terms of the loan agreement, repayment of the loan and interest, the funds reserved in the security buffer are proposed to be returned to borrowers.

Stages of technology for determining the borrower's systemic strategic risk buffer for force major circumstances hedging:

Stage 1. Analysis of information from credit bureaus.

Stage 2. Assessment of the borrower's creditworthiness – quantitative analysis in the following areas: analysis of liquidity, profitability, financial stability, turnover.

Stage 3. Assessment of the borrower's creditworthiness – a qualitative analysis in the areas of: market analysis, industry, management, government support.

Then the total score and the rating of the borrower are determined.

Stage 4. Loss Given Default (*LGD*) (formula 1).

Stage 5. Determining the probability of default of the borrower and the systemic strategic risk of an force major circumstances hedge:

- Determining the probability of default of borrower (PD) (formula 1, 2, 3).
- Definition of systemic strategic risk (S) (formula 1, 2, 3).

Stage 6. Determining the value of risk-weighted credit claims against the borrower taking into account the systemic strategic risk of hedging force major circumstances situations (1,5) (Cr) (formula 1).

$$Cr = 12,5 * LGD * \left(N \left(\frac{N^{-1}(PD+S) + \sqrt{R(PD+S)} * N^{-1}(0,999)}{\sqrt{1-R(PD+S)}} \right) - (PD+S) \right) * \frac{1+(M-2,5)*b(PD+S)}{1-b(PD+S)};$$

(1)

where:

R – is the value of the correlation index;

$$R(PD+S) = 0,12 * \left(\frac{1 - e^{-50*(PD+S)}}{1 - e^{-50}} \right) + 0,24 * \left(1 - \frac{1 - e^{-50*(PD+S)}}{1 - e^{-50}} \right); \quad (2)$$

$b(PD+S)$ – maturity adjustment value:

$$b(PD+S) = (0,11852 - 0,005478 * \ln(PD+S))^2; \quad (3)$$

$N(x)$ – standard normal distribution function;

$N^{-1}(x)$ – inverse standard normal distribution function;

M – period;

b – a correction factor established by the regulatory body to maintain the current level of minimum capital requirements while stimulating the introduction of more sensitive approaches to credit risk assessment. The value of the coefficient can be adjusted by the regulatory body (Decree of the Government of the Russian Federation of 06.08.2015 №483-P, 2015).

Stage 7. Determining the exposure of credit risk it needs to consider the systemic strategic risk of hedging force major circumstances situations (formula 4).

$$CRP = b * Cr * EAD; \quad (4)$$

EAD – exposure at default of organization.

Stage 8. Determination of the estimated reserve and loan rate, considering the systemic strategic risk of hedging force major circumstances situations.

Stage 9. Determination of the borrower's systemic strategic risk buffer for hedging force major circumstances situations as the difference between total loan payments, considering the probability of a systemic strategic risk and not taking into account the systemic strategic risk.

Stage 10. Creating a systematic strategic risk buffer for the borrower for hedging force major circumstances situations by monthly deductions from paid interest.

Stage 11. In case of repayment of the loan and non-occurrence of systemic strategic emergencies, the borrower's systemic strategic risk buffer for hedging emergencies is returned to the borrower in full.

4. EMPIRICAL RESULTS

The study conducted a quantitative and qualitative analysis of creditworthiness of JSC «RSK «MiG» in terms of liquidity, profitability, turnover and others. «RSK «MiG» has a modern design and experimental base, well-equipped production facilities, effective financial and marketing structures, as well as a developed global system of technical support for its products. The creation of «RSK «MiG» fighters is carried out using digital technologies at all stages of the life cycle: from development to after-sales service. The dynamics of the development of the industry, company management are studied. As a result, the borrower's financial condition is very poor in total 85 points in 2017, and 91 points in 2018 (Gorelov B.A. et al., 2018; Kuprin I.L. et al., 2013; Eremin M. et al., 2020; Bondarenko A.V. et al., 2020; Tarasova E.V. et al., 2018; Ermolina L.V. et al., 2020).

The study carried out the practical implementation of the mechanism for determining the value of risk-weighted credit requirements for the borrower and credit risk, taking into account the systemic strategic risk of hedging force major circumstances situations (table 1).

Table 1.

Determination of credit risk taking into account systemic strategic risk

<i>Credit requirement to the organization (million rubles)</i>	<i>EAD</i>	200	200	200
<i>for a period of 5 years</i>	<i>M</i>	5	5	5
<i>44% defaultlossrate</i>	<i>LGD</i>	0,44	0,44	0,44
<i>probability of default of the borrower and strategic risk:</i>	<i>PD + S</i>	5%	7%	9%
<i>probability of default of the borrower 5%</i>	<i>PD</i>	5%	5%	5%
<i>Borrowerstrategicrisklevel 2%</i>	<i>S</i>	0%	2%	4%
<i>b - correctionfactor, b = 1.06,</i>		1,06	1,06	1,06
<i>The amount of credit risk</i>	<i>CRP = b * Cr * EAD</i>	372,66	411,12	445,13
<i>Cr</i>		1,76	1,94	2,10
<i>R</i>		0,13	0,12	0,12
$\left(1 - \frac{1 - e^{-50*(PD+S)}}{1 - e^{-50}}\right)$		0,92	0,97	0,99
$e^{-50*(PD+S)}$		0,08	0,03	0,01
e^{-50}		0,00	0,00	0,00

$b(PD + S)$		0,08	0,07	0,06
x		-0,57	-0,42	-0,28
$N(x)$		0,28	0,34	0,39
$N^{-1}(PD + S)$		-1,64	-1,48	-1,34
$N^{-1}(0,999)$		3,09	3,09	3,09

Source: compiled by the authors

5. DISCUSSION

In accordance with the requirements of Basel III and CBRF, banks are required to assess the creditworthiness of borrowers in order to form a reserve for possible losses on loans to minimize the credit risk of the bank. However, as practice has shown, the modern economic system is not ready for the systemic risks of force major circumstances (pandemic of the coronavirus infection COVID-19 caused by the coronavirus SARS-CoV-2). Banking regulators also did not describe in their documents the technology for determining redundancy for systemic emergencies. These factors substantiate the relevance of the study. The authors studied approaches to assessing the creditworthiness of borrowers and the credit risk of a bank. The requirements of Basel III and the Central Bank of the Russian Federation (CBRF) for the assessment and management of bank credit risk for active operations are analyzed.

In this study, the goal has been achieved: a model has been developed to create a buffer of the systemic strategic risk of the borrower for hedging force major circumstances situations, which can be used as an instrument of monetary policy. The study assessed the borrower's creditworthiness, credit risk, taking into account the systemic strategic risk and without. The practical implementation of the mechanism for determining the value of risk-weighted credit claims against the borrower and credit risk was carried out considering the systemic strategic risk of hedging force major circumstances situations. However, the authors do not describe a method for determining the probability of a systemic strategic risk when creating a buffer of a systemic strategic risk of a borrower for hedging force major circumstances situations.

6. CONCLUSION

The lending process is connected with the risk of non-repayment of the loan by the due date; there is a need for a more informed approach to determining the creditworthiness of the borrower and the credit risk of the bank. The modern economic system, along with others, is at risk of force major circumstances (pandemic of the coronavirus infection COVID-19 caused by the coronavirus SARS-CoV-2). In these conditions, the bank is forced to roll over loans, issue at zero interest rates, but no liquidity buffer has been created for these processes.

Bank risk management approaches are contained in letters of recommendation from the Bank of Russia and documents from the Basel Committee on Banking Supervision (BCBS). The same applies to the questions of the borrowers being connected with each other, lending procedures for persons associated with a credit institution, assessing the quality of liquidity management and a number of other aspects of the activities of a credit institution.

The study provides an interpretation of the concept of a systemic strategic risk of the borrower. A model has been created for determining the buffer of the systemic strategic risk of the borrower to hedge the force major circumstances of the presented reserve of funds in case the borrower is unable to repay loan obligations for economic, political, and medical reasons beyond his control. It is believed that the size of the buffer depends on the type of activity of the borrower. The level of its state support. The main idea of creating a systemic strategic risk buffer for the borrower is the repayment of funds to the borrower reserved for systemic strategic risk in the event of force major circumstances. That is, in case of full compliance with the terms of the loan agreement and repayment of the loan. The proposed model is offered to be used as an instrument of monetary policy.

7. REFERENCES

- [1] Decree of the Government of the Russian Federation (2015). Decree of the Government of the Russian Federation of 06.08.2015 №483-P «Regulation on the procedure for calculating credit risk based on internal ratings» (ed. from 01/20/2020). Available at: http://www.consultant.ru/document/cons_doc_LAW_186639/.
- [2] Decree of the Government of the Russian Federation (2017). Decree of the Government of the Russian Federation of 06.06.2017 №590-P «The Regulation on the procedure for the formation by credit organizations of reserves for possible losses on loans, loan and equivalent debt» (ed. from 01/20/2020). Available at: http://www.consultant.ru/document/cons_doc_LAW_220089/.
- [3] Decree of the Government of the Russian Federation (2017). Decree of the Government of the Russian Federation of 28.06.2017 №180-I Instruction of the Bank of Russia «On Mandatory Bank Ratios» (ed. from 01/20/2020). Available at: http://www.consultant.ru/document/cons_doc_LAW_220206/.
- [4] Decree of the Government of the Russian Federation (2005). Decree of the Government of the Russian Federation of 17.01.2005 №2-T Letter of the Bank of Russia «On Transactions with Bank Related Persons and Assessment of Risks Arising from Their Execution» (ed. from 01/20/2020). Available at: http://www.consultant.ru/document/cons_doc_LAW_51256/.
- [5] Collection of documents issued by the Basel Committee on Banking Supervision, Bank for International Settlements, Basel, Switzerland (1997) «Fundamental Principles of Effective Banking Supervision Section IV, Part A».
- [6] Achkasov A.I. (2014). Active operations of commercial banks. *Consult-Banker*. Moscow: 75.
- [7] Burdina A.A., Bondarenko A.V. (2020). Assessing the Strategic Efficiency of Aviation Projects. *Russian Engineering Research*. 40, (5): 439–441.
<https://doi.org/10.3103/S1068798X2005007X>.

- [8] Eremin M., Moskvicheva N., Melik-aslanova N.(2020). Servicing of imported airplanes by means of performance-based logistics. *Russian engineering research*. 40 (2): 146-148.doi: 10.3103/S1068798X20020112 .
- [9] Gorelov B.A., Davydov A.D., Silaev A.V., Tikhonov A.V. (2018). Models for managing the development of distributed technical systems. *Proceedings of universities. Mechanical engineering*. 3: 92-103.
- [10] Kuprin I.L., Davydov A.D., Teplov Yu.A. (2013). Key trends in the development of transformable high-tech complexes. *National interests: priorities and security*. 46: 20-30.
- [11] Lavrushin O.I. (2014). Banking: Textbook. *Finance and Statistics*. Moscow: 44.
- [12] Olshany A.I. (2014). Bank lending (Russian and foreign experience). *Textbook*. Moscow: 39.
- [13] Ryapukhin A., Kabakov V., Zaripov R.(2019). Risk management of multimodular multi-agent system for creating science-intensive high-tech products. *Espacios*. 40 (34): 19. Available at: <https://www.scopus.com/inward/record.uri?eid=2-s2.0-85073687636&partnerID=40&md5=4228fdbaadf13aaa56d14f6f456a3512> .
- [14] Sheremet A.D. (2005). Theory of Economic Analysis: A Textbook. *INFRA-M*. Moscow: 638.
- [15] Sevruk V.T. (2013). Analysis of creditworthiness of the joint venture. Money and credit: Textbook. *Handbook*: 26.
- [16] Troshin A.N., Burdina A.A., Moskvicheva N.V., Nikulina E.N., Tarasova E.V., Rogulenko T.M. (2016). Mechanism to analyze economic reliability of the innovational potential of aircraft enterprises. *International Journal of Applied Business and Economic Research*: 747-765.
- [17] Tarasova E.V., Nikolenko T.Y., Gorbunov G.L., Semina L.V. (2018). Implementation of investment projects at industrial enterprises. *Russian Engineering Research*: 295-300doi: 10.3103/S1068798X18040214 .
- [18] Zaripov R.N., Murakaev I.M., Ryapukhin A.V. (2020). Industrial enterprise risk management mechanisms aggregation and integrated visualization of risk assessment results. *REVISTA INCLUSIONES*: 32-4.
- [19] Shabaltina L.V., Egorova E.N., Agaphonov I.A., Ermolina L.V. (2020). Managing the digital economy: directions, technologies, and tools. *Lecture Notes in Networks and Systems*: 168-174. doi: 10.1007/978-3-030-29586-8_20 .
- [20] Yakovlev G.I., Streltsov A.V., Izmailov A.M., Ermolina L.V., Sunteev A.N. (2020). Specific features of formation of value creation chains in industry and entrepreneurship in the digital economy. *Lecture Notes in Networks and Systems*: 677-689. doi: 10.1007/978-3-030-29586-8_79 .
- [21] The official website of the Central Bank of the Russian Federation (2020). Available at: <http://www.cbr.ru/>.