Assessment And Management of Credit Risk in Banks

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Abstract. **The article describes the content of credit risks in commercial banks, the objectives of credit risk management, the causes and stages of credit risk management, methods of identification and assessment of credit risk, credit risk monitoring, the role of relevant departments of the bank in credit risk management. At the same time, the views of local and foreign scholars in the scientific literature on the assessment and management of credit risks in banks are analyzed. There are also scientific suggestions and conclusions on how to reduce potential credit risks.**

Keywords: Credit risk, loan portfolio, problem credit (NPL), default, standard credit, risk assessment.

I. INTRODUCTION

In order to ensure the financial stability of banks and protect the interests of depositors and creditors, banks and banking groups must comply with prudential standards set by the Central Bank of the Republic of Uzbekistan. [1] The fact that most of these prudential standards are related to credit risks determines the need to establish a reliable system for assessing and managing credit risks.

The main direction of reforming the banking sector in the Republic of Uzbekistan is to improve the quality of credit portfolio and risk management, adhere to moderate growth of lending, pursue a balanced macroeconomic policy, ensure financial stability of the banking system through the implementation of technological solutions for financial risk assessment. [2] This situation will require the development of credit risk assessment methods and management in banks.

Credit activity of any bank, unlike any other institution, is one of the leading criteria. Looking at the world practice, we can conclude that a large part of the bank's profit is related to lending. However, non-repayment of loans, especially large amounts of debt, can lead to bankruptcy. This affects the economy and leads to the bankruptcy of a number of enterprises, banks and individuals. Thus, credit risk management is an important part of the development of any commercial bank. Books on foreign and domestic economic literature place great emphasis on credit risk [3].

The level of socio-economic development of the country and the level of development of the legal framework have a significant impact on the level of credit risk[4].

The current problem of credit risks for banks is that in the presence of credit risk, the lender (bank) is unsure of the ability of the borrower to fulfill the terms of the loan agreement, its obligations in a timely manner. It is known that in banking practice, the profit consists mainly of interest on loans. Decrease in the bank's profit due to late payment or non-payment of the interest rate or the principal amount of the loan on the loans taken by the borrower leads to a decrease in the share of the bank's future assets. Therefore, lenders try to reduce the risks associated with the return of funds they have provided [5].

In general, the withdrawal of the bank's main source of income from lending activities leads to an increase in lending, but the biggest losses arise from these lending activities, if the risks arising from these loans are not managed in time and properly managed. Therefore, it requires theoretical and practical scientific research on credit risk assessment and management.

II. LITERATURE REVIEW

Granaturov V.M. credit risk is the risk of default, ie the amount of principal and interest paid by the borrower in accordance with the terms of the loan agreement [6].

Basel credit risk is the probability that a borrower or counterparty will default on its obligations under agreed terms. [7].

Lavrushin O.I defines credit risk as the risk of default on credit obligations to a third party credit institution [8].

Korshunova NI defines credit risk as the risk of loss of the bank as a result of untimely or incomplete fulfillment of financial obligations of the credit institution by the borrower in accordance with the terms of the loan agreement. Although the bank's credit risk depends on external and internal factors, it is very difficult to manage external factors related to the economy, politics, market situation, and the external and internal policy of the state and its regulation possible changes and the level of development of banking competition. [9].

The Regulation on Requirements of the Central Bank of the Republic of Uzbekistan to the Management of Banking Risks of Commercial Banks defines credit risk as follows. Credit risk is defined as the risk of financial

loss to the bank as a result of the borrower's inability to partially or fully meet its financial obligations to the bank under the terms of the contract[10].

In view of the above, we can define credit risk as the damage that may occur as a result of the borrower's failure to fulfill its obligations under the terms of the financial agreement.

III. RESEARCH METHODOLOGY

The article focuses on the essence of credit risk, goals and objectives of credit risk management, causes and stages of credit risk management, credit risk assessment, prevention, assessment, analysis of general credit risks in accordance with the requirements set by the Central Bank and industry best practices. Independent approaches have been formed on the basis of scientific conclusions of the research work carried out by foreign and domestic scientists and practical experience of the authors in the study of the necessary features. Methods such as tables, analytical comparisons, logical analysis, grouping, as well as statistical data were also widely used.

IV. ANALYSIS AND RESULTS

Credit risk assessment should be objective and accurate, ie based on reliable information, and conclusions and recommendations for improving the quality of the loan portfolio should be based on analytical calculations.

Credit risk management is based on the following principles:

The complex nature of the assessment - it is necessary to cover all aspects of credit-related activities in order to determine the real level of credit risk in the bank and develop the necessary measures to regulate it.

Systematization of economic and non-economic indicators of creditworthiness assessment of the borrower, which determines the level of risk. In a comprehensive risk assessment, it is necessary to reconcile the quality indicators obtained during the individual interview with the financial performance of the debtor;

Adequate reaction - the assessment of risk factors in previous periods and the prediction of their future effects should be done expeditiously. The essence of this principle is that the Bank must respond quickly to external and internal changes that lead to an increase in credit risk and apply the necessary methods to regulate it.

Based on these principles, the main goal of credit risk management is to improve the quality of the loan portfolio by minimizing the level of risk.

The purpose of credit risk management in the Bank is achieved on the basis of a systematic and comprehensive approach, which involves solving the following tasks:

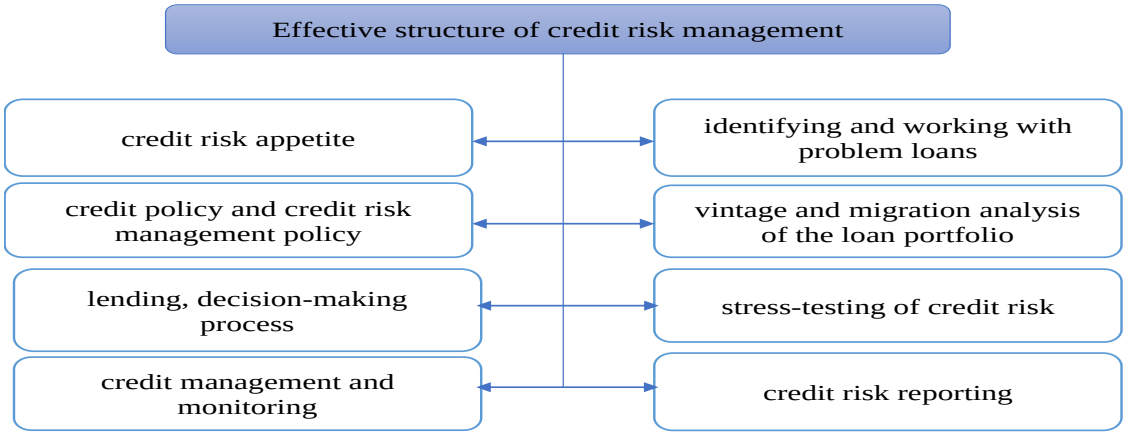
Obtaining operational and objective information on the status and amount of credit risk;

Qualitative and quantitative assessment of credit risk;

Establishing interrelationships between individual risk types in order to assess the planned measures to limit the impact of one type of risk on the increase or decrease of other types of risk;

Credit risk management at the stage of negative trend, as well as the creation of a system of rapid action to prevent the Bank from reaching a significant, critical level of credit risk.

Risk minimization (or risk regulation) is the taking of measures aimed at maintaining the level of risk at a level that does not harm the financial stability of the Bank, the interests of depositors and creditors. This includes the following processes: risk forecasting, identification of possible amounts and consequences of risks, development and implementation of measures aimed at prevention and minimization of associated losses. Effective management decisions require relatively accurate assessment and forecasting of credit risk, as the Bank can apply adequate regulatory methods to minimize such risks and, of course, improve the quality of the loan portfolio when the loan portfolio is maximally identified and forecasted.



The reasons for the occurrence of credit risks can be due to many reasons, in particular the level of a particular loan or the level of the loan portfolio.

Excessive concentration of loans in one sector of the economy, based on the occurrence of credit risk at the level of the loan portfolio, excessive diversification of loans in different sectors, despite the lack of specialists who understand the characteristics of all sectors of the economy, exchange rate fluctuations for loans in foreign currency, the structure of the imperfect loan portfolio, formed on the basis of the needs of customers, not the bank, and the lack of qualifications of employees.

Credit risk management consists of the stages of credit risk identification, credit risk assessment, credit risk monitoring, credit risk regulation.

There are initial and current identification stages of credit risk identification, according to which:

at the initial identification stage, the documents submitted for obtaining a loan are analyzed before allocating a loan, special attention is paid to the client's ability to repay the loan, assessment of its strengths and weaknesses, and loan repayment periods;

the second stage of credit risk identification is to identify the client’s current activities and problems at the initial stage, i.e., loans that are at risk of being repaid in a timely manner, once the loan has been granted. At the same time, special attention is paid to the industries or enterprises where the decline in production is observed, and the observance of established norms.

The regulation and assessment of the risk level of the loan portfolio is important for the Bank as it is one of the key areas of effective credit management. The main goal of the loan portfolio management process is to ensure maximum return on a certain level of risk.

The Bank's loan portfolio risk assessment methodology provides for:

Qualitative analysis is the identification of risk factors (sources) and requires in-depth knowledge, experience and intuition in the field of credit risk. Credit risk qualitative analysis should also take into account lending and concentration of stakeholders;

Quantitative analysis means determining the level of risk. The level of credit risk is a quantitative expression of the borrower's creditworthiness and assessment of credit operations.

Qualitative and quantitative analyzes are conducted simultaneously using analytical, statistical and coefficient methods of risk assessment.

The analytical method involves the assessment of potential losses and is carried out in accordance with the Regulation of the Central Bank "On the classification of asset quality in commercial banks and the order of formation and use of reserves to cover potential losses on assets" (registration number: 2696, July 14, 2015).

In accordance with this Regulation, the quality of the bank loan portfolio is classified into the following categories: standard, substandard, unsatisfactory, doubtful, hopeless.

The calculation of credit risk using statistical analytical methods assumes that all risks affect the quality of the loan portfolio. This emphasis provides a basis for interpreting the credit risk variation for each loan agreement that makes up the loan portfolio as an aggregate indicator of the Bank's lending risk.

The essence of the statistical method is as follows:

Statistical analysis of credit risks on contracts that make up the bank's loan portfolio;

features of the distribution of credit risks in the loan portfolio;

determining the high and frequency of credit risk.

The main tools of the statistical method of calculation and evaluation of the bank's loan portfolio are:

variance, variation, standard deviation, coefficient of variation and asymmetry.

The third method of calculating bank risk is the coefficient method.

The essence of this method is the relative indicators that allow to calculate the credit risks of the Bank's loan portfolio, and they are compared with the threshold values, on the basis of which the total credit risk is determined qualitatively and quantitatively.

The difficulty of applying the coefficient method in assessing the cumulative risk of the bank's loan portfolio arises from the comparison of calculated indicators with standard values. Because some indicators will be within the threshold values, while others will be above these threshold values. It is therefore necessary to highlight a generalizing indicator to determine the level of risk.

A comprehensive assessment of the loan portfolio provides an assessment of credit risks, both quantitative and qualitative. Potential losses in the loan portfolio are the most important factor in credit risk because its probability plays a key role in the distribution.

The meaning of this indicator is that it indicates the most optimal value of the risk level and is determined as follows.

$$S_p = \sum_{i=1}^{n} s_i \times p_i(c)$$

Here, Si-is the credit given to the i-group of borrowers, í = 1, n;

pi (c) is the credit risk relative to group i of borrowers.

Since this indicator is a generalized quantitative indicator, it does not allow to decide on the main methods of credit portfolio risk management (diversification or concentration). But in order to make a decision, it is necessary to determine the level of variability of the loan portfolio risk. The following two indicators are mainly used to calculate this indicator: variance and standard deviation. To calculate them, it is necessary to determine the average weighted risk of the bank's loan portfolio using the following formula:

$$\partial = \frac{\sum_{i=1}^{n} p_i(c) \times s_i}{\sum_{i=1}^{n} s_i} = \frac{s_p}{\sum_{i=1}^{n} s_i}$$

The above formula is the basis for calculating the variation of credit risk of borrowers belonging to group -i, which make up the Bank's loan portfolio.

The variance of the credit risk of borrowers belonging to group -i, which make up the bank's loan portfolio, is calculated as follows:

$$V(p) = \sum (P_i(c) - \partial)^2 \times \frac{s_i}{s},$$

$$S = \sum_{i=1}^{n} S_i$$

For the results of the analysis to be more accurate, the distribution value of the random unit must be calculated in the same unit as the amount of the random value. For this purpose, the standard deviation of credit risk for borrowers belonging to group i, which make up the bank's loan portfolio:

$$\sigma(p) = \sqrt{V(p)}$$

The calculation of this indicator allows to determine the closeness of the relationship between the effective and grouping factor attribute. It has the following limits:

$$0 < \sigma(p) < 1$$

If = 0 - the grouping factor has no effect on efficiency, = 1 - then the efficiency factor varies depending on the grouping factor.

Dispersion and standard deviation refers to the distribution of credit risk relative to loan portfolio contracts and average weighted loan portfolio risk. These indicators indicate the diversification of the loan portfolio relative to risk. The greater the variance and standard deviation, the greater the risk diversification of the loan portfolio. The variance and standard deviation indicate whether the distribution of credit portfolio risks relative to the loan agreement is on the positive side or on the negative side. Therefore, the above indicators do not allow accurate calculation of credit risk. Therefore, it is expedient to calculate the indicator of semivariation (semi-variability).

Depending on the outcome of the credit risk deviation from the average weighted credit risk in relation to loan portfolio agreements, the semivariation of credit risk may be positive or negative.

The positive semivariation of credit risk of borrowers belonging to group i, which make up the bank's loan portfolio, is as follows:

$$PSV = \sum_{i=1}^{n} t_i^2 \times \frac{S_i}{S}$$

Here n- is the size of the loan portfolio;

ti is the positive deviation of credit risks from the average weighted credit risks in relation to the contracts concluded for the i-group of borrowers who make up the bank's loan portfolio, that is:

$$t_i = \begin{cases} 0, & p_i(c) \geq \partial \\ p_i(c) - \partial, & p_i(c) < \partial \end{cases}$$

The positive semivariation of credit risk of borrowers belonging to group-i, which make up the bank's loan portfolio, is as follows:

$$NSV = \sum_{i=1}^{n} l_i^2 \times \frac{S_i}{S}$$

Where n is the size of the loan portfolio;

li- is the negative deviation of credit risks from the average weighted credit risks in relation to the contracts concluded for the i-group of borrowers who make up the bank's loan portfolio, ie:

$$l_i = \begin{cases} 0, p_i(c) \le \partial \\ p_i(c) - \partial, p_i(c) > \partial \end{cases}$$

It is expedient to calculate the positive and negative semicircular deviation of the credit risk of borrowers belonging to group i, which make up the bank's loan portfolio. To do this, use the following formula:

$$psv = \sqrt{PSV}$$

$$nsv = \sqrt{NSV}$$

where -psv is the positive mean semiconduct deviation of credit risk relative to the contracts entered into for the group of borrowers that make up the bank's loan portfolio.

where -nsv is the negative mean semiconductive deviation of credit risk relative to contracts entered into for the i-group of borrowers that make up the bank's loan portfolio.

The greater the positive half-life (positive average semiconductive deviation) of credit risk relative to loan portfolio contracts and the lower their negative half-variability (negative average semiconductive deviation), the lower the risk level of the bank loan portfolio.

The use of only two indicators (average and standard deviation) in the analysis can lead to erroneous conclusions. The standard deviation, the uncertain distribution, does not adequately describe the risk because most of the variability does not take into account whether the expected return is on the "good" (right) or "bad" (left) side. Therefore, in the analysis of asymmetric distributions, an additional indicator is the asymmetry coefficient of credit risk in relation to the i-group contracts of borrowers who make up the loan portfolio of the bank.

This is determined by the standardized value of the third central process and the formula:

$$a = \sum_{i=1}^{n} \frac{S_i}{S} \times (p_i(c) - \partial)^3 / \sqrt{V^3(p)}$$

The lower the asymmetry resistance coefficient (a), the lower the risk level of the loan portfolio, because the deviations from the average portfolio risk on the right-hand side of the credit risk relative to loan portfolio contracts are closest to the daily weighted risk of the loan portfolio the appropriate (acceptable) values of credit risk relative to the portfolio agreements are significantly different from the average portfolio risk.

The value of a bank's loan portfolio risk can be determined using relative values that represent the level of uncertainty in the implementation of management decisions, reflect the structure of the loan portfolio, and act as a qualitative indicator of the bank's credit risk.

The risk level of the bank's loan portfolio can be determined as follows:

$$K_p = \frac{K_1 + K_2}{2} = \frac{K_1 + K_{21} + K_{22} + K_{23} + K_{24}}{2},$$

Here,

K1 - variability of loan portfolio risk;

K2 - the share of non-standard loans in the total volume of issued loans;

K21 - share of substandard loans in the loan portfolio;

K22 - the share of unsatisfactory loans in the loan portfolio;

K23 - share of doubtful loans in the loan portfolio;

K24 is the share of bad loans in the loan portfolio.

An indicator that characterizes the trend of risk level volatility over a period of time is the variability of risk in the loan portfolio,

it is defined as follows:

$$K_1 = \frac{\partial \times nsv}{psv}$$

Variability of total credit risk. The indicator is based on the standard deviation of credit risk in relation to

contracts concluded for the i-group of borrowers who make up the bank's loan portfolio. The use of this indicator when comparing the level of risk of the bank's loan portfolio at different periods of the assessment allows to determine the risk of diversification (concentration).

The indicator characterizing the quality of Bank K2 loan portfolio management is the share of non-standard loans in the total volume of loans provided, this ratio is determined by summing the indicators K21, K22, K23, K24, the calculation of which is necessary to identify non-standard factors.

One of the first indicators characterizing the quality of the bank's loan portfolio is the share of substandard loans in the total loan portfolio:

$$К21 = \frac{\text{Substandard credits}}{\text{Bank loan portfolio}} \text{ x } 100$$

This ratio gives the bank a warning about the need to increase the effectiveness of control over the financial condition of borrowers whose credit quality is deteriorating.

The next step in calculating the share of overdue loans in the bank's loan portfolio is to determine the share of unsatisfactory loans in the bank's total loan portfolio:

$$К22 = \frac{\text{Unsatisfactory loans}}{\text{Bank loan portfolio}} \text{ x } 100$$

It is important for the bank to control the volume of credit transactions with customers who are experiencing certain specific difficulties. To do this, it is necessary to determine the share of doubtful loans in the loan portfolio.

$$К23 = \frac{doubtful\ loans}{\text{Bank loan portfolio}} \text{ x } 100$$

The quality of the bank's loan portfolio is affected by the share of holpless loans.

$$К24 = \frac{hopeless\ loans}{\text{Bank loan portfolio}} \text{ x } 100$$

The K24 value must be zero. A high value of this indicator can have a negative impact on bank liquidity.

When calculating loans that are expected to be lost (ECL), the bank is credited with premiums on credit risk and reserves for possible credit losses.

The expected credit loss, exposure at default (EAD), probable default (PD) and loss given default (LGD) for a single credit risk are as follows: $ECL = EAD \cdot PD \cdot LGD$

Here,

EAD - total debt;

PD - the expected probable default;

LGD - the loss given default.

The risk of expected losses in the loan portfolio is stated as the sum of the total losses expected from the loans.

$$ECL \text{ умумий риск} = \sum ECL \text{ бир риск}$$

By calculating loans that are not expected to be lost, the bank determines the maximum losses that will exceed the level of materiality determined by the target credit rating.

Unexpected losses for a single credit risk can be determined by taking into account the expected loss of loans, total debt (EAD), expected probable default (PD), and default loss (LGD) listed below.

$$UCL = \sum \left(EAD \cdot PD_y(N^{-1}(\propto), PD) \cdot LGD\right) - ECL$$

Here, EAD is total debt;

PD - the expected probable default;

LGD - default losses;

N ^ (- 1) is the inverse function of the standard normal distribution;

$\propto$ - level

The correlation factor (p) between the risk of unforeseen loans given below can be defined as the product of unforeseen loans for a given risk.

$$EC = \sqrt{\sum_{i=1}^{n} \sum_{j=1}^{n} UCL_j \cdot UCL_j \cdot p_{ij}}$$

The correlation factor is assessed based on the observation of the statistical relationship between industry and product risk exports.

In order to prevent the growth of credit risk, the Bank conducts regular monitoring of credit risk.

Credit risk monitoring is carried out both on the part of one borrower and on the bank's loan portfolio in general.

In order to control credit risk on the loan portfolio, the bank uses a system of credit risk indicators.

Indicators that are theoretically or empirically related to the level of credit risk accepted by the Bank are applied as follows:

Kq is an indicator of credit quality, the share of bad loans in the loan portfolio and is calculated according to the following formula:

$$К_q = \frac{Loss}{KP} \text{ x } 100\%$$

Here, Loss-desperate loan, KP-loan portfolio. It is determined in accordance with the current Regulations of the Central Bank.

Kraroc - calculation of the return on economic capital taking into account the risks, ie deductions from interest income / loan balance * risked asset * capital adequacy ratio (14%) and determined by the following formula:

$$К_{raroc} = \frac{Ii-P}{L*RWA*CAR}$$

Here, Ii - interest income;
P-shaped reserves;
L-credit balance;
RWA-risk weight assets;
CAR-capital adequacy ratio (14%).

Knpl - the share of overdue loans (NPL) The recommended amount of overdue loans in the total loan portfolio should not exceed 5%, it is calculated by the following formula:

$$К_{npl} = \frac{NPL}{KP} \text{ x } 100\%$$

Here, NPL - loans overdue for 90 days;

KP-loan portfolio.

Kp - reserves formed on potential losses, the recommended amount of overdue loans (NPL) to be covered by the reserve should not be less than 100% and is calculated according to the following formula:

$$К_p = \frac{NPL}{P} \text{ x } 100\%$$

Here, NPL - loans overdue for 90 days;

P is the total reserves actually formed.

The main methods of loan portfolio risk management are diversification, setting limits, organizing reserves, powers and decision-making system.

Diversification of the bank's loan portfolio is carried out through the distribution of loans by different groups of borrowers, terms of provision, types of collateral, network characteristics. Of particular importance is the diversification of the loan portfolio by maturity, with which the level of credit risk increases with the maturity of the loan.

Debt diversification can be done depending on different population groups according to the purpose of lending (consumption, mortgage, education, microcredit, overdraft, etc.). In the case of economic entities, diversification can be carried out both by form of ownership and area of activity.

Diversification of industries by distribution of loans to customers operating in various sectors of the economy

The process of stress testing on credit risks is calculated by the impact of the bank on credit risks, the scenario of significant negative changes in credit risk factors. Credit risks are based on a stress test policy.

Stress-testing methodology is an analysis of the sensitivity and sensitivity that can be applied to each type of transaction and to each credit risk exposure.

The calculation of a stress test on a single risk is as follows:

$$\textbf{Single Stress Loss} = \textbf{Risk Exposure} \cdot \textbf{Scenario risk factor}$$

The stress-test calculation for total portfolio risks should be developed as a correlated measure of the non-correlated sum of losses as follows.

$$\textbf{Total Stress Loss} = \begin{cases} \sum \textbf{Single Stress Loss, Uncorrelated} \\ \sum \textbf{Total Exposure} \cdot \textbf{Scenario risk factor, Correlated} \end{cases}$$

Here, Total Stress Loss — Total Stress Loss;

Single stress Loss, uncorrelated - the loss of a single stress that is not related

Total exposure, scenario risk factor, correlated - total risk, risk scenario, correlation.

V. CONCLUSIONS AND RECOMMENDATIONS

The main direction of credit risk regulation should be the development and implementation of measures to prevent credit risk or minimize related losses.

It is necessary to implement a set of measures to minimize credit risk, reduce the likelihood of situations and circumstances that lead to losses on loans and (or) limit potential losses.

In order to limit credit risks, the bank should set limits on the types of economic activities, to finance investment projects, territorial boundaries, maximum loan terms by type of economic activity, balance and off-balance loan portfolio ratio, retail lending to individuals.

An effective way to reduce the risk of the loan portfolio for the bank is to create reserves. This method is aimed at protecting the quality of the loan portfolio, trust in the bank, as well as depositors, creditors, shareholders. The provision is arranged so as not to incur losses as a result of the debtor's insolvency.

Credit risk management Approval of credit and risk appetite policies to the Supervisory Board of the Bank, as well as amendments and additions to them; ensuring the creation of the organizational structure of the bank in accordance with the basic principles of credit risk management; control over the activities of the bank's executive bodies on credit risk management; Deciding on the allocation of loans to borrowers who exceed the limits of the bank's management; Consideration of the credit risk management report submitted by the bank's management should be given authority and responsibilities.

Review and approval of internal regulations and amendments to the Bank's management, which determine the rules and procedures for credit risk management (regulations, procedures, rules, methodologies, regulations, tariffs, etc.), distribution of powers and responsibilities for credit risk management among heads of departments at different levels , empower them to provide the necessary resources, interact and establish reporting procedures.

Development of internal documents on the credit risk management system for the risk management department of the Bank; coordination of internal documents of the bank on issues related to credit risk management; exercise control over credit risks and inform the bank's management bodies about its results; identifies, assesses and analyzes credit risks; provide guidelines and recommendations for determining and assessing the level of credit risk; analyzes the credit risk management system (risk audit, self-assessment) and develops proposals for its improvement, taking into account the best international practices and standards; it is necessary to consolidate the powers and responsibilities, such as giving technical assignments for the formation of a system of automation of credit risk management and monitoring its implementation.

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