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«ХАЛЫҚ» ЖҚ

# Х А Б А Р Ш Ы С Ы

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**ВЕСТНИК**

РОО «НАЦИОНАЛЬНОЙ  
АКАДЕМИИ НАУК  
РЕСПУБЛИКИ КАЗАХСТАН»  
ЧФ «Халық»

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В 2016 году для развития и улучшения качества жизни казахстанцев был создан частный Благотворительный фонд «Халык». За годы своей деятельности на реализацию благотворительных проектов в областях образования и науки, социальной защиты, культуры, здравоохранения и спорта, Фонд выделил более 45 миллиардов тенге.

Особое внимание Благотворительный фонд «Халык» уделяет образовательным программам, считая это направление одним из ключевых в своей деятельности. Оказывая поддержку отечественному образованию, Фонд вносит свой посильный вклад в развитие качественного образования в Казахстане. Тем самым способствуя росту числа людей, способных менять жизнь в стране к лучшему – профессионалов в различных сферах, потенциальных лидеров и «великих умов». Одной из значимых инициатив фонда «Халык» в образовательной сфере стал проект *Ozgeris powered by Halyk Fund* – первый в стране бизнес-инкубатор для учащихся 9-11 классов, который помогает развивать необходимые в современном мире предпринимательские навыки. Так, на содействие малому бизнесу школьников было выделено более 200 грантов. Для поддержки талантливых и мотивированных детей Фонд неоднократно выделял гранты на обучение в Международной школе «Мирас» и в *Astana IT University*, а также помог казахстанским школьникам принять участие в престижном конкурсе «*USTEM Robotics*» в США. Авторские работы в рамках проекта «Тәлімгер», которому Фонд оказал поддержку, легли в основу учебной программы, учебников и учебно-методических книг по предмету «Основы предпринимательства и бизнеса», преподаваемого в 10-11 классах казахстанских школ и колледжей.

Помимо помощи школьникам, учащимся колледжей и студентам Фонд считает важным внести свой вклад в повышение квалификации педагогов, совершенствование их знаний и навыков, поскольку именно они являются проводниками знаний будущих поколений казахстанцев. При поддержке Фонда «Халык» в южной столице был организован ежегодный городской конкурс педагогов «*Almaty Digital Ustaz*».

Важной инициативой стал реализуемый проект по обучению основам финансовой грамотности преподавателей из восьми областей Казахстана, что должно оказать существенное влияние на воспитание финансовой

грамотности и предпринимательского мышления у нового поколения граждан страны.

Необходимую помощь Фонд «Халык» оказывает и тем, кто особенно остро в ней нуждается. В рамках социальной защиты населения активно проводится работа по поддержке детей, оставшихся без родителей, детей и взрослых из социально уязвимых слоев населения, людей с ограниченными возможностями, а также обеспечению нуждающихся социальным жильем, строительству социально важных объектов, таких как детские сады, детские площадки и физкультурно-оздоровительные комплексы.

В копилку добрых дел Фонда «Халык» можно добавить оказание помощи детскому спорту, куда относится поддержка в развитии детского футбола и карате в нашей стране. Жизненно важную помощь Благотворительный фонд «Халык» оказал нашим соотечественникам во время недавней пандемии COVID-19. Тогда, в разгар тяжелой борьбы с коронавирусной инфекцией Фонд выделил свыше 11 миллиардов тенге на приобретение необходимого медицинского оборудования и дорогостоящих медицинских препаратов, автомобилей скорой медицинской помощи и средств защиты, адресную материальную помощь социально уязвимым слоям населения и денежные выплаты медицинским работникам.

В 2023 году наряду с другими проектами, нацеленными на повышение благосостояния казахстанских граждан Фонд решил уделить особое внимание науке, поскольку она является частью общественной культуры, а уровень ее развития определяет уровень развития государства.

Поддержка Фондом выпуска журналов Национальной Академии наук Республики Казахстан, которые входят в международные фонды Scopus и WoS и в которых публикуются статьи отечественных ученых, докторантов и магистрантов, а также научных сотрудников высших учебных заведений и научно-исследовательских институтов нашей страны является не менее значимым вкладом Фонда в развитие казахстанского общества.

С уважением, Благотворительный Фонд «Халык»!

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<sup>1</sup>Auezov University, Kazakhstan, Shymkent;

<sup>2</sup>Korkyt Ata University, Kazakhstan, Kyzylorda;

<sup>3</sup>Narxoz University, Kazakhstan, Almaty;

<sup>4</sup>University of Darussalam Gontor, Indonesia, Demangan.

E-mail: [Katira7575@mail.ru](mailto:Katira7575@mail.ru)

## COMMERCIAL BANK CREDIT RISK MANAGEMENT ISSUES AND WAYS TO SOLVE THEM

**Mamutova Katira** — candidate of economics sciences, Associate Professor of the Department of Finance. Auezov University. 160012, Republic of Kazakhstan, Shymkent, Tauke khan Avenue, 5  
E-mail: [Katira7575@mail.ru](mailto:Katira7575@mail.ru). ORCID: 0000-0003-0676-1620;

**Nurmaganbetova Begzat** — candidate of economic Sciences, Associate Professor, education program "Finance, Accounting and Audit". Korkyt Ata University. 120000, Republic of Kazakhstan, Kyzylorda, 29A Aiteke Bi Street  
E-mail: [nbegzat@mail.ru](mailto:nbegzat@mail.ru). ORCID: 0000-0002-8661-2555;

**Kapanova Sholpan** — Master of Economics, Senior Lecturer of the education program "Finance, Accounting and Audit". Korkyt Ata University. 120000, Republic of Kazakhstan, Kyzylorda, 29A Aiteke Bi Street  
E-mail: [sholpan\\_dar@mail.ru](mailto:sholpan_dar@mail.ru). ORCID: 0000-0003-3072-2111;

**Appakova Gulmira** — PhD, Narxoz University, Professor of the Accounting and Audit educational program. 050035, Republic of Kazakhstan, Almaty, 55 Zhandosova str.  
E-mail: [ganek310@mail.ru](mailto:ganek310@mail.ru). ORCID: 0000-0001-8512-3824;

**Smailov Murat** — Master of Economics, Senior Lecturer of the Department of Finance, Accounting and Audit, Korkyt Ata University. 120000, Republic of Kazakhstan, Kyzylorda, 29A Aiteke Bi Street  
E-mail: [murat\\_ismail@mail.ru](mailto:murat_ismail@mail.ru). ORCID: 0000-0001-9900-7736;

**Mahfudz Affandi Akhmad** — PhD, University of Darussalam Gontor Indonesia. 63471, Jl. Raya Siman, Dusun I, Demangan, Kec. Siman, Kabupaten Ponorogo, Jawa Timur  
E-mail: [affandi@unida.gontor.ac.id](mailto:affandi@unida.gontor.ac.id). ORCID: 0000-0002-0806-8347.

**Abstract.** The purpose of the article is to explain the essence of the credit risks of a commercial bank, to consider the problems of managing commercial banks and credit risk in the Republic of Kazakhstan and measures on ways to solve it. Risk management and risk transformation is one of the main management functions of a commercial bank. It was determined that the more accurate the choice of a decision on the management, assessment of risk (primarily credit risk) and ways to



reduce it in various directions, the more likely it is to implement it, the more effective the management of a credit institution and the lower the risk of its insolvency. In modern conditions of banking development, the quality of the loan portfolio was considered the conditions for the bank to function and be successful as a commercial organization. According to the practice of the World Bank, it is known that if the share of bad assets exceeds 7 percent, then the bank will go bankrupt. Therefore, the activities of banks are primarily aimed at improving the quality of the loan portfolio, managing credit risks, creating and implementing organizational and technological measures aimed at using them in favor of the bank's credit policy. Also, ways were identified to eliminate deficiencies in the loan portfolio and reduce emerging credit risks. The presence of a large number of credit risks in the portfolios of domestic banks is not only a reflection of problems in the economic sphere of society, but also requires further improvement of the bank's credit policy, in the selection and hiring of qualified personnel, as well as the bank's credit policy. In the framework of credit risk-oriented supervision, ways of monitoring the process of regular validation of models and measures to improve the quality of the data used and to digitize credit risk management were studied. At the same time, on the basis of initial data on the quality of the bank's loan portfolio, the results of the calculation of the structure of the loan portfolio, the description of credit risk control and management, the ratio of provisions to the loan portfolio during the stress scenario, the monetary structure of the loan portfolio, a structural-functional scheme of the risk management mechanism of the banking system was created.

**Keywords:** bank, capital, credit, risk, credit risk, asset, liability, income, expense, finance, loss

© К.К. Мамутова<sup>1\*</sup>, Б.К. Нурмаганбетова<sup>2</sup>, Ш.А. Капанова<sup>2</sup>,  
Г.Н. Аппақова<sup>3</sup>, А.А. Махфудз<sup>4</sup>, 2023

<sup>1</sup>М. Әуезов ат. Оңтүстік Қазақстан университеті, Қазақстан, Шымкент;

<sup>2</sup>Қорқыт Ата ат. Қызылорда университеті, Қазақстан, Қызылорда ;

<sup>3</sup>Нархоз университеті, Қазақстан, Алматы;

<sup>4</sup>Даруссалама Гонтора университеті, Индонезия, Деманган.

E-mail: [Katira7575@mail.ru](mailto:Katira7575@mail.ru)

## **КОММЕРЦИЯЛЫҚ БАНКТИҢ НЕСИЕЛІК ТӘУЕКЕЛДЕРІН БАСҚАРУ МӘСЕЛЕЛЕРІ ЖӘНЕ ОНЫ ШЕШУ ЖОЛДАРЫ**

**Мамутова Катира Кудайбергеновна** — э.ғ.к., «Қаржы» кафедрасының доценті, М.Әуезов ат. Оңтүстік Қазақстан университеті. 160012, Қазақстан Республикасы, Шымкент қ., Тәуекхан даңғылы 5

E-mail: [Katira7575@mail.ru](mailto:Katira7575@mail.ru). ORCID: 0000-0003-0676-1620;

**Нурмаганбетова Бегзат Кошеровна** — э.ғ.к., Қорқыт Ата атындағы Қызылорда университеті «Қаржы, есеп және аудит» білім беру бағдарламасының қауымдастырылған профессоры. 120000, Қазақстан Республикасы, Қызылорда қ., Әйтеке би 29а

E-mail: [nbegzat@mail.ru](mailto:nbegzat@mail.ru). ORCID: 0000-0002-8661-2555;

**Капанова Шолпан Аманжоловна** — экономика ғылымдарының магистрі, Қорқыт Ата



атындағы Қызылорда университеті «Қаржы, есеп және аудит» білім беру бағдарламасының аға оқытушысы. 120000, Қазақстан Республикасы, Қызылорда қ., Әйтеке би 29а

E-mail: [sholpan\\_dar@mail.ru](mailto:sholpan_dar@mail.ru). ORCID: 0000-0003-3072-2111;

**Аппакова Гульмира Несипбековна** — PhD, Нархоз университеті «Есеп және аудит» білім беру бағдарламасының профессоры. 050035, Қазақстан Республикасы, Алматы қ., Жандосов көшесі 55

E-mail: [gane310@mail.ru](mailto:gane310@mail.ru). ORCID: 0000-0001-8512-3824;

**Махфудз Аффанди Ахмет** — PhD, Даруссалама Гонтора университеті, Индонезия. 63471, Дж.Л. Рая Симан, Дусун I, Деманган, округ. Симан, понорого регрессиясы, Шығыс Ява

E-mail: [affandi@unida.gontor.ac.id](mailto:affandi@unida.gontor.ac.id). ORCID: 0000-0002-0806-8347.

**Аннотация.** Мақаланың мақсаты — коммерциялық банктің несиелік тәуекелдерінің мәнін түсіндіру, Қазақстан Республикасында коммерциялық банктер мен несиелік тәуекелді басқару мәселелері мен оны шешу жолдары бойынша шараларды қарастыру. Тәуекелдерді басқару және тәуекелді түрлендіру – коммерциялық банктің негізгі басқару атқарымдарының бірі. Тәуекелді (ең алдымен несиелік тәуекелді) басқару, бағалау және оны әр түрлі бағыттар бойынша азайту жолдары жөніндегі шешімді таңдау, оны жүзеге асыру ықтималдылығы неғұрлым дәлірек болса, соғұрлым несие мекемесін басқару тиімдірек және оның төлем қабілетсіздігінің тәуекеліде төмен болатыны айқындалды. Банк ісі дамуының қазіргі жағдайында несие портфелінің сапасы банктің коммерциялық ұйым ретінде қызмет ету және табысты болу шарттары қарастырылды. Дүниежүзілік банк ісінің тәжірибесіне сәйкес үмітсіз активтердің үлесі 7 пайыздан асатын болса, онда банк банкротқа ұшырайтыны белгілі. Сондықтан банктердің қызметі, ең алдымен, несиелік портфельдің сапасын арттыруға, несиелік тәуекелдерді басқаруға, оларды банктің несиелік саясатының пайдасына пайдалану үшін бағытталған ұйымдық-технологиялық шараларды құруға және оны жүзеге асыруға бағытталады. Сондай-ақ, несие портфеліндегі кемшіліктерді жою және туындайтын несиелік тәуекелдерді азайту жолдары анықталды. Отандық банктердің портфелінде несиелік тәуекелдердің көп болуы қоғамның экономикалық саласындағы мәселелердің көрінісі ғана емес, сонымен қатар банктің несиелік саясатының, білікті кадрларды іріктеу мен жалдауда, сондай-ақ банктің несиелік саясатын одан әрі жетілдіруді талап етеді. Несиелік тәуекелге бағдарланған қадағалау шеңберінде модельдерді тұрақты валидациялау процесін бақылау жолдары мен пайдаланылатын деректердің сапасын жақсарту және несиелік тәуекелдерді басқаруды цифрландыру іс шаралары зерттелді. Сонымен бірге банктің несиелік портфелінің сапасы, несие портфелінің құрылымын есептеу нәтижелері, несиелік тәуекелді бақылау мен басқарудың сипаттамасы, стресстік сценарий кезінде провизиялардың несие портфеліне қатынасы, несие портфелінің ақшалай құрылымы туралы бастапқы мәліметтердің негізінде банк жүйесінің тәуекелдерді басқару механизмі бойынша құрылымдық-функционалдық схемасы жасалды.

**Түйін сөздер:** банк, капитал, несие, тәуекел, несиелік тәуекел, актив, пассив, табыс, шығын, қаржы, залал

© **К.К. Мамутова<sup>1\*</sup>, Б.К. Нурмаганбетова<sup>2</sup>, Ш.А. Капанова<sup>2</sup>,  
Г.Н. Аппакова<sup>3</sup>, М.О. Смайлов<sup>2</sup>, А.А. Махфудз<sup>4</sup>, 2023**

<sup>1</sup>Южно-Казахстанский университет им. М. Ауэзова, Шымкент, Казахстан;

<sup>2</sup>Кызылординский университет им. Коркыт Ата, Кызылорда, Казахстан;

<sup>3</sup>Университет Нархоз, Алматы, Казахстан;

<sup>4</sup>Университет Даруссалама Гонтора, Деманган, Индонезия.

E-mail: *Katira7575@mail.ru*

## **ПРОБЛЕМЫ УПРАВЛЕНИЯ КРЕДИТНЫМИ РИСКАМИ КОММЕРЧЕСКОГО БАНКА И ПУТИ ИХ РЕШЕНИЯ**

**Мамутова Катира Кудайбергеновна** — к.э.н, доцент кафедры «Финансы», Южно-Казахстанский университет им. М.Ауэзова, г. Шымкент, Казахстан

Электронная почта: *Katira7575@mail.ru*. ORCID: 0000-0003-0676-1620;

**Нурмаганбетова Бегзат Кошеровна** — к.э.н, кафедры «Финансы, учет и аудит», Кызылординский университет имени Коркыт Ата. г. Кызылорда, Казахстан

Электронная почта: *nbegzat@mail.ru*. ORCID: 0000-0002-8661-2555;

**Капанова Шолпан Аманжоловна** — магистр экономических наук, старший преподаватель кафедры «Финансы, учет и аудит», Кызылординский университет имени Коркыт Ата. г. Кызылорда, Казахстан

Электронный почта: *sholpan\_dar@mail.ru*. ORCID: 0000-0003-3072-2111;

**Аппакова Гульмира Несипбековна** — PhD, Университет Нархоз, профессор кафедры «Учет и аудит» г.Алматы, Казахстан

Электронная почта: *ganek310@mail.ru*. ORCID: 0000-0001-8512-3824;

**Смайлов Мурат Омизакович** — магистр экономических наук, старший преподаватель кафедры «Финансы, учет и аудит», Кызылординский университет имени Коркыт Ата. г. Кызылорда, Казахстан

Электронная почта: *murat\_ismail@mail.ru*. ORCID: 0000-0001-9900-7736;

**Махфудз Аффанди Ахмет** — PhD, Университет Даруссалама Гонтора, Симан, регентство Понорого, Восточная Ява, Индонезия

Электронная почта: *affandi@unida.gontor.ac.id*. ORCID: 0000-0002-0806-8347.

**Аннотация.** Цель статьи — разъяснение сущности кредитных рисков коммерческого банка, рассмотрение мер по вопросам управления коммерческими банками и кредитными рисками в Республике Казахстан и путей их решения. Управление рисками и преобразование рисков являются основными управленческими функциями коммерческого банка. Чем точнее будет выбор решения по управлению риском (прежде всего кредитным риском), оценке и путям его снижения по различным направлениям, тем эффективнее будет управление кредитным учреждением и тем ниже риск его неплатежеспособности. В современных условиях развития банковского дела в качестве кредитного портфеля рассматривались условия функционирования и успеха банка как коммерческой организации. Согласно практики Всемирного банка, если доля безнадежных активов превышает 7 процентов, то банк обанкротится. Поэтому деятельность банков направлена, прежде всего, на создание и реализацию организационно-технологических мероприятий,

направленных на повышение качества кредитного портфеля, управление кредитными рисками, их использование в пользу кредитной политики банка. Авторами определены способы устранения недостатков в кредитном портфеле и снижения возникающих кредитных рисков. Большое количество кредитных рисков в портфеле отечественных банков является не только отражением проблем экономической сферы общества, но и требует дальнейшего совершенствования кредитной политики банка, отбора и найма квалифицированных кадров. В рамках надзора, ориентированного на кредитный риск, были исследованы пути контроля процесса устойчивой валидации моделей и мероприятия по улучшению качества используемых данных и цифровизации управления кредитными рисками. Разработана структурно-функциональная схема банковской системы по механизму управления рисками на основе исходных данных о качестве кредитного портфеля банка, результатах расчета структуры кредитного портфеля, характеристике контроля и управления кредитными рисками, соотношении провизий к кредитному портфелю при стрессовом сценарии, денежной структуре кредитного портфеля.

**Ключевые слова:** банк, капитал, кредит, риск, кредитный риск, актив, пассив, доход, расход, финанс, убыток

### **Introduction**

Today, there is a significant imbalance in stimulating the development of the economy, new phenomena have appeared as a result of the introduction of new technologies and the action of a megaregulator, the consolidation of capital, the opening of opportunities for managing significant funds in private credit institutions, with state participation, reinsurance of multi-level risks. Lending is the main activity of a commercial bank. It accounts for the bulk of banks' income. The profitability of the credit activity of a commercial bank depends precisely on the quality of the formed loan portfolio and the ability to manage portfolio credit risk. The low quality of the loan portfolio is the main reason for the bankruptcy of many banks.

In many ways, the effectiveness of the bank's credit policy depends on the quality of the formed loan portfolio. And the quality of the loan portfolio, in turn, directly affects the occurrence of credit risks. Thus, in modern conditions, work on the quality of the loan portfolio minimizes the emergence of credit risks, the impact of which always leads to the bankruptcy of the bank.

The main part. A distinctive feature of the development of the economy is the strengthening of state regulation, the direct intervention of the state in economic processes, primarily in the activities of credit institutions. Due to the sharp decline in the financial situation of large banks, due to the underestimation of credit risks and insufficient reserves, the megaregulator was forced to change the recovery procedure in domestic banks. This fact alone indicates the importance of correctly assessing the risks inherent in the banking system (Lavrushin, 2020).

The successful functioning of the bank depends on its policy of developing measures to reduce credit risks. In this regard, increasing the profitability of the

financial risk management system, as well as expanding its capabilities, will be available only with the improvement of this system. The possibility of concretizing the procedures of management decisions, on the basis of which, within the framework of the financial risk management process, the bank's management creates its structural divisions, as well as clarifies the methods of assessing the main credit risks and methods of countering them.

The specific methods and approaches used in making decisions in the context of risk are determined in the form of the bank's activities, depending on the strategy for achieving the goals set. At the same time, the theory and practice of credit risk management establish the fundamental principles that are guided in the course of credit risk analysis. Firstly, it is possible to risk as much as possible the amount of equity in the property, and secondly, it is unacceptable to risk with the majority for the minority (D.Mazhitov et al., 2019).

Risk reduction-reducing the likelihood of a risky situation and the amount of possible losses. When choosing a risk management method, it is necessary to calculate the maximum possible expense by type of risk, correlate it with the amount of capital that can lead to risk, and compare all possible expenses with the amount of own financial resources. Financial condition is a generalized characteristic of the effectiveness of managing the financial and economic activities of a bank, its assets and liabilities.

In order to effectively manage credit risk, it develops an assessment policy at the end of each reporting period to determine whether the credit risk for loans has increased significantly, taking into account changes in the risk of default during the loan period. In connection with this policy, the bank, depending on the quality of the loans issued, divided them into several 3-Step groups, as can be seen from Table 1.

Table 1 - Quality of the bank's loan portfolio, million tg

	2020	2021	2022
Commercial lending			
1-step loans	59 599,8	89 404,5	107 813,9
2-step loans	-	1 706,4	-
3-step loans	8 859,1	8 170,2	7 102,8
Total	68 459,0	99 281,2	114 916,8
Small business lending			
1-step loans	13 735,7	15 847,2	19 565,3
2-step loans	79,0	335,3	29,5
3-step loans	3 823,0	3 877,4	4 788,5
Total	17 637,8	20 059,8	24 383,3
Consumer lending			
1-step loans	38 397,7	45 927,3	62 322,1
2-step loans	478,2	518,7	382,3
3-step loans	3 402,2	6 973,7	6 211,4
Total	42 278,2	53 419,7	68 915,7
Mortgage lending			
1-step loans	4 571,7	3 659 760	2 320,0

2-step loans	15,6	38,4	12,5
3-step loans	540,4	469,6	311,1
Total	5 124,6	4 167,8	2 646,7
Total lending portfolio			
1-step loans	116 305,0	154 838,8	192 021,4
2-step loans	569,8	2 598,7	427,4
3-step loans	16 624,9	19 490,9	18 413,8
Total	133 499,7	176 928,5	210 862,6
Note – Compiled by the author on the annual report of commercial banks			

As can be seen from Table 1, at the end of 2020, the share of Stage 1 loans in the commercial lending portfolio was 90%, the share of Stage 2 loans was 1.72 %, and Stage 3 loans was 8.28 %. And at the end of 2021, the share of 1-stage loans in the commercial lending portfolio increased significantly to 93.8 %. The share of 3-stage loans decreased by 6.2 %. According to the results of 2022, 1-stage loans increased by 18,409.4 million tenge and amounted to 107,813. 9 million tenge. And 3-stage loans decreased by 1,067.4 million tenge and amounted to 7,102. 8 million tenge. This means that the share of default loans, which pose a threat to the bank, has decreased due to an increase in the share of standard and substandard loans in the portfolio of commercial lending (Statistical Bulletin of the NBRK, 2023).

### Methodology

In the last decade, the credit process has become more complex and at the same time more efficient, increasing efficiency has been achieved not only by automation, but also by introducing credit risk control tools into the lending process. It is known that consideration of issues related to the analysis and improvement of the effectiveness of the credit process in connection with the use of internal rating estimates and other risk management tools will have a huge impact on the effectiveness of risk management in the future.

The hitherto unfinished crisis showed how much the stability of the banking system depends on the quality of risk management. The stability and, accordingly, reliability of each individual bank is largely determined by the reliability of its risk management system.

With the same amount of regulatory capital, the bank's credit risks can vary widely, reflecting the weak sensitivity of the standardized approach. The use of advanced approaches (internal rating systems) to determine the parameters necessary to calculate the equity requirements for credit risks (Probability of Default, PD; Loss Given Default, LGD; exposure at Default, EAD) increases sensitivity: the higher the credit risks, the more capital will be required to cover unforeseen expenses, and vice versa. The more accurate models of internal ratings and loan portfolios are used by banks, the more accurately the requirements for created reserves can be calculated (Peganova, 2022; Lavrushin, 2020).

The next level of protection is the parameters of credit products that are subject to strategic and operational risk factors, but can exacerbate and even cause credit risks. Control tools at this level allow you to partially limit the perception of credit

risk to "entry", but they are mainly designed to reduce the amount of costs in the implementation of credit risk. If we give small amounts and demand adequate collateral on the loan, then the amount of losses will be small in case the client defaults. This is already a fine filter.

At the third level, there are methods (models) of internal ratings that the bank uses to assess the creditworthiness of borrowers. Reliable methods (models) for determining the probability of default (PD) of the borrower allow you to reduce the frequency of implementation of credit risk. So, if we set a cut-off limit of 5 % on the probability of default calculated according to the qualitative internal assessment methodology, the share of defaults in the portfolio, as a rule, will be less than 5 %. When using internal ratings to calculate equity requirements, the rating should include part of the previous level, namely the credit product and guarantee rating. In addition to assessing the likelihood of default by the borrower, it allows assessing credit risk parameters such as default costs (LGD) and credit risk exposure (EAD) (Gamble John et al., 2019).

Operational risks that indirectly cause credit risk account for more than 60 % of the implementation of credit risk. Another important factor in the credit process is the availability of information. So, the borrower may not have the necessary data to assess his creditworthiness and manage credit risk. Therefore, when building a credit process, it is necessary to determine the composition of the necessary sufficient data to be stored in the future, taking into account the goals of developing credit risk management. On the other hand, the bank itself can develop and implement such products, the sale of which makes it difficult to obtain information about the borrower (there are the above-mentioned express loans).

Without obtaining reliable information about the income of borrowers, the bank cannot provide high-quality control over credit risk and often focuses on involuntary management: firstly, the amount exposed to credit risk (loan amount) is limited; secondly, the costs are covered by overpayment for the loan. The lack of appropriate data processing methods leads to the fact that information is available: it seems to exist and cannot be used (Shilling Melissa, 2019).

The last of the properties under consideration is the relevance of information. The importance of this property is clear to any credit analyst. So, reliable and adequate, but outdated information about the financial condition of the borrower or its management can lead to a bad decision or a failure to make the right decision at the right time. "Success in any case depends on two conditions: correctly setting the ultimate goal and finding the appropriate means that will lead to this goal." Basically, this quote from Aristotle determines the success of any process.

In our opinion, the lending process, as shown in Table 2, can have two main goals: the first is to obtain the target income from a certain volume of the loan portfolio and at the same time control the risk; the second is to obtain a certain loan yield, taking into account the risk for the desired volume portfolio. Despite the similarity of definitions, these two goals have significant differences: the first refers to credit risk control; the second refers to risk management (Hill Charles et al., 2019).



Accordingly, the analysis of the procedures for using models in the rating process will be different in two cases. In the second case (an improved process that will be applied further), even when choosing to increase lending profitability, taking into account the risk achieved through active risk management as a goal, many components of the credit process should be different.

Table 2- Description of control and management of credit risk

Name	Credit risk control	Credit risk management
Risk policy	Cancel transaction loss	Optimization of the risk-yield indicator for the loan portfolio
Risk policy implementation tool	Risk control through pre-independent credit risk analysis	Risk management based on a fixed appetite for credit risk
Accent	Initial statement and periodic analysis	Active management throughout the entire life cycle of loans (credit product)
Methods	Expert, partly confirmed by quantitative estimates	Based on quantitative statistical analysis and other mathematical methods
Employees	Experienced underwriters	Underwriters and portfolio managers
Dates	Slow process, long viewing time	Quick decision making
Note – Compiled by the author on the basis of information data		

In the first step, we determine that the transaction with this client is too risky, using negative business rules, cutting off customers who do not meet the requirements of credit policy ("unwanted customers"). Further, at the stage of the rating assessment, there is a significant difference: a qualitative assessment with blurred boundaries is replaced, if you wish, you can easily move in one direction or another, a quantitative transparent assessment appears due to a centralized risk appetite.

The next stage of the advanced process is the establishment of a risk fee. The loan process should include a methodology for setting prices for various loans depending on the costs of the loan and the risk taken, and an appropriate internal process for determining the cost of the loan, taking into account the risk. At the same time, when we talk about credit risk, we must take into account not only the expected costs that are covered by reserves, but also unforeseen expenses that must be covered by the bank's own capital. The higher the credit risk of the transaction, the higher the loan payment. Of course, when determining the loan fee, we take into account the specifics of the product, whether it is a corporate or retail loan, standard or non-standard, what is the market value of similar products.

Here we come to the relationship of the credit process with other processes of the bank. Best practices convince us that it would be better to predict the profitability of the client, taking into account the sales of other credit and non-credit products. To do this, the credit process must be included in the banking process of customer relationship analysis and forecasting based on the Lifetime Value (LTV) concept, which takes into account the client's current value (generating profit), Future Value, and customer loyalty (Olkhova, 2020; Shatalova, 2020; Kosarev, 2020).

The use of advanced methods entails high requirements for information support. Most banks, even the most advanced ones, have only fragmented databases on



customers and transactions that do not provide the completeness and relevance of the information necessary to implement an advanced credit process that requires the presence of an integrated data collection and processing system.

### **Results**

Macro-scenarios reflect the hypothetical development of the economic situation for assessing the stability of banks and are not official forecasts of the NBRK. For the purpose of macro stress testing, unified base and stress scenarios for the entire system are used. The base scenario uses base scenarios of macroeconomic variables developed by various experts and institutions as initial data. The stress scenario describes a hypothetical crisis and is used to assess the stability of the financial system in adverse conditions. The price of Brent crude oil was used as the main variable determining the unexpected change, in connection with which scenario trajectories of real GDP and the tenge exchange rate were obtained.

In the basic scenario, the price of oil will drop to the level of 8 85 at the end of 2022 and 7 75 at the end of 2023. In a stressful scenario, oil prices were found to drop to US 4 40 per barrel by the end of 2022 and US.20 per barrel by the end of 2023. According to the stressful scenario, the fall in oil prices will lead to a significant drop in real GDP to -1.4 % by the end of 2023. Real sector credit risk model-assessment of the quality of the corporate portfolio based on data from enterprises.

The task of the approach to developing a real sector credit risk model is to analyze the potential impact of the financial state of enterprises on the stability of the banking system. The vulnerability of real sector entities to various unforeseen changes negatively affects financial stability and increases risks for the banking sector, being primarily the main borrower of credit resources. Data on the financial statements of real sector enterprises and credit agreements of legal entities submitted by banks to the credit register are used to assess the expected credit costs of banks. As part of the first approach, credit risk criteria such as the probability of default and the level of loss at the time of default (LGD) were calculated for each industry.

In world practice, structural models of credit risks are widely used, in which the probability of default of a company is calculated based on the value of its assets and liabilities. The company is recognized as defaulting if the total value of the company's assets is less than its debt. During the period of economic crisis, the profits and assets of enterprises decrease, liabilities increase, and many firms declare defaults. To calculate the probability of default of sectors of the economy, financial indicators of large and medium-sized enterprises were used on a quarterly basis. In particular, financial liabilities and interest expenses were used as debt, and assets and profits before interest and taxes were assessed as the value of the business (Vorontsova, 2020).

As a result, in the future, the estimated credit losses will lead to the formation of additional provisions of banks, which, in turn, will reduce the equity of banks. By the beginning of 2024, the ratio of provisions to the loan portfolio will increase by 7 % during the stress scenario and 4 % during the base scenario. The main forecast of stress testing within the model, as shown in Figure 1, is to replace the direct impact

of the formed provisions on the equity capital of banks, without taking into account net interest income, which somewhat regulates the negative impact on accounting. Despite this conservative forecast, the K1 capital adequacy ratio will continue to be above the 8 % threshold at the system level (excluding additional capital buffers).

According to the results of the stress test, the capital adequacy ratio k1 at the level of the banking system is maintained in the base scenario, as well as in the stress scenario. Corporate portfolio quality model of banks-assessment of the quality of the corporate portfolio in credit register data the second model of macro stress testing is based on the criteria for the quality of loans developed by the National Bank.

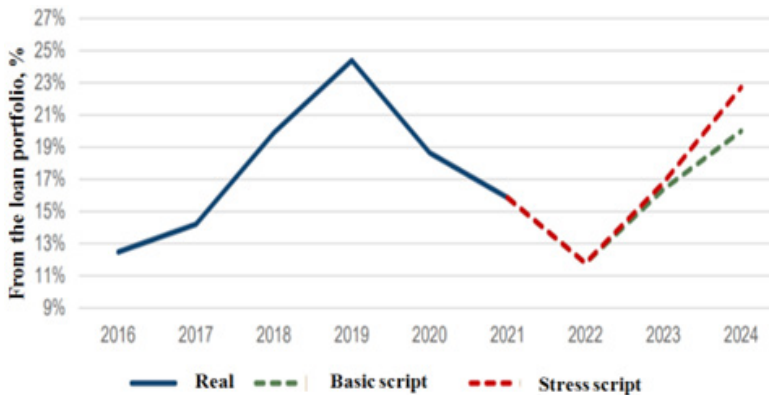


Figure 1. The ratio of provisions to the loan portfolio during a stressful scenario by the beginning of 2024 Note – STB reports, NBRK calculations

These criteria make it possible to identify problem debts that do not have signs of repayment on the principal and/or accrued interest for a certain period of time. When creating the model, analytical criteria for the quality of loans were converted to digital values in the form of a weighted average score or categories (from 1 to 5) and assigned to each corporate borrower depending on the amount of his principal debt and the categories of all his debts.

A panel regression has been developed to assess the impact of macroeconomic scenarios on debt criteria. In the model, the quarterly change in the weighted average (by the amount of principal debt) score of the corporate borrower is used as a dependent variable, and macroeconomic variables are used as independent variables. The model makes it possible to predict future categories of debts based on scenarios of unexpected macroeconomic changes, which will lead to the transfer of the amounts of principal debt between categories.

So, according to estimates, as a result of the implementation of the stress scenario, the ratio of provisions to the loan portfolio will reach 20 % by the beginning of 2024, which will lead to a decrease in the K1 capital adequacy ratio at the level of the banking system by 2.6 %.

In conditions of increasing demand for credit resources in their modern economy, the importance of the problem of assessing credit risks and their impact on efficiency

is important for the functioning of credit organizations. Empirical research shows that lending risks in the banking sector are growing nonlinearly. Therefore, the formation of the most favorable from the point of view of reducing the risk component of the bank's loan portfolio is an urgent and important issue.

A mechanism for managing the quality of the bank's loan portfolio is proposed, which is characterized by a combination of quantitative and qualitative criteria for assessing the risk of the loan portfolio and allows it to monitor it, make a decision on approval or rejection of a loan application. A model for optimizing the structure of the loan portfolio has been developed, which makes it possible to form the optimal ratio of long-term and short-term loans, ensuring the maximum profitability of the loan portfolio, taking into account credit risk in various situations (Duboshei, 2020).

Assessment of the quality of the loan portfolio at the level of a credit organization is carried out using the following approaches and methods:

- method of coefficients based on a system of financial indicators consisting of 20 coefficients for assessing profitability, liquidity and credit risks that characterize the quality of the loan portfolio;

- a scriptural approach (or stress testing) aimed at modeling various scenarios of changes in the state and structure of the loan portfolio. The bank's sensitivity to risk factors is analyzed. The result of the stress test is the identification of the most important factors affecting the bank's risks and the assessment of possible losses as a result of the occurrence of risk events;

- the method of internal ratings, prepared in accordance with the standards of the Basel Committee and designed to take into account the credit risk of the borrower and the credit risk of the financial instrument. The result is the assignment of a certain rating to the borrower, the determination of the appropriate level of risk for the borrower, which makes it possible to build an adequate system of relations with a particular borrower (according to his rating) and establish lending conditions (Lavrushin, 2021).

In decision theory, probabilistic statistical methods are often used to describe uncertainties (primarily methods of non-quantitative data statistics, including interval statistics and interval mathematics). Fuzzy set theory techniques and conflict theory techniques are also useful. Mathematical tools for risk assessment are used in simulation and econometric models, usually implemented in the form of software products.

Risk assessment is carried out on the basis of a number of methods, the choice of which is determined by the nature of the risk and the factors that constitute it. Two groups of methods are widely used - statistical, based on the use of empirical data, and expert, based on the opinion and intuition of specialists.

In statistical methods, if the probability value of the damage associated with the risk is described by a distribution function, the mathematical expectation, median and quantiles, variance, standard deviation, coefficient of variation, linear combination of the mathematical expectation and standard deviation (for example, the traditional confidence interval for determining the damage can be estimated by

the rule of three sigma is the mathematical expectation of plus or minus three sigma), the mathematical expectation of the loss function.

In this case, the task of damage assessment is to evaluate one or more of the mentioned characteristics. Often, such an assessment is based on empirical data — a pattern of damages corresponding to previous similar situations. In the absence of empirical material, it remains to rely on expert assessment.

If the uncertainty is probabilistic and the costs are characterized by a random approximation, then risk minimization can consist of reducing the mathematical expectation of costs as a result of the risk situation, reducing the standard deviation of costs from the average expected value, minimizing the linear value. the combination of mathematical expectation and standard deviation, maximizing the mathematical expectation of a utility function, etc.

One of the most common risk measures today is the asset's value at risk (VaR), which was first introduced by J.P. Used by Morgan and recommended for use by the Basel Committee on Banking Supervision . VaR determines the maximum loss a company can incur with a given probability. Despite its great popularity, this measure has a number of disadvantages - it does not take into account potentially large costs with low probability.

S. Uryasev proposed the conditional value at risk (CVaR) measure, which determines the mathematical expectation of income less than VaR. This measure of risk more adequately assesses risk when the tail of the expected return distribution density is heavy.

Currently, dimensionless (indexed) risk measures are being developed that combine quantitative measures of risk, level measures and various indices (Shatalova, 2020).

A set of allowed control actions can be specified, which is described using a corresponding set of control parameters. Then, the ability to influence the risk characteristics that determine the extent to which the objective is achieved is formalized as the choice of the control parameter value. In this case, the control parameter can be a number, a vector, it can be an element of a finite set, or it can have a more complex mathematical nature. The main problem is to correctly define the purpose of risk management. Since there is a whole spectrum of different risk characteristics, risk management optimization is often reduced to solving a multi-criteria optimization problem (Abdinova et al., 2023).

In conclusion, the methods of managing the quality of the credit portfolio aimed at reducing the credit risk are diverse and multi-directional: assessment and improvement of the methods of assessing the creditworthiness of the borrower; limiting credit decision-making powers depending on the size of the loan and the amount of possible damage; supervision of payment order and organization of work with problem borrowers; defensive transformation of debt claims provided for in the terms of the agreement (improvement of information provision, fines, penalty of instability, increase of interest rate); as well as management methods aimed at the consequences of risk events: diversification of the loan portfolio in the direction

of one or a set of qualitative characteristics of the loan in order to reduce risk concentration; limiting the amount of credit given to one borrower.

This study examines the method of loan portfolio diversification.

In general, banking activities are characterized by the following main types of risks: credit risk, interest rate risk and liquidity risk. Credit risk is associated with non-payment of obligations, in the case of growth of lending, it creates systemic and other risks. This type of risk manifests itself in the form of full or partial non-repayment of the loan (calculated interest and commission payments) or delay in repayment of the loan. Interest rate risk is caused by unfavorable fluctuations in interest rates, which lead to an increase in the cost of paying interest on deposits or a decrease in income from investments, as well as income from loans. Liquidity risk is manifested in the form of the probability that the organization will not be able to meet the expected or sudden situation of cash needs.

A mechanism of credit risk is needed to improve the quality of the loan portfolio based on achieving a suitable risk-return ratio, and to determine the risk appetite of the decision-maker, for the increase in demand for credit resources and, as a result, for the effective functioning of the banking system in the face of increased credit risks. Figure 2 presents the loan portfolio management mechanism, which is presented in the form of a structural-functional scheme and consists of the following stages.

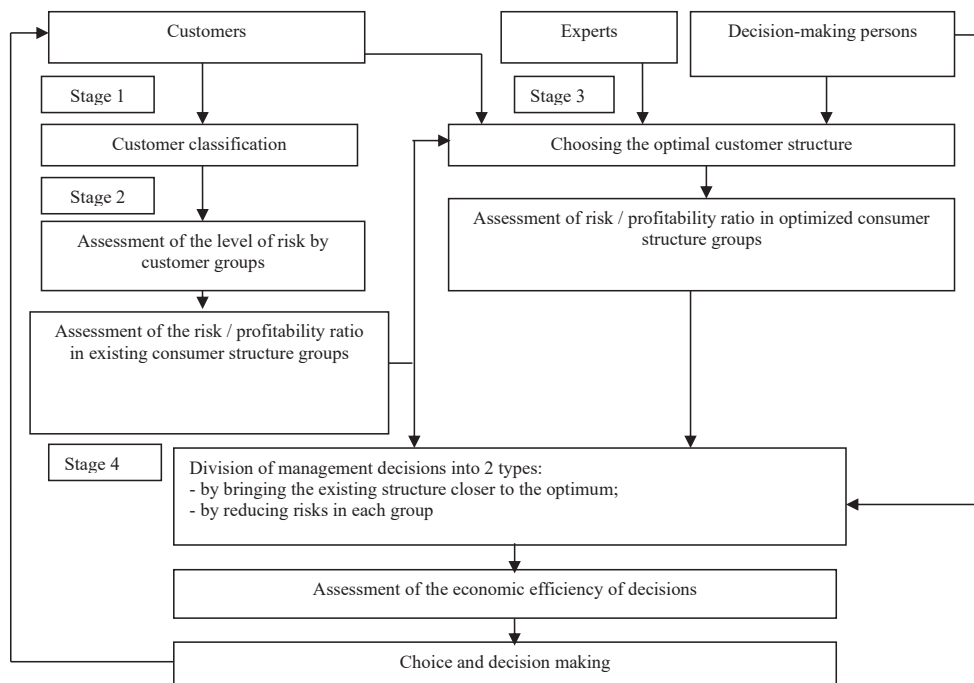


Figure 2 - Structural and functional scheme of the risk management mechanism of the banking system Note - Compiled by the author on the basis of informative data

Stages of implementation of the proposed mechanism:

- 1st stage. Classification of clients. In order to effectively manage the risks of the bank's credit activity, first of all, it is necessary to determine the requirements that are sufficiently attractive to clients and at the same time guarantee the receipt of deposits and the return of loans. Developing individual requirements for each specific client is not productive. Therefore, using the methods of cluster analysis, it is necessary to identify a group of clients with similar characteristics (loan term, loan amount, type of client - individual or legal entity) and properties. In this study, the following basis is used to classify clients: credit duration (short-term and long-term);

- 2nd stage. Assessment of risk level by client groups. If the distribution of the expected return of the loan portfolio is close to the normal level, then as a measure of risk, the return variation indicator or VaR of the asset's value at risk can be used;

- 3rd stage. Development of the optimal structure of the client base. The purpose of this stage is to obtain a set of numbers of each class of clients that provides the lowest total risk (loss) that the bank may be exposed to if the clients do not fulfill their obligations. Each client group is characterized by the following characteristics: group number, total income of the group, actual volume of working capital for each client, coefficient of variation of the amount of cash flow in case of violation of the terms of the contracts. At the same time, the search for optimal structures is carried out from the perspective of the decision-maker's attitude to risk. This stage is implemented through a mathematical programming model and is presented in the fourth part;

- 4th stage. Management of the structure of the client base. At this stage, the existing structure of clients (loan portfolio) is managed in order to bring it closer to the calculated optimum. The analysis of discrepancies between existing and optimal structures is carried out for selected groups with similar personal characteristics that reflect the interests of clients belonging to a certain group. These interests should influence the size of each class. Management methods: interest rate policy, a set of requirements for borrowers to obtain a loan, flexibility of working with loans (possibility of extending and early repayment of loans), a set of regular service parameters or their individual nature.

### **Discussion**

Evaluation of the effectiveness of management decisions, as well as the impact of credit risk management methods on the bank's competitiveness can be carried out on the basis of quantitative methods - calculation of estimated cash flows, risk level, insurance reserve value, as well as methods of qualitative analysis of systems, for example, the method of analyzing hierarchies. The purpose of the analysis is to compare the organization's current position in the market with the position it will take as a result of the proposed changes in the customer service policy. The advantage of this method is that it takes into account quantitative and qualitative indicators of bank activity. A detailed presentation of the stages of risk classification and assessment of individual groups of clients can be obtained from research with numerical experiments.

Diversification of the bank's loan portfolio is a method of reducing credit risk based on the formation of individual lending conditions for each category (group) of borrowers - lending conditions, types of loan collateral and the maximum loan amount. Diversification can be carried out according to various criteria - industry, geographical location, amount of capital, form of ownership, risk/return ratio, etc. We proceed from the assumption that a high level of profitability of the loan portfolio provides more effective ways and methods of managing the borrower's credit risk. The standard deviation of returns is used as a measure of risk in the model.

Approbation of the proposed model was carried out on the basis of statistical data on the operation of one of the banks. The analysis used data on the structure of the loan portfolio, including long-term and short-term loans, which is shown in Table 3.

Table 3 - Initial information on the monetary structure of the loan portfolio

Indications	By the term of loans		Difference
	Short-and medium-term loans (up to 3 years)	Long-term loans (over 3 years)	
Share in the loan portfolio, %	0,41	0,59	0,18
Average yield, %	19,6	26,8	7,2
Maximum yield, %	23,3	32,0	8,7
Minimum yield, %	19,1	23,0	3,9
Deviation of the mean quadratic input	1,8	4,5	2,7

Note-Compiled by the authors on the basis of information data

The total risk of the loan portfolio should be between 5.4 and 13.5 %, taking into account the  $3\sigma$  rule. Implementation of the model under different scenarios for conservative, moderate and aggressive types of credit policy is shown in Table 4. The main goal of an aggressive credit policy is to maximize profitability, taking into account the high level of risk. The interest rate on high-risk loans, as you know, is always higher than the average interest rate. The highest level of credit risk is established for the loan portfolio according to the selected credit policy. The maximum risk value for an aggressive policy is 13.5 %.

Table 4 - Results of calculation of loan portfolio structure

Type of credit policy	Maximum permissible risk level, %	Structure of the loan portfolio, %		Profitability level
		Long-term loans	Short-term loans	
Aggressive	13,5	42	58	28,4
Average	7	65	35	24,5
Conservative	5,4	7	93	19,4

Note-Compiled by the authors on the basis of information data

With a loan portfolio risk value of 13.5 %, the loan portfolio will have a structure: 42% of the total volume will be long-term loans and 58 % will be short- and medium-term loans.

With a conservative credit policy (maximum risk 5.4 %), the bank's loan portfolio



will be optimal with the following structure: 93 % - short-term and medium-term loans and only 7 % - long-term loans. At the highest cost of risk, the maximum profitability of the loan portfolio is 19.4 %.

The main goal of a normal credit policy is to obtain a stable average income with an acceptable level of risk, in contrast to aggressive and conservative. By implementing this lending policy, the bank can provide loans to both reliable borrowers and high-risk borrowers. For a normal credit policy, the maximum risk value is set at 7 %, and the yield reaches 24.5 %.

Therefore, within the framework of the requirements for creating an effective risk management system, banks should develop their own credit risk assessment models to calculate expected losses. Improving credit risk assessment models of banks, currently using credit risk assessment models to assess borrowers' creditworthiness and make provisions for expected losses is a leading practice. Advanced modeling methods can also be used in marketing to detect fraudulent transactions, settle problem debt, and make investment decisions.

In the framework of risk-oriented supervision, monitoring of the process of regular validation of models will be introduced, which will contribute to the improvement of the quality of the data used and the creation of a favorable regulatory environment related to the digitalization of credit risk management. Financial organizations, in turn, increase their expertise in advanced modeling approaches and increase the level of complexity of the algorithms used.

### **Conclusion**

The main problems faced by modern banks in the formation of a comprehensive complex of credit risk management have been identified. The credit risk optimization complex is considered one of these problems. Based on the analysis of some methods of credit risk assessment used in foreign and Kazakhstan practice, a complex of bank risk assessment based on high-risk asset operations was considered.

Credit risk management must actively develop rating systems, select, implement, and revalidate rating models, perform oversight functions for any models used in the rating process, and, ultimately, be responsible for constant review and modification of rating models. Their application in banking work contributes to the bank's credit risk management, early assessment of possible losses of assets, and decision-making in the correct direction of directing financial resources.

At the same time, within the framework of credit risk-oriented supervision, monitoring of the process of regular validation of models was introduced, which contributes to improving the quality of the data used and has an impact on the creation of a favorable regulatory environment related to the digitalization of credit risk management. Financial organizations, in turn, increase their expertise in advanced modeling approaches and increase the level of complexity of the algorithms used.

The need for an IT system for banks: firstly, all quantitative analysis and assessment methods, the results of which are used to make decisions about lending and the future fate of the loan, require high-quality data; secondly, setting automated limits based on the results of portfolio analysis and, most importantly, automated

monitoring of their compliance should be ensured; thirdly, quick decision-making, more accurate assessment of credit risk and other special features of the advanced process suggest the presence of a developed reporting system that can be built only on an integrated IT platform, taking into account the relevance of information.

In conclusion, second-tier banks should conduct regular monitoring and review the credit risk limit; development of rating systems in credit risk management, selection of models, re-examination; it is necessary to form a parapar complex of optimization of credit risks; also, it is necessary to introduce control of the process of regular validation of models within the framework of supervision focused on credit risk in commercial banks.

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