

Economic-Mathematical Modeling of the Activity of Commercial Banks

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Annotation

The article proposes a solution to the problem of finding the optimal structure of bank assets using mathematical and economic modeling. The optimal solution must meet all given constraints and maximize the chosen objective function.

INTRODUCTION

In a market economy, the activities of a commercial bank require a high level of management to ensure efficient operation and high competitiveness. In the banking sector, management can be divided into financial management and personnel management.

The most important goal of the strategic management of a commercial bank is considered to be the provision of maximum profit [3, 5].

Usually, bank profit maximization is understood as earning more at the lowest cost. But such a goal is not focused on the long term. In the pursuit of maximum profit, the quality of customer service, the working conditions of bank employees, and its financial stability may suffer, because the desire to maximize current profit does not imply investments in the repair and improvement of technical equipment, the accumulation of reserves to cover future losses, establishing relationships with promising enterprises that so far unprofitable.

MATERIALS AND METHODS

Therefore, the goal of planning the bank's activities should focus on maximizing the value of the bank, for which it is necessary to strive to maximize profits in the medium and long term.

Stable dividends, growth in the volume of banking operations, growth in the value of the bank's shares on the stock market.

From this it follows that the following issues are the most important for bank owners [1].

1. Organize the bank management system in such a way as to extract the largest amount of dividends and, if necessary, profitably sell the enterprise or its part.
2. It is necessary that all employees of the bank were interested in maximizing the profits of a commercial bank.
3. Make sure that the funds withdrawn by the owner in the form of dividends do not interfere with the work of the bank in the long run.

RESULTS AND DISCUSSION

Bank management must ensure the safety of borrowed funds, timely and full return of money to its depositors and creditors. To achieve this goal, the bank needs to create a system for managing liquidity, financial stability, receivables and payables, ensuring a high quality of the loan portfolio and deposits.

It is important for the effective operation of the bank to best meet the needs of the bank's customers in the quantity and quality of services provided, the speed of order fulfillment, and a high level of service. In addition, the activities of a commercial bank should contribute to the development of the economy by investing resources in the production sector, in promising industries, as well as in the regional economy.

The main tasks that need to be solved when managing the activities of a commercial bank stem from the above economic and social goals of the bank. The entire bank management system can be divided into two areas: financial management and personnel management (Fig. 1).

Financial management deals with planning, performance analysis, regulation and control of the bank's activities.

The first and one of the most important tasks of bank management is the planning of its activities. Planning determines the direction of the bank's future development, as well as its local goals and objectives. At the planning stage, forecast plans are drawn up, which set tasks for the bank for the next period, and strategies for their implementation are determined. Planning indicates the conditions and boundaries in which the team will have to work. Fulfillment or over fulfillment of the plan should materially stimulate bank employees, that is, be in the interests of the team.

As a result of planning, the following are developed [2]:

- long-term plans that consider the formation and deployment of resources in the long term;
- current business plans that focus on the parameters of the bank's activities in the short term.

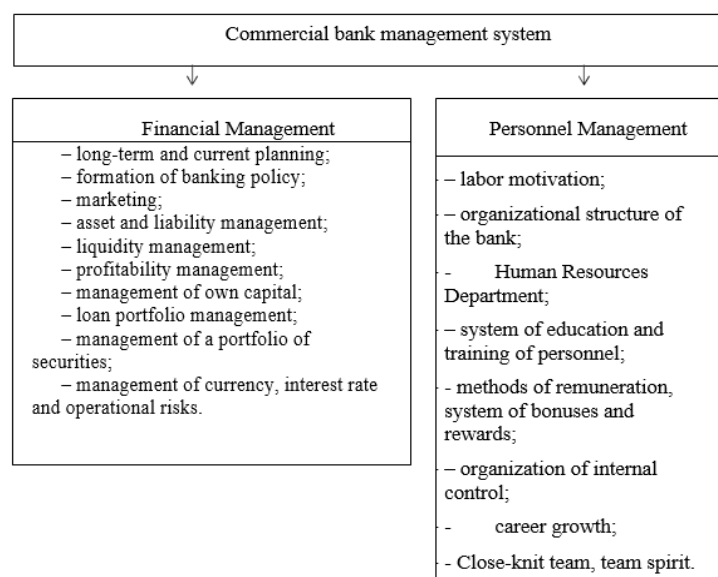


Fig 1. Main aspects in bank management

Planning reflects the content of the bank's strategic goals, analysis of the situation in the banking sector and the economy as a whole, setting current tasks, setting the bank's strategy and mechanisms for allocating resources.

The use of economic and mathematical models in planning the activities of a bank in general and a bank branch in particular allows you to calculate various forecast options for changing initial data, while spending a minimum amount of time.

The issues of identifying, determining and forecasting the main parameters that characterize the financial condition of the bank and affect the efficiency of its work, as well as issues related to the accounting and management of risks arising from this, the management of the banking portfolio are widely considered by foreign scientists.

Various models of banking portfolio management or the idea of end-to-end management of the structure of assets and liabilities that form the balance sheet was created on the basis of modern portfolio theory (portfolio theory), which arose in the mid-1950s. XX century. The models, which are the first attempts to apply modern portfolio theory to banking, were too limited and almost unsuitable for practical use due to their complexity.

To date, a large number of banking models have been developed that have one or more of the following disadvantages:

1. limited applicability (suitable only for a particular bank or its division);
2. narrow focus (they consider only one problem facing the bank (for example, increasing profits, the task of managing liquidity));
3. problems with practical implementation, due to the complexity of the model;
4. The possibility of application depends on the economic situation (for example, in conditions of inflation not exceeding 10% per annum, etc.).

The main limitations of the model arise due to the fact that the Central Bank of Uzbekistan imposes certain limits on the financial activities of the bank and the head bank, in turn, also limits the activities of the bank's branch, then any decisions proposed by the model and related to changes in the balance sheet structure must comply with those specified at various levels of management restrictions. The proposed optimization model for managing the assets and liabilities of a commercial bank branch, taking into account the initial data and the existing system of restrictions, will help to find the best balance sheet structure from the point of view of the person who makes decisions on managing the assets and liabilities of the bank.

The intervals for changing the value of each of the indicators considered in the model (a system of restrictions) are established by an expert, depending on the existing interest rates, prevailing market conditions and current legislation.

CONCLUSION

A multi-criteria problem can be represented as several single-criterion problems in which optimization is carried out according to one of the criteria, while the rest are given in constraints. Based on the proposed model (1)-(6), we can move on to three single-criterion optimization problems:

1. maximizing the percentage profit;
2. maximization of the amount of funds raised by the branch independently;
3. Maximization of the instant liquidity ratio. After finding a solution for each of the optimization criteria, the solutions obtained are analyzed, and the choice of the final version is made by the

decision maker, taking into account the additional non-formalized information he has, the degree of his risk appetite, etc.

REFERENCES

1. Glukhov V.V., Mednikov M.D., Korobko S.B. Economic and mathematical methods and models in management. 2-nd ed. // Textbook. St. Petersburg: Lan Publishing House, 2015. 528 p.
2. Egorova N.E., Smulov A.M. Enterprises and banks: Interaction, economic analysis, modeling. M.: Delo, 2012. 456 p.
3. Zharkovskaya E.P. Financial analysis of a commercial bank: textbook. M.: Omega-L, 2015. 378 p.
4. Rakhmanov M.S. About methods of using valuable information in risk modeling of commercial banks. SAARJ Journal on Banking & Insurance Research. Vol 10, Issue 6, 2021. Pp. 11-20.
5. Sotvoldiyev A.I. Mathematics of economic processes nature and methods of modeling. Science and education scientific journal. Tashkent. 2023. Vol. 4, No. 3. pp. 829-835.
6. www.natlib.uz
7. www.JDU.uz
8. www.TDIU.uz
9. www.ziyonet.uz