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## Credit Risk Assessment Methods in Commercial Banks

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### ABSTRACT

The article focuses on important aspects of credit risk in commercial banks and explores various methods used to effectively manage it. The resulting credit risk, which does not fulfill the financial obligations of borrowers, seriously threatens the stability and profitability of banks. Studies the many strategies and tools used by commercial banks to manage credit risk. In general, this article provides insights into the multifaceted nature of credit risk in commercial banks and provides information on the various methods used by banks to effectively manage and mitigate this common risk factor, thus maintaining their financial health and ensuring sustainable growth.

### KEYWORDS

Risk, credit risk, credit portfolio, market risk, non-performing loan(NPL), diversification

### INTRODUCTION

Credit risk assessment is an important aspect of commercial banks' activities and is necessary to maintain financial stability and profitability. Commercial banks are exposed to various forms of credit risk, including borrower default, counterparty risk and concentration risk, among others. In order to effectively manage these risks, banks use a number of evaluation methods aimed at assessing the creditworthiness of borrowers and reducing possible losses. This essay provides an in-depth analysis of credit risk assessment methods used by commercial banks, showing their strengths, limitations, and development trends.

A study by Guofeng Piao and Biyan Xiao discusses the increasing credit risk faced by commercial banks and the limitations of traditional credit risk assessment models. It suggests the use of data generation modeling and techniques such as support vector machine and artificial neural networks for better credit risk assessment and management (Guofeng, Piao., Biyan, Xiao. (2022)). Tetiana Kosova, Serhii Smerichevskyi, Oksana V.Yaroshevskaya, Svitlana Smerichevskaya, O.S.Zamay's scientific research discusses the relevance of introducing a credit risk management system in banks based on international accounting standards. It mentions techniques such as migration matrices, nonlinear approximation, correlation-regression analysis, statistical

distributions, and forecasting to determine credit risk. However, it does not provide specific information about credit risk management methods in banks (Tetiana, Kosova., Serhii, Smerichevskiy., Oksana, V., Yaroshevska., Svitlana, Smerichevska., O., S., Zamay. (2022)).

Traditional methods of credit risk assessment:

a. **Financial Statement Analysis:** Commercial banks analyze the financial statements of borrowers to assess their financial position, liquidity, profitability and leverage ratios. This method provides valuable information about a borrower's ability to repay loans, but lacks real-time data and may fail to capture quality factors.

b. **Credit Scoring Models:** Banks use credit scoring models based on historical data to determine the creditworthiness of borrowers. These models assign numerical scores based on factors such as payment history, credit utilization, and length of credit history. Although effective for large-scale evaluations, they may overlook individual cases and qualitative factors.

Collateral and asset-based lending:

a. **Collateral Assessment:** Banks assess the value and quality of collateral provided by borrowers to secure loans. Common forms of collateral include real estate, equipment, inventory, and accounts receivable. Collateral reduces credit risk by providing a secondary source of payment, but cannot fully cover potential losses in the event of default.

b. **Asset-based lending:** Banks lend based on the value of certain assets pledged as collateral. Asset-based lending provides flexible financing options, but requires a comprehensive assessment of asset value and liquidity.

Credit risk transfer mechanisms:

a. **Credit derivatives:** Banks use credit derivatives such as credit default swaps (CDS) to transfer credit risk to third parties. CDS contracts provide insurance against borrower default, thereby protecting banks' credit exposure. However, reliance on derivatives requires consideration of counterparty risk and regulation.

b. **Securitization:** Banks package and sell credit risks to investors as securities. Securitization diversifies risk and increases liquidity, but requires greater due diligence and transparency in asset quality disclosures.

Advanced credit risk assessment methods:

a. **Big data analysis:** Banks use machine learning algorithms and big data analysis to improve credit risk assessment. These methods analyze large amounts of data to identify patterns, predict default probabilities, and adjust risk models. While promising, they require complex infrastructure, data privacy protections, and constant model validation.

b. **Stress testing:** Banks conduct stress tests to assess their resilience to adverse economic scenarios and potential loan losses. The stress test simulates various macroeconomic conditions, market shocks and borrower defaults to measure banks' capital adequacy and risk management practices.

Credit risk assessment is a key process in commercial banks and is crucial for managing the risks associated with credit activities. At the heart of this process are various formulas and mathematical models used to determine and evaluate the creditworthiness of borrowers. This essay explores the ins and outs of credit risk assessment formulas, examining their components, applications, strengths, and limitations in facilitating decision making in commercial banks.

Credit Score Formulas:

a. **FICO Score:** The FICO score is one of the most common credit scoring models developed by the Fair Isaac Corporation. It calculates a borrower's creditworthiness based on factors such as payment history, credit utilization, length of credit history, new credit scores, and credit mix. The

formula includes weighted variables to create a numerical score between 300 and 850, with higher scores indicating lower credit risk.

b. **Credit Scoring Models:** Various credit scoring models, including logistic regression and decision trees, use mathematical algorithms to assign credit scores to borrowers. These models analyze historical credit data to predict the probability of default and estimate overall credit risk. Although effective for automated decision making, credit scoring models can oversimplify credit evaluations and ignore quality factors.

Standard probability (PD) formulas:

a. **Structural models:** Structural models, such as the Merton model, estimate the probability of default by modeling a firm's assets, liabilities, and capital structure. The formula calculates distance to default (DTD) based on asset volatility, debt levels and other parameters. The PD is then extracted from the DTD using statistical distributions such as the normal distribution or the log-normal distribution.

b. **Credit Migration Models:** Credit migration models estimate the probability of default by analyzing historical credit rating transitions. These models estimate the likelihood that a borrower's credit rating will deteriorate over time, reflecting increased credit risk. By incorporating transition probabilities and macroeconomic factors, credit migration models provide a dynamic assessment of PD.

Standard loss (LGD) formulas:

a. **Recovery rate models:** LGD formulas estimate the proportion of the loan amount that will not be repaid if the borrower is unable to repay the loan. Recovery rate models use historical data on recovery rates on defaulted loans to calculate expected losses. Factors such as the value of the collateral, the maturity of the loan and recovery efforts affect the recovery rate and subsequent LGD calculation.

b. **Discounted Cash Flow (DCF) Models:** DCF models estimate LGD by discounting the expected future cash flows from an outstanding loan. The formula takes into account factors such as collateral value, liquidation costs, and recovery time to determine the present value of expected damages. DCF models provide a more accurate estimate of LGD, but require more detailed asset-level data and assumptions.

### **CONCLUSION:**

In commercial banks, credit risk assessment methods include a variety of traditional and advanced methods aimed at assessing the creditworthiness of the borrower and reducing possible losses. While traditional methods such as financial reporting analysis and credit scoring models remain common, banks are increasingly adopting advanced techniques including machine learning, big data analysis, and stress testing to increase risk management capabilities. However, the evolving regulatory landscape, technological progress and changing market dynamics require constant adaptation and innovation in credit risk assessment practice to ensure financial stability and sustainable growth in commercial banking operations.

Credit risk assessment formulas play a crucial role in commercial banks, allowing banks to effectively manage credit risk. From credit rating models to the probability of default and loss given by default formulas, these mathematical bases provide valuable insights into the borrower's credit ability and potential credit losses. However, it is crucial to recognize the constraints and assumptions underlying these formulas, including data quality, model robustness, and macroeconomic uncertainty. By using various credit risk assessment formulas and continuously improving their methodology, commercial banks can improve risk management practices and make conscious lending decisions in dynamic market conditions.

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