Assets and Liabilities Management in Banks and Credit Institutions

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By

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AUTHOR'S WORDS

Banks are considered one of the most essential financial institutions in any country's economy. These institutions play a crucial role in national production, employment creation, and ultimately in sustainable economic growth and development by attracting deposits, providing loans, and investing in economic enterprises and projects. Despite the development and deepening of capital markets, banks still account for a significant portion of business financing, with more than 80% of business financing being conducted by banks.Due to the nature of their business and the composition of their assets and liabilities, banks inherently face mismatches in the maturity of their assets and liabilities, which expose them to significant risks. These maturity mismatches include liquidity risk, interest rate risk, and exchange rate risk. Asset and Liability Management (ALM) serves as a strategic tool to manage these mismatches by simultaneously planning the cash flows of bank assets and liabilities and determining an optimal balance sheet composition. This approach aims to reduce interest rate risks, ensure liquidity, and strengthen the bank's value.

This textbook is designed in the format of a university textbook. The Assets and Liabilities Management course is considered one of the specialized courses in banking and financial economics. The book comprehensively covers principles, techniques, and tools for managing mismatch risks, cash flow management of banks, and other topics related to Assets and Liabilities Management in banks and credit institutions.

The current book is structured into 14 chapters. Chapter 1 covers the fundamentals and principles of Asset and Liabilities Management. Chapter 2 discusses the types of risks that banks and credit institutions are exposed to. Chapters 3 to 6 delve into liquidity management topics, including various liquidity risks, measurement methods for liquidity risk, and principles of liquidity management.Chapters 7 to 9 of the book cover interest rate risk topics, including types of interest rate risks, methods for predicting interest rates, theories of the term structure of interest rates, techniques for measuring the impact of interest rate fluctuations on income and bank asset values, and principles of interest rate risk management. Chapter 10 discusses methods for pricing fund transfers between bank

branches.Chapters 11 to 13 of the book focus on foreign exchange risk, covering types of exchange rate risks, measurement methods for exchange rate risk, risk management, and tools and strategies for hedging exchange rate risk. The final chapter of the book discusses the model for strategic planning to determine the optimal mix of assets and liabilities for banks to achieve multiple objectives such as reducing various risks, ensuring liquidity, and increasing bank profitability.

CHAPTER 1

FUNDAMENTALS OF ASSETS AND LIABILITIES MANAGEMENT IN BANKS AND CREDIT INSTITUTIONS

Asset and Liability Management (ALM) is a strategic tool for managing mismatch risks, including interest rate, liquidity, and foreign exchange risks, within banks and financial institutions. ALM facilitates the management of maturity mismatches between assets and liabilities. In addition to these aspects, ALM encompasses other critical dimensions related to assets and liabilities, such as financial performance analysis and the calculation of the weighted average cost of funds. Bank ALM is defined as the simultaneous planning of all bank assets and liabilities that constitute the bank's balance sheet composition, aimed at reducing interest rate risk, ensuring liquidity, and enhancing the bank's value. One quantitative technique used for managing assets and liabilities in banks is the strategic planning model. The primary question here is: What should be the composition of assets and liabilities to achieve specific goals, such as maximizing net income effectively, considering average returns and costs associated with them?

ALM is designed for use by bank managers, treasury officers, branch managers, specialized ALM experts, and strategic planners within banks. The concepts and topics presented in this book will also benefit and be useful for central bank managers, auditors, consultants, and legal professionals. In the initial chapter, fundamental concepts are studied, and in subsequent sections, more advanced topics will be thoroughly examined, encompassing the entirety of Asset and Liability Management discussions.

1.1 The function of a bank

Banking today is recognized not only as an economic structure but also as a fundamental pillar for development and economic progress. This industry plays a crucial role not only in regulating and moderating monetary policies

and influencing interest rates but also in providing financial facilities, including banking loans, to companies and individuals, enabling them to invest and expand their economic activities.Banks, as key economic enablers, enable investors and entrepreneurs to manage their resources more efficiently through the attraction and management of financial resources. This fosters greater economic vitality within society. These actions not only lead to increased production and employment but also help reduce inflation and unemployment rates, thereby enhancing overall public welfare.Furthermore, banks play a vital role in microeconomics by timely providing financial services and facilities to companies and individuals, fostering the development and expansion of businesses, and consequently improving societal well-being and increasing social prosperity.Therefore, when banks effectively allocate resources and implement fiscal policies, they can contribute to sustainable economic growth and have a positive impact on society and the economy. However, failure to do so may lead to resource wastage and have adverse effects on the economy.

Therefore, banks must continuously monitor their assets and liabilities. Asset-liability management involves a set of tools and technical methods that create value for shareholders and ensure control and supervision over risks.Today, the growing trend in banking globally is shifting from balance sheet item development to focusing on capital return rates and risk control. This shift makes asset-liability management knowledge essential for bank managers to fulfill their duties efficiently. If banks succeed in controlling banking risks, they not only ensure their sustainability but also protect themselves during crises.

1.2 Bank Portfolio

Bank commercial managers face one of the most complex and critical challenges in banking: managing the bank portfolio. Decisions made in the past not only impact current bank conditions but can also incur significant additional costs for the bank. For instance, attracting long-term deposits at high rates may lead to substantial costs over many years, and granting long-term loans could result in a loss of resources and control over them by the bank.Nevertheless, determining the optimal portfolio composition requires a delicate balance between various metrics such as profitability, income, liquidity, and risk. This process is highly intricate and demands precise evaluation and appropriate weighting of each factor related to the portfolio. Assessing these factors and examining their impact on the bank's operational position enables bank managers not only to mitigate financial

risks but also to maintain desirable returns.In forming a bank portfolio, it's crucial not only to evaluate the return and risk of each asset or liability individually but also to calculate their returns and risks along with their correlation coefficients with other portfolio items. This comprehensive approach to portfolio management empowers banks to strategically manage risk and resource efficiency strategically, thereby achieving financial stability and optimal performance.

1.3 Financial Statements

Managing Assets and Liabilities (ALM), as balance sheet management, is widely regarded as crucial in financial institutions due to the significant role assets and liabilities play in the economy. This management encompasses processes that financial institutions undertake to optimize their balance sheets. The balance sheet, as a fundamental economic tool, indicates which entities or institutions a financial institution is indebted to, what assets it possesses, and how these assets are funded. It also illustrates how these assets are utilized to meet the financial and operational needs of the financial institution.The Income Statement, another primary financial document, provides a measure of the financial performance of a financial institution over a specific period. It shows how profitable the institution has been during a defined period and how efficiently it has utilized its resources.Furthermore, the Cash Flow Statement displays various financial flows of a financial institution, including operational flows (such as sales and purchases, operational expenses, cash inflows, and outflows due to primary activities), non-operational flows (like investments and financial activities), and financing flows (such as issuing new shares or debt). This statement helps the financial institution optimize its financial resources and ensure access to resources to meet its needs.Ultimately, the balance sheet, income statement, and cash flow statement are critical documents in analyzing a financial institution's financial position. They provide valuable information for managers and investors to make informed decisions regarding investments, financial provisioning, and risk management.

1.4 Assets and Liabilities Management (ALM)

Assets and Liabilities Management (ALM) encompasses a set of technical tools and methods aimed at creating value for shareholders and controlling risk. Since one of banks' primary financial management functions is asset and liability management, banks utilize ALM techniques to maximize profitability while monitoring risks to minimize losses from their

transactions. Proper evaluation of the asset and liability management status of a bank requires a correct understanding of the nature of assets and liabilities, customers, the economy, and the competitive environment in which the bank operates. Managing assets and liabilities involves actively attracting deposits to meet loan demand. Competitive pricing of deposits in the form of short-term and long-term deposit interest rates directly results from debt management.

Today, due to the risks and uncertainties arising from the integration of financial markets and technological innovations, investors often struggle to navigate their assets to achieve satisfactory returns amid this instability, numerous constraints, and debt-related commitments. Additionally, investors ponder how to integrate decisions regarding asset and liability utilization to effectively enhance their wealth accumulation.ALM is actually a domain that considers answers to all these questions and issues. In particular, it can be said that ALM is indeed one of the most critical dimensions of risk management.Until the 1960s, debt management proceeded without a clear objective. Most banks and financial institutions regarded debts as internal factors that could constrain asset management. In fact, for a long time, a significant portion of capital resources originated largely from savings.

Debt management is considered one of the primary components of any bank's strategy, enabling a bank or financial institution to use it to embark on investments through the most cost-effective means possible. The importance of decision-making regarding sufficient capital adequacy has also concurrently intensified.Capital adequacy can mitigate the risk of bankruptcy, where bankruptcy refers to a situation in which a bank cannot repay its debts to depositors who have entrusted their money to the bank or to individuals who have taken out loans.Furthermore, the adequacy of banks' capital is influenced by changes in stock prices relative to the amount of capital. Ultimately, the minimum level of capital exists as part of commercial banks' obligations to the central bank. It is worth noting that based on the latest data published by the Basel Committee, the capital adequacy ratio for Tier 1 capital has been set at 12%.Managing assets in today's banks cannot be separated or distinguished from managing liabilities and debts. Simultaneous management of assets and liabilities aims to increase efficiency, profitability, and reduce risk, requiring analysis and consideration of several factors:

1- Estimating the total amount of deposits a bank intends to attract and the total amount of loans it aims to secure and provide.

2- Identifying the types of risks associated with assets and liabilities and selecting appropriate methods for risk management.

3- Calculating effective maturity (duration) of assets and liabilities to measure the impact of interest rate changes on the net present value of assets.

4- The issue of planning and creating a separate pricing system for each product or service is highly important. As long as asset management is considered, pricing becomes intertwined with risk management and risk tolerance. It's a common practice for banks to determine loan interest rates based on existing risks.

5- Effective asset and liability management requires skilled and experienced personnel collaboration.

1.5 Asset and Liability Management Committee

The Asset and Liability Management Committee, as a vital part of the bank's organizational structure, is responsible for strategically guiding the bank's assets and liabilities. This committee operates under the oversight of the board of directors and is tasked with supervising and detecting various risks associated with the bank's assets and liabilities. Additionally, it oversees the bank's daily activities.Overall, this committee acts as a central coordinating body for the bank's various activities and sets operational objectives. For optimal bank planning, the Asset and Liability Management Committee requires gathering reports and diverse information from different parts of the bank. This information includes financial, operational, risk-related aspects, market conditions, and other significant bank activities related to its assets and liabilities. These reports and information help the committee make more effective strategic and operational decisions regarding the management of the bank's assets and liabilities and ensure that established goals are pursued in the best possible manner.

1.6 The goals of asset and liability management

In fact, the aim of managing assets and liabilities is to enhance the quality and quantity of assets, considering the risks associated with them, for future management. To achieve this goal, banks must pursue investments with the highest returns, resources with the lowest costs, thereby maximizing profits. However, all of this should be done while taking into account various risks

that threaten the profitability of banking activities and finding ways to control them as effectively as possible.

1.7 Assets management

The right side of the balance sheet depicts the allocation of deposits and bank capital. The composition of these assets, and indeed the quality of these assets, impacts the profitability of the bank. Financial analysis, in fact, is meaningless without a proper understanding and recognition of the value of the bank's assets. When examining the composition on the right side of the balance sheet, it's essential to assess the risk and return of all assets.Banks' major assets include cash, facilities based on Islamic contracts conducted in accordance with banking operations law without interest, and bank investments, which encompass investments in company shares, government and non-government securities, and even deposits in other banks or financial institutions.Issuance of guarantees, documentary credits, and similar operations are among authorized banking activities. Although these are classified under off-balance sheet items due to their contingent nature, they still impact the profitability and risk of the bank. Typically, assets with higher income returns impose higher risks on the balance sheet, while those with lower risks often experience significantly reduced returns.For example, holding cash in vaults significantly reduces the bank's liquidity risk but overlooks potential income that could have been earned. Therefore, bank managers must create a logical balance in the composition of balance sheet items to not only maximize income but also minimize costs and risks effectively.

1.8 Strategies for Asset Management

Strategies of ALM can be categorized into three main groups:

a) **Asset Management Strategy:** This strategy pertains to controlling cash inflows by allocating facilities and determining interest rates.

b) **Liability Management Strategy:** This strategy focuses on controlling financial resources and monitoring the composition and cost of demand and non-demand deposits through price and interest rate controls.

c) **Liquidity Management Strategy:** This strategy is considered a combination of the above two strategies. Specific strategies aimed at

increasing or decreasing the sensitivity of assets and liabilities are presented in the table below:

Table 1-1. Liquidity Management Strategies in Banks and Financial Institutions

Method	Purpose
Reducing assets sensitivity	Purchasing long-term securities, lengthening maturity periods
Increasing assets sensitivity	Purchasing short-term securities, shortening loan maturities
Reducing liabilities sensitivity	Attracting long-term deposits
Increasing liabilities sensitivity	Attracting short-term deposits

1.9 The effectiveness of assets and liabilities management

ALM in banks is a strategic process aimed at optimizing the management of assets (such as loans and investments) and liabilities (such as funds collected from customers), while effectively controlling interest rate and liquidity risks. The primary goal of ALM is to enable banks to achieve better financial performance through enhanced efficiency in asset utilization, cost reduction, and improved profitability.To achieve these objectives, ALM goals need to be clearly defined and aligned with a theoretical framework that accommodates the financial, economic, and regulatory environment. These goals may include optimizing interest rates, managing liquidity risks, maximizing financial resource utilization, and maintaining a balanced portfolio of assets and liabilities.Decisions in ALM should be implemented using suitable methods that are transparent, executable, and impactful. This involves leveraging advanced analytical models and tools for predicting and optimizing the structure of assets and liabilities, efficiently managing interest rates, and devising liquidity management strategies.

Effective ALM decision-making requires access to comprehensive and accurate information. This includes historical performance data of assets and liabilities, current status and future projections, maturity profiles, and interest rates. Additionally, sufficient information about the competitive landscape, asset-liability ratios, market yields, and major competitive

factors is crucial for making informed decisions.In banks, the ALM unit is responsible for managing interest rates and liquidity risks. The Asset and Liability Committee (ALCO) within banks is entrusted with executing decisions related to ALM. ALCO members rely on detailed analysis and reliable data to make decisions aimed at enhancing financial performance and mitigating financial risks effectively.

1.10 Mission and Scope of Operation of ALM

The technique known as ALM has gained public popularity in recent years and has been utilized from the outset as a method for regulating cash flow and compiling statistics. Today, ALM constitutes a conceptual framework for financial management and professional activities. In a world directed by financial markets and physical commodities, it is crucial to systematically analyze the economic impacts on balance sheet changes, revenue growth, and company valuation. In general terms, the mission and scope of ALM's operations can be expressed as follows:

Table 1-2. Mission and Scope of ALM Operations

Liquidity Management	- Financing to cover deficits - Investment of surplus funds - Liquidity ratios
Measurement and Control of Interest Rate RiskRecommendations for Off-Balance Sheet Items:	- Reporting of gaps and current valuations -Risk mitigation plans and hedging strategies
Recommendations for On-Balance Sheet Items:	- New business ventures -Current portfolio
Transfer Pricing	- Economic and benchmark prices -Benchmark pricing
Preparing the Asset-Liability Management Committee (ALCO)	- Analyzing deviations (forecasts vs. actuals) and recent status

	- GAP reporting and current Net Present Value (NPV) assessment -Scenario analysis and simulations
Risk-adjusted Pricing	- Increase in transfer pricing rates (from credit risk allocation system) - Incorrect pricing: Gap between target prices vs. - Effective prices
Reporting to senior management	

1.11 Traditional Asset and Liability Management

Traditional Asset and Liability Management refers to the process where banks and financial institutions focus on managing their assets and liabilities to optimize profitability and reduce financial risks. This includes managing asset portfolios (such as loans and investments) and liabilities (such as funds collected from customers and other financial sources), managing liquidity, controlling financial risks like interest rate and liquidity risk, and aligning financial strategies with overall business goals and strategies.Functions of traditional ALM typically include:

- Interest rate risk management
- Analysis of income sensitivity to interest rate changes
- Maturity gap analysis
- Analysis of portfolio value sensitivity to interest rate changes
- Duration and convexity gap analysis
- Scenario analysis
- Prepayment modeling
- Liquidity reporting
- Hedging reporting
- Capital adequacy
- Debt servicing
- Leverage ratios
- Regulatory capital ratios

These established elements articulate and elucidate their own status. For example, maturity gap analysis measures the absolute value difference between assets and liabilities sensitive to interest rate changes. This analysis

aims to assess the sensitivity of assets and liabilities to interest rate fluctuations, thereby determining the bank's risk exposure arising from interest rate changes.The Gap ratio, commonly used, is defined as follows:

$$\text{Gap ratio} = \frac{Assets\ sensitive\ to\ interest\ rate}{Debts\ sensitive\ to\ interest\ rate}$$

A positive gap indicates that assets sensitive to interest rates exceed liabilities sensitive to interest rates. If interest rates rise (or fall), the net interest margin will increase (or decrease).A negative gap indicates that liabilities sensitive to interest rates exceed assets sensitive to interest rates. If interest rates rise (or fall), the net interest margin will decrease (or increase). When the gap ratio is above one, the ratio is greater than one, and when the gap is negative, the ratio is less than one.

Gap analysis typically evaluates the net asset value of a bank based on interest rate changes, focusing on changes in the market value of liabilities and assets. Therefore, the duration gap is commonly defined as follows:

$$\text{Duration Gap} = (\text{Duration of assets}) - \text{W}^{*}(\text{Duration of liabilities})$$

W represents the percentage of assets financed through borrowing. It's clear that the maturity gap indicates the impact of changes in the net value of the bank, where a larger gap exposes the bank to greater interest rate risk. Traditional ALM methods have not been very successful. Some reasons for the traditional ALM's lack of success include:

The methods of this process excessively focus on short-term net interest income management and are unable to identify potential changes in balance sheet values.Scenario analysis in traditional ALM is extensively used, but interest rate scenarios created often contradict future interest rates and expected market price fluctuations. Therefore, cash flow projections and net income based on these scenarios are unrealistic.Simulation of income is synonymous with traditional ALM. But does this really happen? The objective of such simulations is to maximize potential income over the specified horizon, typically spanning one or two years.In addition, simulations$N$ can lead to more errors, rendering experiments futile because they often do not include the risk simulation component. Profits are calculated nonetheless, but no assessment of risk is conducted. Given that modern balance sheets are more dynamic and complex, various types of risk assessment are necessary to achieve effective and high-quality horizons.

1.12 Approach to the new asset and liability management

It seems like you have listed several proposed enhancements to traditional ALM processes to address existing deficiencies. Here is the translation of your list:

- Redefining the role of treasury and ALM committee
- Analysis of adjusted gap with discretion
- Organizational-level risk management integration
- Risk-adjusted value methods
- Introduction of new risk measurement metrics
- Performance measurement adjusted for risk
- Credit risk management
- Planning for asset securitization
- Expanded role of credit derivatives
- Document management systems
- Interest rate gap and liquidity gap management

These processes aim to complement traditional ALM methods by incorporating additional frameworks and strategies.

1.13 Chapter One Summary

Asset Liability Management (ALM) is one of the strategic tools for managing mismatch risks (including interest rate risk, liquidity risk, and currency risk) in banks and financial institutions. ALM, also referred to as balance sheet management, aims to minimize losses from these mismatches by optimizing the mix of assets and liabilities. The goal is to enhance investment returns and profitability while keeping mismatch risks at a minimum.The primary objective of ALM is to enhance the quality of assets and liabilities to create value for shareholders and control risk. ALM strategies include debt management strategies focusing on controlling the mix of financing sources, asset management strategies concerning resource allocation and investment mix, and liquidity management strategies, which combine asset and liability management strategies. Currently, the main strategy in ALM is liquidity management.ALM encompasses liquidity management, interest rate risk management, currency risk management, transfer pricing, and risk-based pricing as its primary operational domains. To ensure the effectiveness of ALM, it is crucial to establish appropriate structures and formations within the bank, clearly defining the roles of the board of directors and senior managers. In some banks, there exists a

department specifically dedicated to Asset and Liability Management responsible for overseeing interest rate risk, liquidity risk, and currency risk. The Asset and Liability Committee (ALCO) is tasked with implementing decisions made by this department, supported by technical units that provide necessary analyses for decision-making and executing ALM models.

CHAPTER 2

TYPES OF RISK IN BANKS AND CREDIT INSTITUTIONS

Banks form a part of a country's financial system. They attract deposits from households and various entities and then provide capital through lending to individuals and companies and direct investment in projects and companies. Through these operations, they facilitate the flow of goods and services from producers to consumers and the government's investment activities. Therefore, they contribute to the developmental methods of a country. On the other hand, they provide the tools and means for implementing monetary policies and strategies. Hence, the banking system is of great importance to the economic condition of a country.

2.1 Main Activities of Commercial Banks

Commercial banks play an important role in a country's economy because they influence the money supply and capital formation. This situation is particularly evident in developing countries, as they create a mechanism for accumulating savings, forming capital, and distributing it to units facing a shortage of funds.These capabilities lead banking regulatory authorities to formulate special regulations aimed at fostering desirable economic growth and development in countries. These regulations include rules regarding claims, reserve maintenance in banks, capital adequacy, liquidity, deposits, interest rates on deposits, loan interest rates, and other banking transactions. Such laws impose limitations on the decisions of banks, affecting their financial structure, activities, and portfolio composition.

The activities of commercial banks are organized in various forms, but a significant portion of a bank's assets consists of different types of loans granted to individuals and companies. Similarly, a major portion of a bank's liabilities relates to various types of deposits attracted from depositors. Decisions regarding the structure of the balance sheet constitute one of the most important decisions for commercial banks, as they affect their income. Nonetheless, banks must also consider a series of other important decisions,

which may be more challenging, especially if uncertainty continues to exist in the financial market.The main objective of commercial banks, like other economic enterprises, is to increase the wealth of their shareholders while considering the constraints imposed by responsible authorities. Therefore, they adjust their portfolio to achieve this goal.

2.2 Basic policies of commercial banks

The basic policies in commercial banks include financial provisioning policies, lending policies, liquidity management, risk management, and capital adequacy.Attracting financial resources is essential in bank management because every bank needs sufficient financial resources to conduct its operations. Banks utilize various tools to attract financial resources, including different types of deposits, borrowing from the central bank, and issuing various types of securities. Each bank must assess the cost of capital from various sources and flexibly procure financing accordingly. Additionally, a bank must consider factors affecting capital when making decisions about its structure and ensure satisfactory income from utilizing these targeted resources. Furthermore, given the competitive environment among various financial institutions today, achieving the goal of securing financial resources remains a focal point of attention.

Providing loans and various types of credit facilities to businesses and individuals forms the core operations of banks. It necessitates the implementation of a planned credit policy aimed at generating higher income and returns while minimizing risks. A bank must decide on the amount of each type of loan in its credit portfolio mix, considering economic needs and the bank's capacity. This decision-making process should align with economic requirements and the bank's capabilities.In addition, banks must decide on the distribution of their capital among various types of loans, considering differences in maturity and risk levels among these loans. Banks need to conduct thorough market analysis and, based on the returns and risks associated with each loan, structure their loan portfolio accordingly. Furthermore, banks must determine interest rates on loans based on their risk levels. However, banks have flexibility in setting their policies regarding interest rates based on varying degrees of flexibility.Another fundamental policy of commercial banks relates to their liquidity management, especially assessing and measuring the needs associated with deposit and loan trends. To address these needs, banks engage in debt management and strive to match the maturity of their assets and liabilities to safeguard against liquidity shortages.Additionally,

investments in securities in the secondary market play a crucial role as sources of liquidity and income in the liquidity management of a bank. Since random investments can lead to outcomes that may not align with a bank's desired objectives, portfolio management of investments is highly important for a commercial bank.

Risk factor in investments plays a crucial role in the investment tools and portfolio composition of a bank. Therefore, another key policy of a bank is risk management. Banks aim to reduce the risk of their investments by holding assets with less than complete correlation in their returns. Diversifying assets helps mitigate investment risk through diversification.Additionally, capital adequacy is of paramount importance for a commercial bank because banks utilize capital in attracting financial resources, supporting deposits, ensuring necessary confidence in banking operations' development and improvement, and covering losses resulting from investment risks. However, excessive capital can lead to reduced bank income. Nonetheless, capital adequacy policies aim to accept an acceptable level of risk, as risk in banking activities can lead to higher income.

2.2.1 Accumulation of Capital Policy

Accumulation of capital is a fundamental element of management policies in commercial banks, crucial for attracting capital and securing essential financial resources for banking operations. This article explores the importance and methods of capital accumulation by commercial banks.Commercial banks require sufficient financial resources to conduct banking operations effectively. Therefore, capital accumulation is crucial to ensure adequate resources and strengthen the financial position of banks. With increased capital, banks can offer more diverse and extensive services to their customers and wield greater influence in the market.To attract capital, banks employ various methods and tools, including:

- Issuance of Bonds and Certificates of Deposit: Banks issue different types of bonds that allow investors to invest capital in the bank. Additionally, issuing certificates of deposit with varying terms and interest rates is another tool used to attract capital.

- Opening Various Deposit Accounts: Banks offer different types of deposit accounts with varying conditions, motivating investors to accumulate their capital in the bank. These accounts may include current accounts, fixed deposits, and specialized investment accounts.

- Borrowing from Other Banks: Some banks resort to borrowing from other banks to increase their financial resources, thereby enhancing their financial position.

For banks, reputation and the interest rates offered on deposits are critical factors in attracting depositors. Banks with a reputable name and competitive interest rates typically have a higher ability to attract capital, converting it into sufficient financial resources for their banking activities.Capital accumulation is fundamental for commercial banks, enhancing their financial base, competitive strength, and ability to provide better services to customers. By utilizing appropriate methods and tools, banks can effectively capitalize on these opportunities and improve their financial position.

2.2.2 The lending policies

Lending operations are crucial for commercial banks. Developing appropriate lending policies to achieve higher income and minimize risk is highly important. Other characteristics of bank loans also require attention. Bank loans play a significant role in generating deposits and attracting customers to perform other banking operations. The returns from loans should appropriately compensate for the associated risks, reflecting the level of risk involved. Due to the lack of tradability of loans, the interest rate on loans should be set to not only cover potential risk losses but also generate sufficient income. Therefore, the higher the risk associated with a loan, the higher its interest rate should be.

Traditionally, banks aim to maintain interest rates at a level derived from the central bank's set benchmark rate. While commercial banks classify customers based on products, geographic regions, and other factors, they often operate with incomplete information regarding borrower risks. However, banks strive to enhance their risk information by establishing databases of loan delinquencies to better understand the risks associated with their loans.

2.2.3 Cash Management Policy

Commercial banks must also evaluate their cash needs and the methods to meet these needs. These needs are determined by the difference between loans extended and the status of bank deposits. These evaluations are based on past experiences and various regulations that must address different

variables. Banks must maintain liquidity at an acceptable level by matching the maturity of their assets (loans) and liabilities (deposits).

Maintaining an adequate level of liquidity is indeed a challenging process for banks, often requiring specific transactions that banks frequently struggle to manage. One method they typically use involves managing liabilities, which means acquiring debt in the market to cover demands for loans or covering maturing withdrawals and deposits. These activities involve attracting deposits at interest rates higher than the capital market and obtaining loans from the central bank as needed.These activities involve attracting deposits at interest rates higher than the capital market and obtaining loans from the central bank as needed. However, such a policy can be very costly, especially for smaller banks. They can mitigate their liquidity needs by investing in assets with high liquidity, although this approach may reduce their income.

2.3 Risk management in banking

In the banking industry, various risks arise due to several reasons. Some of these reasons include the diversity and variety of banking operations, differences in the nature of operations, the capital position of banks, maturity profiles of assets and liabilities, exchange rate fluctuations, and the diverse financial conditions of borrowers. These risks threaten the profitability of banks, leading to reduced profitability, non-profitability, or financial losses. Banks constantly face these risks in their operations.Generally, banking risks are classified into four main categories: financial risk, operational risk, business risk, and categorial risks. Financial risks are divided into pure risks, including liquidity and credit risks, and speculative risks, including interest rate risks, exchange rate fluctuations, and market price changes.

Furthermore, financial risks often entail complex internal dependencies that can significantly increase the overall risk profile of a bank. For instance, a bank involved in currency exchanges faces the risk of interest rate fluctuations and liquidity risk if it fails to meet future commitments in timely manner, along with its exposure to exchange rate risks.Operational risks in banking relate to the organizational structure, internal systems performance including computer technologies and other technologies, and adherence to systems and procedures, which assess mismanagement and fraud.Commercial risks in banking pertain to the bank's business environment, including macroeconomic factors, policies, legal and

regulatory aspects, financial infrastructure, and payment systems. Specific risks encompass all external risks that, if significant, can jeopardize bank operations or undermine financial status and capital adequacy.

Table 2-1. Types of Risks in Banks

Event Risks	Commercial Risks	Operational Risks	Financial Risks
Political	Major Policies	Internal Fraud	Balance Sheet Structure
Transitional	Financial Infrastructure	External Fraud	Profit and Loss Statement Structure
Banking Crisis	Legal Infrastructure	Employment Practices and Job Security	Capital Adequacy
Other External Risks	Legal Debts	Customer and Producer Services	Credit
	Compliance	Impairment of Tangible Assets	Liquidity
	Reputation and Credibility	Business Failure and Inefficiency of Systems	Market
	Country Risk	Implementation, Outsourcing, and Process Management	Currency / Foreign Exchange

As mentioned in the previous section, uncertainty and risk play a crucial role in the capital and loans that form the core of commercial bank asset and liability management. The concept of financial risks, along with their assessment and risk management techniques, will be discussed in the following section.

2.3.1 Financial Risks

Financial risks are associated with fluctuations in financial markets. Naturally, because financial risks directly impact the performance of banks, banks are more actively engaged with financial risks. The financial risks that a bank faces include market risk, interest rate risk, credit risk, exchange rate risk, liquidity risk, and bankruptcy risk. Efficient management of these risks is crucial for determining the performance of financial institutions.In recent decades, the management of financial risks has made significant advancements due to the turbulence present in international financial markets. Several factors and events control this new turbulent environment. The breakdown of the fixed exchange rate system in 1971 led to variable exchange rates. The energy crisis that began in 1973 persisted until 1979, stabilizing inflation rates at higher levels and escalating into a global crisis in the 1980s, putting many Eastern European banks, which were lenders, in difficult positions. The capital market development in developing countries in the 1990s was accompanied by severe crises. However, in developed markets, the environment became even more unstable.

As mentioned in the previous section, traditional banks historically acted as intermediaries between surplus and deficit units. In today's financial environment, the role of financial institutions has become more complex. Banks have shifted from mere intermediation towards actively managing financial risks. This shift away from intermediation has allowed companies to directly source funds from money and capital markets.Therefore, given that banks are keen on maintaining their profitability, they must engage in effective risk management. In a competitive environment, this becomes crucial for profitability.

Financial risk is generally defined as the variability in returns due to unexpected changes in securities markets, equities, and other financial products. Regulatory authorities in each country must understand the nature of these risks and examine how commercial banks assess and manage their effectiveness.In a bank focused on maximizing profits, financial risk can be assessed by calculating the variance or standard deviation of net income. This calculation can be done either at the level of the entire bank or the level of branches or specific services.Risk can be measured at various levels within different banking services. However, the goal of a bank is to enhance its shareholder value or maximize risk-adjusted return. In this regard, a bank operates like any other company. Nevertheless, the ability to generate profits and add value significantly depends on effective risk management. Ineffective risk management can pose a serious threat to the bank.

2.3.1.1 Market risk

Market risk arises from uncertainty related to changes in interest rates, foreign currencies, and overall market parameters. Market risk involves fluctuations in interest rates, exchange rates, and the value of other assets, affecting the overall portfolio of assets and liabilities. Market risk increases particularly when a financial institution exchanges its assets and liabilities for long-term investment purposes instead of holding them.Market risk is also known as systematic risk. This type of risk pertains to changes in the value of all elements in the market, and therefore, it cannot be reduced through portfolio diversification. In contrast to systematic risk, there is non-systematic risk. Non-systematic risk relates to the value of specific internal factors of a firm and can be mitigated through diversification.

2.3.1.2 Interest rate risk

With mismatches between assets and liabilities, a financial institution potentially exposes itself to interest rate risk. An unexpected change in interest rates can impact the profitability and equity value of the institution. For example, if a bank's liabilities are more sensitive to interest rate changes compared to its assets, an increase in interest rates can decrease profitability, whereas a decrease in interest rates can increase profitability.For a better understanding of interest rate risk, let's consider an example: Suppose a financial institution issues bonds with a maturity of one year and lends out funds with loans maturing in two years. Assume the borrowing costs for the financial institution are 9% per annum, and the lending rate for loans is 10% per annum.During the first year, the financial institution can generate profit by borrowing short-term (for one year) and lending long-term (for two years) at a one percent spread. However, its profit in the second year becomes variable. If the interest rate level remains unchanged, the financial institution can roll over its debts at 9% again in the second year and maintain a 1% profit margin.There is always a risk that the interest rate may change between two years. If the interest rate increases and the financial institution borrows at 11% in the new year compared to 10% in the second year, the profit in the second year will indeed be negative (10%-11%=-1%). Positive income from holding assets longer than liabilities in the first year can be neutralized by negative growth in the second year due to financial risk. Consequently, when a financial institution holds assets longer than liabilities, it exposes itself to the risk of refinancing or borrowing funds again, which may incur higher costs than the income generated from asset investments.

In addition to the potential decrease in income due to refinancing risk, during changes in interest rates, a business also faces the risk of market value decline of its assets. The value of assets or liabilities is conceptually equal to the present value of their future cash flows. Therefore, an increase in interest rates leads to an increase in the discount rate, which reduces the present value of future cash flows of assets and liabilities. As a result, with increased interest rates, the market value of assets or liabilities decreases. Conversely, decreasing interest rates increases the market value of assets and liabilities. If the maturity of assets exceeds that of liabilities, this means that when interest rates rise, the market value of a financial institution's assets decreases more than that of its liabilities. This situation exposes the financial institution to the risk of bankruptcy.

2.3.1.3 Credit risk

Credit risk is one of the most significant risks that banks often face and has been recognized as the primary risk by the Basel Committee. This risk refers to the possibility that the borrower may default on the repayment of the principal and interest of their debt. The high level of overdue loans in banks and doubtful receivables in companies indicates that credit risk is one of the most critical risks that financial institutions, especially banks, are confronted with.One of the important aspects of the process of granting facilities by banks or selling on credit by companies is the realistic estimation of the likelihood of default by customers. This helps to take necessary actions and decisions to prevent or mitigate potential losses. Although in the real world, it is usually impossible to completely eliminate the risk, understanding the factors that cause it can help reduce it as much as possible.

Commercial banks must always consider fundamental rules and criteria in the allocation of resources when granting facilities and strive to minimize potential risks in their decision-making. On one hand, the expansion of banking activities in Iran, and on the other hand, the importance of understanding and examining credit risk in the country's banks, is increasingly felt. Therefore, the key point is to create a model based on which this risk can be identified and reduced.

2.3.1.4 Currency risk

This risk refers to the potential loss arising from unfavorable fluctuations in exchange rates and is caused by the mismatch between foreign currency receipts and payments. Currency risk has a speculative nature and can occur

in both spot and forward currency markets. International banks are highly exposed to this risk. It may have a direct or indirect impact on the bank or financial institution. Its direct impact is evident through the revaluation of the bank's foreign currency assets and liabilities into its domestic currency.

2.3.1.5 Liquidity risk

Liquidity risk refers to a bank's inability to meet its matured liabilities or to obtain funds to increase its assets. In other words, likely, a bank will not be able to fulfill its short-term financial obligations. This risk can manifest in the following ways:

- Inability to meet short-term obligations
- Inability to secure short-term financial resources when needed
- Inability to obtain short-term financial resources at a reasonable cost

Ultimately, liquidity risk means experiencing difficulties in obtaining the necessary funds. Liquidity risk refers to the ability to secure funds at a reasonable cost. This ability is influenced by two sets of factors:

- The level of market liquidity varies over time.
- The level of the bank's liquidity.

The interaction between these two sets of factors can determine the funding conditions for a bank. The cost of obtaining funds may increase due to short-term liquidity shortages in the market. Market liquidity significantly impacts the cost of funds for all market participants. The ease of accessing the necessary funds also depends on the organization's own characteristics, such as its funding needs and stability over time, the timing of cash flows from loans, the bank's creditworthiness, financial position, debt repayment capability, and all other factors that could affect the bank's rating. Ultimately, changes in a bank's rating will affect the rate and cost of obtaining funds.Some of these factors relate to creditworthiness stability, while others relate to funding policy. If a bank's credit rating decreases, the cost of obtaining funds will increase. Conversely, if there is a temporary emphasis on obtaining high funds or an unusual fluctuation occurs, the market's response will be negative. All of the above issues create a gap between asset and debt maturity, with banks often attracting short-term resources and lending long-term loans. Exposure to this form (asset-liability mismatch) leads to liquidity risk and costly funding.