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Definition of ALM in the Banking and Insurance Areas

1.1. Introduction

In recent years, the technique known as asset and liability management (ALM) has enjoyed remarkable popularity. Initially pioneered by English-speaking financial institutions during the 1970s as an actuarial and cash flow matching technique, ALM has grown into an essential framework for banks and insurance companies.

The objective of ALM is to ensure the proper coordination between assets and liabilities to achieve the financial targets for a specified level of risk and under predefined constraints. The ALM department, whether in an insurance company or in a bank, is therefore responsible for producing studies providing recommendations on marketing strategy and asset allocation.

In recent years, the ALM department has become increasingly important in a bank or an insurance company for three main reasons. First, modeling tools are increasingly sophisticated, facilitating making relevant cash flow projections. Second, accounting standards, which are central in ALM business, are constantly evolving. Last, but not least, financial communication is increasingly regulated.

This chapter is devoted to the definition of ALM in the banking and insurance areas. We will specifically focus on the history of ALM and the missions of an ALM department.

1.2. Brief history of ALM for banks and insurance companies

Prior to the 1970s, interest rates in developed countries varied little and thus losses caused by asset and liability mismatches were low. The proceeds of their liabilities (for example deposits, life insurance policies or annuities) were invested in assets such as loans, bonds or real estate. All assets and liabilities were held at book value, hiding possible financial risks if assets and liabilities were to diverge suddenly.

In the 1970s, a period of volatile interest rates started and continued until the early 1980s. This volatility had dangerous implications for financial institutions. US regulation, which had capped the interest rates that banks could pay depositors, was abandoned to arise a migration overseas of the market for USD deposits. As most firms used accrual accounting, the emerging risk was slow to be recognized. Firms gradually accrued financial losses over the subsequent 5 or 10 years.

The most famous example is that of Equitable, a US mutual life insurance company. During the early 1980s, the USD yield curve was inverted. Equitable sold a number of long-term Guaranteed Interest Contracts (GICs) guaranteeing rates of around 16% for periods up to 10 years. During this period, GICs were routinely exchanged with a principal of USD 100MM or more. Equitable invested in short-term interest rates to pay the lower long-term high interest rates they guaranteed to their clients. But short-term interest rates soon collapsed. When Equitable had to reinvest, they could not get a sufficiently high interest rate to pay their GICs, and the firm was crippled. Ultimately, Equitable had to demutualize and was then acquired by the Axa Group.

Learning the lessons from Equitable, managers of financial firms focused on developing a sounder ALM. They sought ways to manage balance sheets in order to maintain a mix of loans and deposits consistent with the bank's goals for long-term growth and risk management. Thus, they started developing new financial techniques such as gap analysis, duration analysis or scenario analysis.

ALM practices have evolved since the early 1980s. Today, financial firms, particularly investment banks that enter trading operations daily, are increasingly using market-value accounting for certain business lines. For trading books, techniques of market risk management (for example

Value-at-Risk) are more appropriate than techniques of ALM. In financial firms, ALM is used for the management of assets and liabilities that must be accounted on an accrual basis. This includes bank lending, deposit taking and essentially all traditional insurance activities.

ALM techniques have also evolved. The growth of derivatives markets has facilitated a variety of hedging strategies. A significant development has been securitization, which facilitates firms to directly address asset and liability risk by substantially removing assets or liabilities from their balance sheets. This not only reduces asset and liability risk but also frees up the balance sheet for new business.

The scope of ALM activities has widened. Today, ALM departments are addressing a wider variety of risks, including foreign exchange risks. Also, ALM has extended to non-financial firms. Corporations have adopted some of the ALM techniques to manage interest-rate exposures, liquidity risks and foreign exchange risks. They also use related techniques to address commodities risks.

Nowadays, the process of ALM is at the crossroads between risk management and strategic planning. It not only offers solutions to mitigate or hedge the risks arising from the interaction of assets and liabilities, but also conducts the bank or the insurance company from a long-term perspective.

1.3. Missions of the ALM department

The objective of this chapter is to define the different missions of an ALM department in a bank or an insurance company. These two entities share the same goals, which are to analyze economic risks (mainly market risk), to produce studies providing recommendations on marketing strategy and asset allocation, and to monitor the implementation of those strategies. However, the underlying business is not the same between banks and insurance companies, and therefore the missions of their ALM department can differ.

1.3.1. *Missions of the ALM department for banks*

The first mission of ALM was essentially to manage interest risks and liquidity risks to prevent mismatches between the cash flows of the assets

and the cash flows of the liabilities. This is why ALM uses concepts such as liquidity gap to quantify liquidity risks, and more mathematical indicators such as duration or convexity introduced a long time ago by McCauley. This led to the ALM policy of *immunization* which aimed to structure financial cash flows in a way that minimizes their sensitivity to small changes of the underlying interest rates. Thus, the ALM committee had to work hand in hand with the other departments of the bank and soon played a central role within the structure of the bank.

In 1988, the first Basel rules extended the field of application of ALM even more. They gave the ALM department supervision of other financial risks such as the equity risks, in addition to the traditional liquidity and interest rates risks. Therefore, progressively, ALM gained a central position in the management of the bank, often inside the risk management department. However, the ALM department must keep, as far as possible, a total independence within the firm.

In summary, ALM aims to coordinate the financial decisions of a firm so that the structure of its assets and liabilities optimizes both the financial benefits and the underlying risks, while respecting the prudential rules imposed by the regulators.

As we will see in Chapters 3 and 5, different deterministic or stochastic models exist which are particularly useful for risk managers.

1.3.1.1. *Deterministic models*

In a deterministic model, the evolution of the different financial variables (such as interest rates, equity volatility, etc.) during a given period of time is deterministic. This defines a single scenario, called the *central scenario.* This central scenario is used to project the cash flows generated by the firm's assets and the cash flows generated by the firm's liabilities and to study the discrepancies between these two series of cash flows. Of course, this initial study has to be complete with the consideration of other possible scenarios for the considered cash flows.

Nevertheless, deterministic models are useful to quickly detect the weak and strong points of hedging strategies and to have a basic understanding on how to reduce the *eventual mismatches.*

1.3.1.2. *Stochastic models*

To face the uncertainty of economic, financial and social evolution in the future, the use of stochastic models is necessary. However, stochastic models simple enough to be easily implemented and parameterized tend to rely on strong assumptions which are unfortunately sometimes unrealistic.

Nowadays, the models used in ALM are directly borrowed from quantitative finance. In Chapter 5, we will see how we can build such a model for the evolution of equities.

These models are also quite useful for the VaR computation. The VaR is an indicator of solvability recommended by the Basel authorities as well as by Solvency II for insurance companies.

Stochastic models are also used for the simulation of possible scenarios, and for each of them, basic *risk* and *profit indicators* can be computed.

1.3.1.3. *Mission of the bank ALM department*

The ALM department has to coordinate the management of assets and liabilities in such a way that benefits are optimized under an acceptable level of risk. This level of risk is now imposed by the regulatory authorities. This implies that the ALM department must have an overall, long-term view of the financial activity of the bank. Using different economic scenarios, the ALM department gives the necessary information to the Board of Directors of the bank so that they can soundly plan future financial investments.

The coordination of assets and liabilities was already considered long before the birth of ALM. However, nowadays the presence of a specific ALM department is crucial in a sector as competitive as banking. Indeed, the techniques used in ALM (for example to build generators of scenarios) are now increasingly specific and elaborate.

1.3.2. *Missions of the ALM department for insurance companies*

An insurance company must have good knowledge of its asset and liability risks to ensure its financial strength and honor its contractual commitments to its clients. To do so, the main tasks of the ALM department are the following:

– to ensure proper coordination of assets and liabilities to achieve a financial goal with an accepted level of risk under predefined constraints;

– to produce studies providing recommendations on marketing strategy and asset allocation;

– to calculate the capital requirement for market risks in the framework of the Solvency II regulations.

The following section details these three missions.

1.3.2.1. *To ensure proper coordination of assets and liabilities*

The Asset-Liability Manager's main function is to analyze the balance sheet of the company, and its likely evolution over a period of time. This analysis is based on a number of variables for which he anticipates the future evolution (interest rates, business development, macroeconomic indicators and other market variables). The main objective is to estimate and control the balance between resources (assets) and expenses (liabilities) to the risks taken by the insurance company, under the constraint of a level of profitability and a regulatory framework.

In order to model liabilities, policyholder behavior should be analyzed to determine all liability flows (for example deaths and lapses). The contract specifications must also be taken into account (for example in life insurance, profit sharing and the guaranteed minimum interest rate must be modeled).

Concerning the assets, the financial risks and their impact on the net worth of the company must be analyzed. An insurance company must, for example, manage interest risks (because assets mainly include bonds), liquidity risks (when the company is not able to sell an asset or a liability at the price it is valued), or currency risks (due to the variation of the value of an item after a change of the currency price).

If the asset manager invests without taking into account the expected behavior of insured people, then there will be a mismatch with liabilities. Without the analysis of future cash flow liabilities, it is impossible to determine the horizons of investments to be made. The insurance company can then no longer have enough reserves to pay out, or have a low profitability if the horizon is short. As the market is very competitive, poor financial performance will decrease the level of profit sharing, and thus weaken profitability. It is therefore essential to coordinate the assets and

liabilities to achieve better efficiency for the company. Furthermore, life insurers are particularly exposed to asset and liability mismatching given the long-term nature of their engagements. The ALM department must rely on the skills of actuaries and asset managers to ensure proper management, hence a better profitability.

1.3.2.2. *To provide recommendations on marketing strategy and asset allocation*

ALM is responsible for establishing recommendations on the two main levers for controlling the activity: marketing strategy and asset allocation. On the one hand, marketing strategy can guide the composition of the portfolio of insurance contracts. On the other hand, strategic asset allocation limits financial risks arising from the reversal of the production cycle, in order to ensure the payment of benefits to policyholders and the future profits of the company.

The business of insurance is indeed particular: its production cycle is reversed. Life insurance premiums can be locked up to 30 years, so insurance companies must find investments with stable yields for the lifetime of these policies. Reinvestment risks are apparent, because future premiums must be invested even if their rate of return is lower than the rate necessary to cover present-day pricing. Likewise, insurance companies are exposed to disinvestment risk, when assets must be sold even at low prices to cover claims or other expenses. The impact of rising interest rates can be compounded by lost profits from suspended policies as consumers search for more lucrative financial instruments.

Thus, ALM studies are used to select the optimal strategic allocation of investments based on risk aversion of the insurance company.

1.3.2.3. *To calculate the Solvency II capital requirement for market risks*

The ALM department can also be in charge of different studies or regulatory calculations such as the solvency capital requirement (SCR) market for insurance. An asset and liability manager is involved in the innovation, development and improvement of the prospective cash flow model (or internal model). This includes investment strategy, credit risk modeling and policyholder behavior modeling. He can also work on integration in the ALM studies of elements of Solvency II's Pillar 1 and 2: SCR and coverage ratio, risk profile and risk appetite.

1.4. Conclusion

This chapter has highlighted the fact that ALM has become a key indicator for risk management, not only for banks but also for insurance companies. It is a continuous process involving the formulation, implementation, monitoring and review of strategies related to assets and liabilities in order to achieve financial goals, taking into account a certain risk tolerance and constraints. Thus, ALM is crucial for any business, bank or insurance company that needs to invest capital to meet its contractual commitments and eager to ensure a well-balanced financial management.

The next chapter will describe the risks studied in ALM. After this definition of ALM in a bank and in an insurance company, we will now carry out a deep analysis of the different risks that the ALM department monitors.