

Investment

Introduction

Traditionally, actuaries mainly work in practice areas involving the liability side of an organization. Highly sophisticated and practical methods have been developed by actuaries to assess and manage the risk associated with the liability obligations. In the last several decades, the investment environment has become more volatile and also various innovative financial products have been designed to link the liability with the performance of the underlying invested assets. As a result, actuaries have to consider both the asset and liability sides together in analyzing the problems of any organization.

Actuarial techniques have now been applied to various business problems related to investment. However, modification and adaptation are essential to reflect the specific situation surrounding a particular problem. The following sections describe various investment areas where actuarial knowledge can be used to provide more thorough understanding of the problems encountered in those practice areas.

Analysis of Credit Risk

Credit risk is one of the major risks associated with fixed income securities and derivatives. It is important to measure, model and manage credit risk properly. Underwriting policies and diversification requirements can be used to mitigate credit risks. Various rating agencies also provide ratings that can be used to evaluate credit risks.

Asset Liability Management

As the assets and liabilities of a financial institution become more interdependent, it is necessary to manage both the asset and liability together. This shifts the focus of an actuary from the liability side to the profit of a company. Competitive pressure also causes product prices to come down and reduce the profit margin. In order to generate higher profits, more aggressive investment strategies are followed while optional features related to the investment returns are sometimes used to increase the attractiveness of the products. These approaches create more complicated risk profiles for both the product provider and the consumers and careful analysis must be applied.

Behavioral Finance

Traditional theories of modern finance assume that investors are rational. However, empirical evidence suggests that people do not always behave rationally. Behavioral finance applies cognitive psychological theories to model markets and investor decisions.

Cash Management

For an optimal use of available cash, there should be sufficient cash to cover financial obligations. On the other hand, excess cash can mean a loss of potential return that can be obtained by investing in longer term instruments. Financial institutions, in particular banks and insurance companies, will have to determine an optimal level of cash to satisfy their liquidity needs. Special arrangements also have to be designed for situations of excess cash and cash shortage.

Interest Rate Risk Management

Interest rate risk can occur as disinvestment risk where assets have to be sold at a loss when interest rate increases. It can also occur as reinvestment risk where asset cash flows have to be invested again at lower return when interest rate decreases. Basic techniques for interest rate risk management include cash flow matching, duration matching and convexity matching. Various more advanced techniques have also been developed. Examples include horizon matching, effective duration matching, key rate duration analysis, maturity gap management and scenario testing.

Investment Strategy

Any organization involved in investment will face the problem in formulating an investment strategy leading to preparation of the investment policy statement and determination of the target asset mix. The focus is on the selection of investment approach that can achieve the target rate of return in the long run within the prescribed policy constraints. A clear and well-understood investment strategy will help the organization to fulfill its fiduciary responsibilities in maximizing profit and balancing the requirements from various stakeholders.

Actuaries have participated in investment strategy formulation for insurance companies and pension plans. There are huge potential for actuarial contribution in the development of investment strategies for other organizations, especially banks and investment fund houses.

In general, the following factors must be taken into consideration in the formulation of an investment strategy:

- Objectives
- Economic outlook
- Asset mix and expected returns
- Liabilities characteristics
- Liquidity
- Tax situation
- Asset distribution capability
- Risk tolerance
- Pricing and dividend philosophy
- Diversification
- Risk management tools

Measurement of Performance and Risk

As the investment functions are usually delegated to investment managers, it is necessary to design an appropriate mechanism to properly measure the investment performance. The performance measurement must reflect the risks assumed in the investment process and also provide sufficient incentives for the investment manager.

Modeling of Financial Markets

Various methods have been used to model different segments of the financial markets. These methods include deterministic and stochastic approaches. There is no single model that can be used for all situations, and careful consideration of the limitations will be required in the selection of an appropriate model.

Modeling of Interest Rate Term Structure

Interest rate is the major factor that actuaries used to determine the time value of future cash flows. Various interest rate models have been suggested to describe historical patterns and forecast the structure of future interest rates.

Portfolio Management

Portfolio management essentially involves the integration of most of the investment management concepts. In the development of investment policies, the client's needs must be reflected in an asset liability management framework including investment objectives, risk tolerance, regulatory requirements, solvency concerns, tax considerations and management constraints. Different types of asset allocation strategies must be evaluated and a decision must be made to choose the appropriate strategy to follow.

A portfolio must be developed to appropriately supporting liabilities. The process includes choosing among different funds or securities while conforming to investment policy and objectives, specifying asset selection criteria, incorporating capital market expectations, and determining risk management strategies.

Complete analysis of the embedded options may include calculation of hedging cost, deterministic and stochastic analysis of cash flow, reserves, and capital levels under a range of economic environments.

The portfolio must be regularly monitored and rebalanced if portfolio management objectives are not achieved. Appropriate changes for improvement may include shifts in asset allocation, use of swaps, forwards, and futures, and options.

Pricing of Investment Products

Most investment products are priced based on the competitive forces of supply and demand in the investment market. However, careful analysis of the cash flow pattern and characteristics can provide an indication of the intrinsic value of the investment products. This valuation can then be used for purchase and sale decisions.

The following lists some examples of investment products that can be considered:

- Collateralized Mortgaged Obligations
- Mortgaged Backed Securities
- Asset Backed Securities
- Investment Funds with Guarantees on Returns
- Weather Derivatives

Structured Investment Products

A structured investment is the execution process where various derivatives are used to enhance the risk-adjusted return. Structured investment can also allow fund managers to participate in the investment return of certain kinds of assets without directly involved in the risk areas. These methods have been used for products involving currency risk and credit risk.

Other areas related to investments

- Risk theory for insurance risk models with stochastic return on investments
- Optimal asset allocation problems under the discrete-time regime-switching model
- Optimal investment strategy for insurance portfolio with guaranteed returns

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