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## The Use of Transfer Pricing in Asset Liability Management

by Nancy Bennett & Mike Murphy

The scene takes place in the executive conference room. You are having a conversation with the CEO and CFO about the financial health of your organization. The conversation starts with some questions about company earnings. Perhaps your company is considering investments in alternative asset classes or introducing a new product. Before long, the questions get tougher and tougher. Your heart starts beating faster as you realize you are not able to answer many of these questions.

**CEO:** What are the company's primary sources of earnings and how can we reduce the volatility of earnings?

**CFO:** What are appropriate product pricing targets and how are results evaluated to determine if pricing targets are being met?

**CEO:** What is the value of the company and how should value be measured? Are the financial objectives for earnings, growth, and capital appropriately defined?

**CEO:** What are the sources and possible uses of the company's capital?

**CFO:** How much capital should be retained in the company?

**CEO:** Are the company's reserves adequate to cover benefits?

**CFO:** What is the company's tolerance for liquidity, quality, and other investment risk?

**CEO:** How can our general account investment strategy be modified to increase return? What tradeoff are we making between earnings and appreciation?

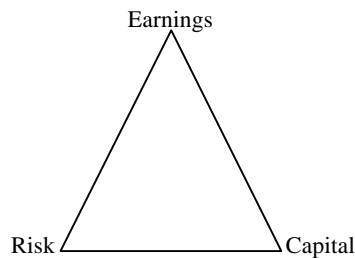
**CFO:** How much interest rate risk can the company withstand? How is interest rate risk monitored? What types of actions would the company take, or need to take, if interest rates spiked?

**CEO:** How can we evaluate the performance of the product, asset, and corporate managers?

Answering these questions is critical for any insurance organization to achieve financial success. For many of us whose job is to answer these questions, we know it is not simple.

Although there are many questions

involved with managing the financial condition of an insurance company, the questions usually fall into one of three categories: earnings management, capital management, and risk management. As illustrated in the following diagram, these three categories are interrelated. Directly or indirectly, intentionally or unintentionally, the actions taken to achieve financial objectives have a domino effect due to the integrated nature of financial management.



**Earnings** are equal to the change in capital.

**Risk** materializes as variability in income.

**Capital** represents the funds needed to cover risk and fund new ventures.

While various organizational structures are used in financial management, every company needs to perform similar tasks. To make these tasks tractable, responsibilities for financial management are divided among many functional areas. This segregation of responsibilities promotes specialization, but often overlooks the integrated nature of financial management. Who is accountable for the development and execution of company strategies? How are the costs and benefits of the strategies measured and evaluated? How are the rewards of implementing these strategies passed on to policyholders, shareholders, and company managers?

More sophisticated financial management involves the development and/or revision of product, asset, and corporate strategies in the context of integrated financial management. The task of managing the financial condition of an insurance organization is quite complex.

Too often, company managers hide behind this complexity and cite many barriers as reasons to stay the course with a segregated approach to financial management. Of course, this "Rip Van Winkle" approach to financial management can work for awhile if you are lucky or if the market is strong.

The remainder of this article describes a new paradigm for managing the financial condition of a life insurance company. We designed this paradigm with many years of experience as ALM practitioners, both with direct responsibility as a company's corporate actuary and as consultants to many life insurance companies. As such, we put ourselves back into these face-to-face conversations in describing this new financial management paradigm. Having worked in financial management for many years, I could see great potential in ALM and integrated financial management. The difficulty was in convincing other senior managers that ALM could help manage the company better.

Discussions with management were interesting, but often dismissed as too theoretical. Financial resources were tapped out dealing with the demands of regulators, rating agencies, and stock analysts, often leaving little time to analyze the underlying financial economics. More sophisticated financial management would necessitate more sophisticated tools and rigorous analysis. However, progress in using these tools was slow due to inadequate technology and a distrust of a model's ability to capture all dimensions of the business. Furthermore, some managers within the organization were wary of formula-driven management since financial objectives were not sufficiently articulated to explain results and recommend strategic changes.

I needed to show management that an integrated approach to managing the financial condition of the organization would result in better decisions and a stronger, and ultimately more competitive, company. But how?

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**The Use of Transfer Pricing in Asset Liability Management**

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My conviction was strong enough to persevere in the face of many obstacles and the competing demands on my time. Eventually, I was successful in attracting the attention of many asset, product, and corporate managers by piquing their curiosity as I posed many of the probing questions mentioned earlier. I had convinced enough people that we could increase the value of the company through more sophisticated and integrated financial management. But, what exactly needed to be done?

Most importantly, a new financial management infrastructure had to be useful in practice. This new infrastructure should provide a basis for evaluating alternative investment, product, or capital strategies, but continue to support the requirements of regulators, auditors, stock analysts, rating agencies, and other

mortality savings to the cost of the underwriter and measure the value of stricter underwriting controls. How can I measure your value?" It would take me years to answer this question.

The answer to this question was the genesis of transfer pricing. In its purest form, transfer pricing involves assigning a "price" for the use of funds that are transferred within the company. Through this transfer process, the company can better manage risk and profitability. In application, transfer pricing represents the intra-company reinsurance of the interest rate risk. The asset and product managers cede or transfer the interest rate risk to a corporate risk manager allowing them to focus on the performance of the assets or products, respectively.

Consider the classic asset-liability question. A life insurance company

***"The answer to this question was the genesis of transfer pricing."***

constituencies. I needed a tool that would enhance the decision-making process; but I knew this tool was only a means to the end. No ALM paradigm, regardless of design, could directly produce the answers. I needed a basis for measuring investment risk and return, establishing profit expectations, and evaluating financial performance and institutionalizing risk management.

While cognizant of regulatory demands, this new ALM paradigm had to be designed around leading-edge risk management concepts. The company's financial management capabilities needed to be enhanced by bridging the existing tools with newer risk management concepts through the translation of current financial performance measures into financial measures based on these leading-edge concepts.

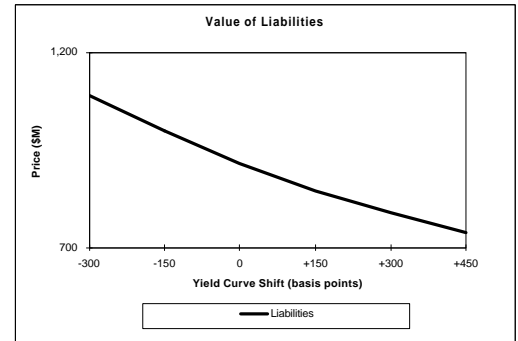
I have never forgotten a conversation with a senior actuary when asked how I could defend my budget requests for more sophisticated financial management. "I can measure the value of adding an underwriter. I can compare the future

issues products with guarantees and product options, producing contingent liability cash flows. What types of assets should be purchased to support this product liability?

The timing, amount, and probability of these contingent events are primarily stochastic, and should be quantified by means of option pricing theory and policyholder behavior studies. Option pricing is a technique of determining the economic value or price of a stream of contingent cash flows. Price Behavior Curves (PBCs) are a tool for identifying interest rate risk using option pricing techniques. Prices are calculated as the present value of expected cash flows, discounted over various shifts in the yield curve.

The following is an illustration of the PBC for a block of deferred annuities. As you can see, the economic value or price of the product changes as interest rates change.

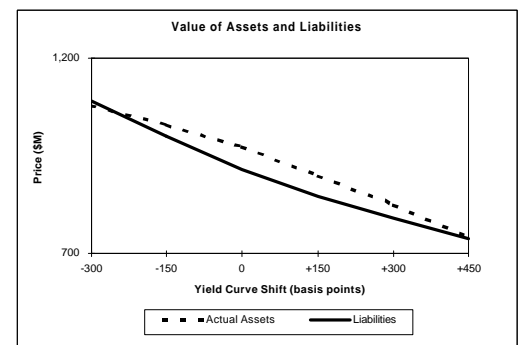
**PBC of an SPDA**



Let's get back to the classic asset-liability question. Given this PBC information, how do we determine the types of assets to be purchased for this product? Designing investment strategies for different products and allocating those results within the financial statements is not a new issue. Even before the regulatory requirements of cash flow testing, many companies recognized the interplay of the product options, crediting strategies, and investment strategies. Eventually, most companies designed some type of product line asset allocation system that attempts to manage the ALM position by matching certain types of liabilities with assets.

The most common method of asset allocation is to simply segment or prorate a portion of all inforce assets to the various liability product lines. A typical segmented ALM paradigm looks like this:

**ALM Approach Based on Segmented Asset Allocation**



As you can see, the assets and liabilities contain different degrees of price volatility, commonly referred to as

interest rate risk. Economic surplus is defined as the difference between the price or value of the assets and liabilities. Various measures, including the durations and convexities of assets and liabilities, are calculated and used in managing the company's surplus. However, this type of ALM paradigm presents some challenges in evaluating investment and product strategies.

While a company may be comfortable assuming some level of interest rate risk, how much risk is appropriate? Who is responsible for deciding how much interest rate risk is appropriate? Are the actions of the product or asset managers increasing or decreasing the interest rate risk? Determining how value is added is a difficult task.

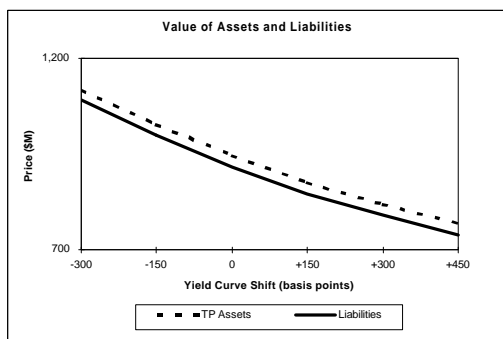
Many ALM systems use information obtained from the accounting systems used in cash flow testing and in the preparation of statutory and GAAP financial statements. A major problem in leveraging ALM systems is that current financial reporting techniques for allocating investment results to the product lines commingle the contributions of the product, asset, and corporate managers. Investment allocation to the product lines needs to be reconfigured to facilitate the management of the interest rate risk and ultimately provide a practical ALM paradigm.

The ALM paradigm based on transfer pricing is characterized by the following:

- Creation of a centralized corporate risk function
- Transference of the interest rate risk from the product lines to corporate
- Intra-product line investment allocation based on synthetic asset portfolios (SAPs)
- Direct recognition of writing options in the products

With transfer pricing, the ALM paradigm looks like this:

#### ALM using Synthetic Asset Portfolios



In transfer pricing, synthetic asset portfolios are constructed with the same interest rate risk profile as the product liabilities. SAPs are constructed to emulate the cash flow characteristics of the product liabilities. Using linear programming tools, SAPs are constructed from a universe of noncallable bonds and interest rate derivatives.

As illustrated, the transfer pricing approach produces an immunized surplus position as the values of assets and liabilities move in tandem with changes in interest rates. The SAPs are monitored and updated as the characteristics of the liabilities change. These SAPs form the basis for allocating investment results to the product lines. By allocating investment results to the product lines based on the synthetic assets, the product lines receive investment cash flows consistent with the risks inherent in the products. The SAPs supporting the products will provide the necessary cash flows to fund product guarantees and options over a wide range of interest rate scenarios.

In transfer pricing, the actual investment return of the company's assets is essentially bifurcated into fixed and residual components. The SAP for a given product line represents the fixed component and its investment results are allocated to that product line. The investment return attributed to the residual component is allocated to the corporate risk line. Residual returns include investment returns from assuming quality risk, liquidity risk, option risk, duration and convexity risk, and the selection of asset types and securities.

The bifurcation of investment results into the fixed and residual components simplifies the analysis of investment and product performance because the managers' contributions to financial performance are delineated. It is easier for a company to evaluate the performance of the asset manager since the impact of product actions is isolated in the maintenance and evaluation of the synthetic portfolios. It is easier for a company to evaluate the performance of the product manager since the impact of the investment actions is isolated in the maintenance and evaluation of the corporate risk line.

The SAPs represent a matched investment strategy. However, it is

important to distinguish between the "synthetic" asset strategy and the "actual" investment strategy. Transfer pricing neither requires nor endorses a matched actual investment strategy for products. In order to earn a competitive rate of return, a company will continue to invest in callable bonds, CMOs, equities, and other asset classes. The actual asset portfolio can be evaluated relative to the residual returns earned in excess of the synthetic portfolio's returns. Because the SAPs emulate the cash flows and risk characteristics of the liabilities, the SAPs form a basis for establishing investment strategies and customized benchmarks for evaluating investment performance.

Transfer pricing does not provide free reign for the asset or product managers. The transfer pricing paradigm is a valuable tool for the corporate risk manager to evaluate and establish risk parameters and financial constraints for the asset and product managers. The transfer pricing paradigm supports an enterprise-wide risk management process and facilitates the evaluation of financial performance within the context of the guarantees made to its policyholders.

Also, transfer pricing does not endorse an ALM approach based on economic surplus. The SAPs are designed to provide the necessary cash flows to the product lines under a wide range of economic conditions. By matching the durations and convexities of the SAPs to the durations and convexities of the product liabilities along the entire price curve, the product lines are assured the cash flow needed to fund product obligations. While this matching of the asset and liability risk profiles results in immunized economic surplus at the product line level, transfer pricing is neither endorsing nor requiring an immunized economic surplus position for the total company.

Alternative investment and product strategies will be analyzed in the context of the obligations made to policyholders and the impact on the total company's financial objectives. Insurance companies use a variety of financial performance measures, including earnings per share, earnings volatility, capital ratios, economic surplus, and distributable

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earnings. While some of these measures are better grounded in financial economics, a company can use transfer pricing to consolidate product and investment strategies at the enterprise level. The consolidated strategies are analyzed relative to the company's chosen financial performance measures.

Implementing a transfer pricing approach can be a significant endeavor for a company, with implementation being a multi-phase project. The all-important first step involves getting senior management buy-in for the project. Since ALM crosses into many functional areas (product management,

Answering these questions is one of the biggest byproducts of transfer pricing. Transfer pricing provides an opportunity to take a fresh look at the company's financial objectives and determine if appropriate charges are being made for the cost of capital, investment risk, and product guarantees and options.

With a transfer pricing infrastructure, the impact of alternative investment, product, or capital strategies can be measured and evaluated. The contributions of the asset, product, and corporate managers are reported separately, allowing the value added by their actions to be evaluated. With transfer

***“The contributions of the asset, product, and corporate managers are reported separately, allowing the value added by their actions to be evaluated.”***

asset management, and corporate management), company-wide acceptance for the project is critical.

The next implementation steps involve the reconfiguration of the product line balance statements as assets and capital are reallocated between the product lines and the corporate line. In the final steps, the product line income statements are reconfigured to be consistent with the reallocation of assets and capital. Product line investment income, capital gains, expenses, and taxes are allocated to be consistent with transfer pricing principles.

While the implementation of transfer pricing may seem an overwhelming task, the effort is worthwhile. Since transfer pricing impacts product line earnings, it is important to review pricing targets and overall line of business financial objectives. Transfer pricing creates a forum for discussing financial objectives in a new light. Furthermore, transfer pricing creates a forum for discussing the various financial responsibilities for achieving the stated objectives. Who is responsible for managing the interest rate or the credit risk? Who is accountable for achieving the priced-for crediting margins?

pricing, ALM becomes institutionalized as the impact of interest rate risk is moved directly into the accounting statements. As the company gains confidence in the transfer pricing results, incentive compensation for asset, product, and corporate managers can be linked to transfer pricing results.

With a more rigorous ALM infrastructure based on transfer pricing, companies can:

- Strengthen existing financial management infrastructure (systems and processes) for analysis of current operations and alternatives and increase quantitative focus on results relative to a financial objective
- Increase the awareness of the interest rate risk within the organization; formally create a forum for discussing the financial impact of asset and liability decisions on the value of the firm
- Demonstrate financial results to various audiences, including the measurement of actual results relative to performance targets with due consideration for risk and the cost of capital

- Develop modeling capabilities to analyze alternative strategies and determine optimal solutions that maximize the value of the firm
- Produce product line income statements with reasonably predictable investment income based on investment decisions within the product line's control
- Analyze the cost of embedded product options and guarantees
- Produce better information to develop and monitor crediting strategies and the pricing of interest sensitive products
- Develop performance benchmarks for investment and product operations
- Produce better information to understand the risk/reward tradeoff of certain asset classes and assist in the development of investment strategy
- More clearly articulate the roles and responsibilities for asset, product, and corporate managers
- Better correlate asset, product, and corporate managers' compensation with performance commensurate with their responsibilities

With more rigorous and sophisticated ALM practices, a company is better positioned to respond to changes in its risk profile and to the changing marketplace. At its core, transfer pricing is a foundation for managing a firm's financial condition based on financial economic principles. An ALM approach based on transfer pricing can provide answers to complex business issues or provide peace of mind that current strategies are operating effectively.

Transfer pricing is the elusive answer the insurance industry has been seeking to develop a rigorous ALM process for managing profitability and risk, and move beyond regulatory cash flow testing.

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