Principles Underlying Asset Liability Management

The Society of Actuaries Board of Governors has approved the following document: "Principles Underlying Asset Liability Management" for release as an exposure draft to the members of the Society of Actuaries, other actuarial organizations and various interested parties outside of the actuarial profession.

The Task Force on Asset Liability Management Principles welcomes your comments. In your comments, please include a clear reference to each section of the document you are commenting on *(i.e. II. Definitions, C. Portfolio: Comments).* All comments received on or before January 31, 2005 will be considered and a final Principles document will be issued shortly thereafter.

Please send your comments to: almcomments@soa.org

Charles L. Gilbert, FSA, FCIA, CFA
Chairperson, Society of Actuaries Task Force on Asset Liability
Management Principles

PRINCIPLES UNDERLYING ASSET LIABILITY MANAGEMENT
~FINAL DRAFT~
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I.   BACKGROUND
  A.   PRINCIPLES AND STANDARDS
  The practice of any profession is shaped by the experience of its members as well as by accumulated scientific knowledge. The practice of the actuarial profession is based on principles and standards.

  Principles abstract the key elements of the scientific framework. Principles are not prescriptions that specify how actuarial work is to be done, but are statements grounded in observation and experience. As our experience and understanding continues to develop, the articulation of these principles may change.

  In addition to principles, the actuarial profession requires *standards*. Standards are normative rules, based on the state of the art and science of actuarial practice, regulatory constraints, and other external conditions. They guide the actuary in the selection of appropriate models and assumptions. Standards are subject to change and new standards will be introduced as actuarial practice evolves. This document is not intended to set forth standards.

  Principles may be categorized as *general or practice-specific*. The principles discussed herein are specific to the Asset Liability Management (b   ALMb   ) area of practice.

B. APPLICABILITY OF ALM PRINCIPLES
    A wide variety of entities are faced with ALM related considerations. Such entities include:

    ▪ Insurance companies, banks and thrifts, investment firms, and other financial services
      companies
    ▪ Pension and trust funds (e.g., endowments and foundations)
    ▪ Governments
    ▪ Other commercial or not-for-profit enterprises
    ▪ Individual investors

C. ALM PRINCIPLES TASK FORCE
    The Task Force was comprised of members of the actuarial profession with experience in ALM in the United States and Canada. The ALM principles articulated in this document are applicable to a broad range of entities facing ALM-related issues. The applicability of these principles will depend on the relevant context and circumstances of each such entity. Although the principles herein are intended to cover a broad range of topics and issues, there may be other factors not discussed here, and some of the definitions may be interpreted differently based on the context of a particular industry under the consideration. Whenever possible, the document attempts to capture these differences, such as in the case of pension plans and trust funds. However, independent professional judgment must be exercised in all situations.

    Since the early work of Frank M. Redington in the 1950s, actuaries have applied actuarial techniques and skills to ALM for insurance companies, pension funds, investment firms, and other financial institutions. To recognize this contribution, the Society of Actuariesb Finance Practice Area Advancement Committee formed the Asset Liability Management Principles Task Force (b Task Forceb), with the charge to identify and articulate the principles of ALM.

    The original Task Force was formed in 1996 and distributed an initial draft ALM Principles document in 1998. At that time, there existed divergent views on the central principle of ALM b economic value. Financial industry practice at the time placed greater importance on accounting results rather than economic value, and this issue was debated at length. Much has happened since 1998. Equity analysts and rating agencies began calling for a more meaningful way to value companies than the traditional accounting measures. Internationally, pressure mounted to move to fair value-based accounting standards. Accounting scandals shed new light on how easily accounting earnings could be manipulated and the emergence of earnings distorted. The importance of focusing on economic value was no longer a theoretical argument. A revitalized Task Force took up the call to finalize the ALM Principles document in the Spring of 2003 and unanimously recognized economic value as the central principle of ALM. This document incorporates changes the Task Force considered appropriate based on the many comments received in response to the original exposure draft.

    While specific considerations and methodology used to in implementing ALM may differ between insurance companies, private pension plans, public pension plans and social insurance systems, the principles articulated in this document broadly apply to all entities.

    Current members of the Task Force are:

    Charles L. Gilbert, Chairperson
    Mark W. Bursinger
    Evaronda Chung
    Charles V. Ford

This report represents the findings and conclusions of the Task Force.

II. DEFINITIONS
The selection criterion for definitions included in this section was their ability to enhance the interpretation of the Principles Underlying Asset Liability Management document (b Principlesb). The definitions appear in a logical order considered most appropriate for the enhanced understanding of the Principles.

Many terms used in the Principles assume a working knowledge of actuarial science, particularly as applied to risk management and finance. The reader is referred to the b Principles Underlying Actuarial Scienceb   statement of the Society of Actuaries for details.

A. ASSET LIABILITY MANAGEMENT
Asset Liability Management is the ongoing process of formulating, implementing, monitoring, and revising strategies related to assets and liabilities to achieve financial objectives, for a given set of risk tolerances and constraints.

ALM is critical for the sound financial management of any entity that invests to meet future cash flow needs within constraints. ALM is broader than risk mitigation[1] and is inextricably linked to the liability and investment management functions.

ALM is a vital element within an Enterprise Risk Management framework. Some companies use ALM as part of a strategic decision-making framework to exploit opportunities to create value and optimize their risk/reward profile.

The desirability of applying ALM and the chosen ALM process will vary from entity to entity due to case-specific circumstances and preferences of each entity. The importance of ALM to an entity that focuses on managing risks for profit, and the sophistication of its ALM process, is different than that of an entity that has other sources of revenue. A general outline of the fundamental steps in an ALM process is provided in Section IV.

B. ENTITY
Entity is defined in the Principles to include an organization, pension plan, portfolio, and individuals.

Sometimes the entity at risk and responsible organization are different. There are often multiple organizations/individuals with an interest in the entity, e.g., state regulators, individuals doing business with the entity, but only one organization bears the primary

risk, as well as legal and fiscal responsibility. For insurance companies there is generally no difference between the entity at risk and responsible organization. For other entities, these might be different. For example, the pension plan is an entity for which the plan sponsor has responsibility, but which is legally separate and managed in addition to the core business of the organization. The entity at risk is generally the plan but the entity bearing the risk is generally the plan sponsor, who must weigh the risks generated by the plan against other enterprise risks.

C.   PORTFOLIO
A *portfolio* is a collection of assets, liabilities or both.

A portfolio may consist of a single asset or liability. Only financial assets and liabilities are considered in these Principles.

D.   ASSET
An (financial) *asset* is cash held or the right to receive cash, possibly contingent on a predetermined event, at future times.

Some assets, such as derivatives, may have both asset and liability characteristics.

E.   LIABILITY
A (financial) *liability* is an obligation to pay cash, possibly contingent on a predetermined event, now or in the future.

F.   ENTERPRISE RISK MANAGEMENT
Enterprise Risk Management (b ERMb) is the discipline by which an entity in any industry assesses, controls, measures, exploits, finances, and monitors risks from all sources for the purpose of increasing the entityb s short- and long-term value to its stakeholders (based on the ERM definition from the Casualty Actuarial Society Advisory Committee on Enterprise Risk Management, May 2003 Report).

ALM is an integral part of ERM.

G.   RISK
Risk is the exposure to an uncertain event or outcome that has a financial impact to which the entity is not indifferent.

For insurance and other financial institutions, risk is inherent in doing business. Risk captures the possibility of positive and negative deviations from an expected outcome. Financial institutions and other entities may be exposed to many different types of risks, which can broadly be categorized as credit, market, operational, and insurance/underwriting risks.

For private pension plans, risk is often considered in light of the plan sponsorb s business plan. Financial results of pension plans are generally components of the plan sponsorb s overall results. In some cases, the plan may account for a significant portion of the plan sponsorb s results; in other cases, the pension plan may be relatively insignificant. Risk can also be separately considered for shareholders, plan participants, and any guaranty agencies.

H.   RISK TOLERANCES
Risk tolerance of an entity is a degree of preference for a particular risk over a stated time horizon.

Risk tolerances may be translated into risk limits that set the maximum allowable exposure (e.g., the maximum loss for a given confidence level, or the maximum change in economic value for a given change in a financial variable).

For private pension plans, the risk tolerance considered is generally that of the plan sponsor. The plan sponsorb s risk tolerance is influenced by regulatory and fiduciary constraints.

I. CONSTRAINTS
Constraints are restrictions on the set of strategies that may be incorporated into an ALM process.

Constraints may be either external or internal. External constraints include regulatory requirements, tax laws, and other legislative requirements. Internal constraints reflect management philosophy or professional judgment (such as asset allocation limits), which may be influenced by rating agencies, regulators, customers, and other stakeholders.

J. FINANCIAL OBJECTIVES
Financial objectives are the key financial priorities and goals for an entity.

In an entity, financial objectives are generally determined by senior management and the board of directors. The financial objectives most appropriate to the ALM process usually focus on the long-term best interests of the policyholders, shareholders, and other stakeholders. Examples of financial objectives include maximizing economic value and accounting measures, including future net income, return on equity, statutory surplus, or current year earnings. Financial objectives for pension plans typically focus on the ability to cover obligations when due, with acceptable level and volatility of contributions, pension expense and funded levels.

K. ECONOMIC VALUE
Economic value represents the long-term inherent value of the portfolio.

Economic value is based on the portfoliob s future cash flows, as distinguished from values based on a specific accounting framework or funding requirements. Funding requirements and accounting-based values serve as a constraint on future cash flows.

L. ACCOUNTING VALUE
An *accounting value* for a portfolio is the net value assigned to the portfolio by a financial accounting system.

An accounting value may be an economic value, but often involves non-economic considerations and conventions that act as constraints. The International Accounting Standards Board defines a financial accounting system as a system that provides guidance to the recognition and measurement of financial values used for presentation in a financial statement. Several different financial accounting systems are in use.

M. SCENARIO
A *scenario* is a possible future state of the world.

Scenarios are chosen to represent the possible future states of the world relevant to managing portfolios of assets and/or liabilities. The set of scenarios may represent the possible future values of financial instruments, such as bonds and stocks, inflation, term structure, credit spreads, ratings changes or defaults, or the possible set of survivors from an initial group of insured lives.

N. CORRELATION
The *degree of correlation* between two portfolios relative to a set of scenarios is a measure reflecting the relative variation of the economic values of the portfolios over the set of scenarios.

Two portfolios are said to be 100% positively correlated relative to a set of scenarios if the ratio of the economic values of the two portfolios is the same in each scenario in the set at each time period. Linear relationships between variables are often assumed in finance and economics but true interdependencies may be considerably more complex.

O. NON-SYSTEMATIC RISK
Non-systematic risk is risk that can be reduced or eliminated by aggregation of entities that are less than 100% positively correlated with respect to a given risk factor.

Non-systematic risk is also known as diversifiable risk or specific risk.

P. SYSTEMATIC RISK
Systematic risk is the residual risk that cannot be eliminated by aggregation or pooling of the same risk within a given market.

Systematic risk is also known as non-diversifiable risk or market risk. It may be reduced by hedging.

Q. HEDGING
Hedging is the technique of designing a portfolio with cash flows that offset or defease another portfolio's cash flows in certain scenarios.

After hedging, the entity's risk profile is more aligned with the entity's risk tolerance. This technique allows the entity to become less concerned with which future scenario unfolds.

III. PRINCIPLES
A. ECONOMIC VALUE
ALM focuses on Economic Value.

A consistent ALM structure can only be achieved for economic objectives. Economic value is based on future asset and liability cash flows. ALM uses these future cash flows to determine the risk exposure and achieve the financial objectives of an entity.

An entity's financial objectives may include maximizing one or more of these values: economic value, accounting measures such as earnings and return on equity, or embedded value. For private pension plans, financial objectives may include the pattern of future funding requirements. Various accounting measures are affected by rules that change the emergence of income and the reported book value of the assets and liabilities. These measures can sometimes distort economic reality and produce results inconsistent with economic value. Because ALM is concerned with the future asset and liability cash flows, the natural focus of ALM is economic value. Accounting measures or future funding requirements are often included as constraints within an ALM framework.

Entities that focus on economic value tend to achieve their financial objectives more consistently in the long term.

B. MUTUAL DEPENDENCE
Liabilities and their associated assets are mutually dependent.

Mutual dependence arises in an ALM context because of the necessity to manage the interdependence between the asset and liability cash flows to achieve economic and financial objectives. The mutual dependence principle applies to portfolios consisting of both assets and liabilities. It holds even if the assets and liabilities are affected by different economic factors, or even if asset and liability cash flows are fixed.

Mutual dependence may be greater when the performance of one portfolio affects the performance of another portfolio. For example, the credited rate on the liabilities may influence the lapse/withdrawal rate, which in turn may require unexpected liquidation or reinvestment of assets.

The mutual dependence principle implies that assets and liabilities must be managed concurrently in order to optimize achievement of economic and financial objectives.

C.   DIVERSIFICATION
The level of risk associated with a given financial objective can be reduced through diversification by combining exposures that are less than 100% positively correlated.

Risks are diversifiable through aggregation up to the point where only systematic risk remains. For example, the return volatility of a portfolio of assets caused by changes to the level of prevailing interest rates is diversifiable through investing in different asset classes such as stocks. However, the residual systematic risk cannot be diversified through simple aggregation. It can, however, be reduced through hedging.

In times of significant economic turmoil asset correlations tend toward 1.0 or b   1.0. This can be observed in equity market data from October 1987 or bond market data from August 1998. During such environments the risk reduction benefits of diversification may temporarily disappear. Correlations between asset returns may not be a constant function, but instead may vary over time and between different scenarios. Moreover, true relationships between variables may be nonlinear.

The diversification principle applies to all combinations of asset and liability portfolios.

D.   RISK/REWARD TRADE-OFF
Greater rewards are generally expected from portfolios with higher levels of risk.

Rational investors[2] expect greater rewards for accepting higher levels of risk. The higher-risk/greater-reward relationship may not hold if the portfolio is sub-optimal for a given level of risk (i.e., a comparably risky portfolio has a higher return); if an arbitrage opportunity exists in the markets, or if environmental pressures affect investorsb preferences and behaviors. As a direct result of the risks accepted, greater reward commensurate with higher risk levels may not be actually realized.

In an ALM context, the riskiness of a portfolio is determined by the net position of the combined assets and liabilities.

E.   CONSTRAINTS
Expected risk/reward trade-off tends to worsen as more constraints are imposed and as the constraints become more restrictive.

An ALM framework contains internal and external constraints including investment policy requirements, rating agency expectations, regulatory issues, and required capital goals. For example, an investment policy may specify that no below investment grade bonds may be purchased and bonds downgraded to below investment grade must be sold within 30 days. This constraint forces a sale at a time when a bondb   s price is under

short-term pressure and may offer an opportunity to investors not subject to this constraint.

Another common example of constraints within an ALM context is the professional judgment constraints applied to outcomes generated by mathematical models. For example, traditional efficient frontier analysis is extremely sensitive to input assumptions, and slight adjustments to assumptions can produce very different efficient portfolio outcomes. Professional judgment is typically applied to temper the modelb s outcomes by constraining asset class allocations and forcing additional portfolio diversification.

F.   DYNAMIC ENVIRONMENT
The risks to which an entity is exposed and the associated rewards are determined by internal and external factors that change over time.

ALM is an ongoing process. Risks an entity assumes and to which it is exposed are continuously changing. Internal factors arise from the financial objectives, risk tolerances, and constraints of the entity. External factors include interest rates, equity returns, competition, the legal environment, regulatory requirements, and tax constraints. Such factors often impact both assets and liabilities simultaneously, although the impact is not necessarily of the same magnitude or in the same direction. Furthermore, an entity may have different risk tolerances under different circumstances and for different time horizons. Accordingly, analyses, conclusions, and strategies relevant to a specific point in time need to be periodically reevaluated and updated.

G.   UNCERTAINTY
Asset and liability cash flows cannot be projected with certainty.

The dynamic environment as well as pure randomness create uncertainties in the portfolio cash flows and, hence, in the true risk exposure. Risk varies as the underlying risk factors (e.g., interest rates, equity returns, defaults, policyholder/customer behavior, lapses/withdrawals, pension shutdowns, etc.) change and as future expected cash flows are replaced by actual cash flows. This process reflects cash flows reacting to factor changes (e.g., interest-sensitive cash flows), truing up to actual experience, and results in revisions of future assumptions. The ultimate risk exposure will be a function of the actual cash flows.

ALM requires the use of models to project future uncertain cash flows. In some cases, simple deterministic models can be used and ALM can be based on one set of expected future cash flows. In other cases, such as when future cash flows are expected to depend on future economic conditions, more complex models may be required to understand the interaction of the asset and liability cash flows.

Stochastic models are often used to simulate future expected cash flows under various scenarios to help identify the associated risk exposures. These models produce statistical distributions of potential results and different ALM strategies can be evaluated by studying the range of results produced from modeling these strategies. Modeling can also be used to construct many possible futures or scenarios, and then, results across all the scenarios can be used to measure risk in the portfolio.

Model risk is the additional risk created when the model does not adequately represent the underlying process or reality. There are two general classes of model risk: the risk of model misspecification, oversimplification, or outright errors, and the risk of a changing environment not anticipated in the model. For example, using a lognormal model of stock market prices produces a distribution with too few extreme value sample points (i.e., that is not b fatb enough in the tails) to adequately assess the risk for some complex

embedded options, such as guaranteed minimum death benefits. In addition, the volatility of equity returns varies over time and this may not be accurately captured in the model.

H.   HEDGING

The overall risk of a portfolio may be reduced through hedging.

Hedging plays an integral role in the ALM process. Once the risks associated with a portfolio or transaction have been identified, the existing risks can be modified to suit the entity's risk tolerances and financial objectives. Undertaking additional risks that partially or fully offset the existing risks may accomplish this goal.

Hedging may be done at either the transaction or portfolio level. Hedging may be complete or partial, perfect or imperfect (i.e., cross hedging). Hedging instruments include assets, liabilities, and derivatives. An asset with a matching liability is a natural hedge. The time horizon over which the hedge is in place may vary, but should nevertheless be explicitly defined.

Risk can be controlled through diversification when the law of large numbers applies (e.g., when risks are diversifiable). Hedging is a strategy available to reduce risk when the law of large numbers does not operate, such as when a stock market decline results in equity-linked guarantees of an annuity block of business being in the money for every annuity contract at the same time.

Hedging may reduce some risks but often introduces other risks, such as counterparty risk and basis risk. Basis risk arises from imperfect or partial hedging, where the hedging instruments are not perfectly negatively correlated with the risks being hedged. In some instances, an imperfect hedge may even increase the overall risk.

As the overall risk is reduced through hedging, the expected reward normally decreases as well.

IV.   CONSIDERATIONS

   A.   ECONOMIC VALUE

For a pension plan, economic value is the value of plan surplus taking into account the level of contributions required to achieve that surplus.

In practice many entities do not focus on economic value and focus instead on accounting earnings. Accounting results are relevant for many reasons: they are reported to regulators, shareholders, and to the public; they may be the basis for measuring management's performance and have other uses.

However, ALM is internally consistent only if it is based on economic value. All of the traditional risk metrics (duration, convexity, VaR, CTE or TailVaR, key rate sensitivity analysis, etc.) focus on the asset and liability cash flows for the purpose of measuring the exposure of economic surplus to changes in financial variables.

If an entity is not concerned with economic value, it does not need ALM. However, many entities who have managed their assets and liabilities based on the accounting treatment ended up mismatching their assets and liabilities and ultimately failed.

Today, there are still companies that do not focus on the economic value and permit unrewarded mismatches on an economic value basis. These mismatches are not to be confused with accounting asset and liability mismatches, which may actually be naturally occurring in ALM.

B. FUNDAMENTAL STEPS OF AN ALM PROCESS

An effective ALM process begins with the support of the entity's senior management. Ongoing communication is essential. The process consists of five fundamental steps:

1. ASSESS THE ENTITY'S RISK/REWARD OBJECTIVES

   The purpose of ALM is not necessarily to eliminate or even minimize risk. The level of risk will vary with the return requirement and entity's objectives. Financial objectives and risk tolerances are generally determined by senior management of an entity and are reviewed from time to time.

2. IDENTIFY RISKS

   All sources of risk are identified for all assets and liabilities. Risks are broken down into their component pieces and the underlying causes of each component are assessed. Relationships of various risks to each other and/or to external factors are also identified.

3. QUANTIFY THE LEVEL OF RISK EXPOSURE

   Risk exposure can be quantified 1) relative to changes in the component pieces, 2) as a maximum expected loss for a given confidence interval in a given set of scenarios, or 3) by the distribution of outcomes for a given set of simulated scenarios for the component piece over time. Regular measurement and monitoring of the risk exposure is required.

4. FORMULATE AND IMPLEMENT STRATEGIES TO MODIFY EXISTING RISKS

   ALM strategies comprise both pure risk mitigation and optimization of the risk/reward tradeoff. Risk mitigation can be accomplished by modifying existing risks through techniques such as diversification, hedging, and portfolio rebalancing. For a given risk tolerance level, a given set of investment opportunities, and a given set of constraints, optimization ensures that the portfolio has the most desirable risk/reward tradeoff. Optimization presupposes that the management team has been previously educated on the risk/reward profile of the business and understands the necessity to take action based on ALM analysis. Practitioners are cautioned not to put undue reliance on the results of a mechanical calculation. Professional judgment is an important part of the process.

5. MONITOR RISK EXPOSURES AND REVISE ALM STRATEGIES AS APPROPRIATE

   ALM is a continual process. All identified risk exposures are monitored and reported to senior management on a regular basis. If a risk exposure exceeds its approved limit, corrective actions are taken to reduce the risk exposure. For pension plans, monitoring current financial status and possible short-term outcomes is very helpful in managing pension risk.

   Operating within a dynamic environment, as the entity's risk tolerances and financial objectives change, the existing ALM strategies may no longer be appropriate. Hence, these strategies need to be periodically reviewed and modified. A formal, documented communication process is particularly important in this step.

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[1] "Risk mitigation" seeks to eliminate or reduce exposure to financial risk. "Risk management", on the other hand, does not necessarily seek to eliminate or even reduce risk exposure.