A Modern Approach to Performance Measurement for Insurers [FIGURES MISSING IN THIS COPY]

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1. Performance Measurement and Firm Goals

One of the most basic tenets of modern financial theory is that managers should act in a manner consistent with maximizing the value of owners' equity. While there are theoretical conditions under which this tenet may not always apply, for practical purposes companies usually espouse it as a financial goal. If an insurer accepts this maxim as a company goal, it follows that the firm should view the performance of insurance managers and operatives in terms of whether this performance helps to promote higher firm value.[1] Any benchmarks the firm uses to facilitate performance measurement must be designed in a manner that is consistent with a firm value focus.

It is important to recognize that the appropriate benchmark against which to measure performance will vary within the organization according to the level of the individual whose performance is being measured. Senior investment management, responsible for establishing broad investment strategies and overall asset allocation, should be judged on how well those strategies meet the overall needs of the firm. On the other hand, the actual portfolio managers — who may invest only

[1]For the stock insurer, this goal translates directly into maximizing the firm's stock price. For the mutual insurer, the translation is more complex, as the policyowner is both the debt holder (in the form of issued policies) and equity owner. Therefore, certain actions that maximize current equity value may do little more than transfer wealth from one pocket to another of the same person (if surplus is distributed to policyowners). Or, if surplus is accumulated for future expansion, this may only transfer wealth from the current group of policyowners/equity holders to a succeeding generation of policyowners/equity holders. Because our focus will be on the investment management process, we will avoid this complication in large measure. Given a schedule of intended policy dividend payouts, an increase in investment performance beyond that anticipated can only add to surplus or enhance dividend levels. Thus, the policyowner would be at least as well off. In general, therefore, we can say that maximizing firm value enhances policyholder value today or in the future.

in a subset of the bond universe, such as corporate bonds or mortgage securities within a stated duration and credit quality range — should be judged against the performance of comparable securities. Their business objective should be to outperform an unmanaged portfolio of permitted investments. Generally, others in the organization will be responsible for defining which investments are permitted. Therefore, an ideal performance measurement system must have the flexibility not only to appropriately measure overall investment performance against firm goals, but also to include performance attribution.

Theoretically, the value of owners' equity in an insurance company should be the fair market value of its assets (mostly financial assets and its intangible going concern value) minus its liabilities (mostly insurance policies and other financial liabilities). Typically, however, the focus is on accounting statements that are based on book values rather than market values. (Changes in market value are not recognized for bonds, mortgages, and liabilities.) Consequently, insurance companies have traditionally relied on yield as the primary performance measurement criterion. They have collected yield data on new investments and compared these yields with other insurers' results or against a specified passive index.

In recent years, however, there has been a growing disenchantment with the use of yield measures. High yields that a company achieves on new investments may merely reflect the fact that its investments have more credit risk, less liquidity, more call risk, greater foreign currency exposure, or a worse duration mismatch than those of a company showing a lower yield. Recent years have witnessed an increase in interest rate volatility, the growth of the high yield market where yield can be traded off for credit quality, the growth of the mortgage securities market where yield can be traded off for prepayment risk, and the proliferation of other new security types with complex risk/reward tradeoffs. In this environment, looking at yield on new investments alone, without adjusting for the various risks associated with each security, can be misleading. Indeed, the development of modern valuation technologies for mortgages, corporate bonds, and insurance liabilities has been motivated by the fact that yield and return are not the same thing.[2] These models attempt to measure the cost (or expected loss) associated with yield curve, option, and credit risks.

Looking at portfolio yields even among insurers with comparable investment strategies and risk profiles can also be misleading. Timing differences in insurance cash flows, in conjunction with the wide swings in interest rates experienced in recent years, can result in one insurer having more money to invest when rates are high and another having more money to invest when rates are low. This results in different portfolio yields for reasons beyond the investment manager's control. A yield focus can spawn accounting games and foster book-value-based portfolio reshuffling, yet it may have very little, if anything, to do with promoting higher firm value. There has been growing recognition among insurers, therefore, of the need to adopt a performance measurement system that is

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[2]See Roll [1988], Litterman and Iben [1988], and Asay et al. [1989].

compatible with the insurer's objective of increasing firm value. In this paper, we propose a system designed to accomplish just that.

2. Enhancing Firm Value

We can identify four areas within the finance domain where portfolio managers can act to increase firm value: (1) investing in projects or financial securities with positive net present values (NPVs), i.e., finding undervalued assets; (2) altering the firm's financial structure; (3) altering the firm's duration and convexity mismatches; and (4) outperforming the firm's liabilities.

2.1 Investing in Projects or Financial Securities with Positive NPVs

For the typical industrial firm, this is undoubtedly the area with the most potential for enhancing firm value. Insurers and other financial intermediaries, however, face quite a different situation. Their comparative advantage — indeed, their *raison d'être* — is in issuing customized liabilities. Their aim is to issue these liabilities, be they in the form of property/liability insurance or life/health insurance, more cheaply than they could by raising funds in the public and private debt markets.

With the funds collected, they invest mostly in financial securities, not in projects with positive NPVs. Because publicly traded securities, according to believers in the efficient market hypothesis, are generally assumed to trade at fair prices, their NPVs are zero. Their prices are equal to the present values of expected future cash flows, discounted at the appropriate rates to reflect their relative riskiness. Even if one finds a security that appears underpriced, its NPV, as far as the market is concerned, remains zero until it is shown that the market is wrong; thus, buying the security will have no immediate repercussions on firm market value. When the market finally is convinced of its earlier mispricing, the price will quickly adjust so that NPV returns to zero. This change in equilibrium asset price will then have a positive impact on firm market value. In practice, many portfolio managers consider their comparative advantage to be an ability to find such underpriced assets.

It is also possible that investments with positive NPVs can be found in the private placement market. However, these generally have less liquidity than publicly traded securities, and the market charges higher yields for this illiquidity. Therefore, as insurers acquire investments in this area, they may find that their firm values do not increase as much as might be expected based on yields alone, if indeed they increase at all in the short run. Only over time will the higher yields add to firm value.

There are other areas where the firm might be an active participant in undertaking a business or developing real estate property with a positive NPV. The market may recognize the attractiveness of the project and reward the company forthwith, and this reward will be manifest in the firm value.

2.2 Altering Financial Structure

An area in finance theory that has long been a center of controversy is the impact of financial structure — leverage — on the value of the firm. Empirical evidence is largely consistent with the notion that higher leverage, at least to a point, is associated with higher stock prices. Our research confirms this finding for insurers.[3] An aspect of the leverage issue that is particularly perverse with insurers is the influence of the insurance insolvency guarantee programs in most states, which protect policyholders against the consequences of insurer insolvencies. These programs, which assess the responsible, healthy insurers to cover the losses of the insolvent insurers, create obvious incentives for excess leverage, especially among the lower-tier companies.

2.3 Altering the Duration and Convexity Mismatches

There is a growing body of evidence that the market recognizes the importance of asset/liability management among life/health and property/liability insurers.[4] Those insurers exhibiting greater mismatches between the interest rate sensitivity (duration) of market values of assets and liabilities generally had greater volatility in their stock prices occasioned by interest rate fluctuations. This is because many insurance companies maintain bond portfolios that are longer than their liabilities, and their economic surplus increases if rates fall and decreases if rates rise.[5] (See Exhibit 1.) But this line of research has not been oriented toward the impact of better asset/liability matching on the *level* of firm value; rather, it has been restricted to the impact of a mismatch on *changing* firm values produced by interest rate moves.

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[3]See Babbel and Staking [1989].

[4]See, for example, Lamm-Tennant [1989] and Messmore [1990].

[5]See Babbel and Stricker [1987].

A more interesting question is whether better asset/liability matching can enhance the *level* of firm value. Here, the study by Babbel and Staking [1989] gives us the first evidence. This study showed that better matched companies commanded higher stock prices relative to the liquidation value of their surplus.[6] This finding was particularly significant during years of higher interest rate volatility and among companies that were not precariously leveraged. Perhaps the reason for this market premium is that an insurer has economic goodwill or going concern value, and a company operating with a better match between assets and liabilities is more likely to be around to capture that extra value. Indeed, the study found that the better match resulted in higher relative stock prices for all but the marginal companies, which exhibited higher stock prices by being less well-matched. The value of a mismatch to this latter group arises, perhaps, from the option to default (i.e., to "put" the liabilities to the state); this option increases in value as the business becomes more volatile.

2.4 Outperforming the Firm's Liabilities

In addition to taking measures that can have an immediate impact on the stock price or market value of owners' equity, a company can take a number of actions that will affect firm value only over time. Whenever a firm earns more on its assets than it pays on its liabilities, the excess will accrue to surplus. To the extent that these incremental additions to surplus are greater than the required return on equity, the economic value of surplus will rise.

This increment to surplus value derives from two principal sources. The operations side may be issuing liabilities on favorable terms and through cost-efficient distribution networks. Alternatively, the investment department may be experiencing favorable returns (relative to the product pricing assumptions) through superior market timing, securities selection, or asset allocation. Sometimes these two sources of value creation work together. For example, a prolonged pattern of superior investment performance will aid the sales force in attracting additional clients on favorable terms. In such a case, part of the credit for sales should go to the investment department.

3. Structuring a Performance Measurement System

An evaluation of the financial and investment performance of a company should include activities undertaken in any of the aforementioned categories. Actions taken by the firm such as finding and investing in positive NPV securities or projects, altering leverage, and altering the duration and convexity mismatches can be expected to have swift repercussions on the firm value, to the extent that informa-

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[6]The liquidation value of their surplus was measured by marking to market the tangible assets of the company and subtracting the present value of the liabilities. The study showed that companies with well-matched assets and liabilities had stock prices that were two and three times higher, relative to their liquidation value, than those of companies with average mismatches.

tion regarding these actions is made publicly available. Accordingly, it is relatively straightforward to measure the impact of such actions. If a firm's stock is publicly traded, it requires only determining how its price changed, after factoring out the broad stock market, interest rate, and insurance industry influences on its price movement.[7] For the mutual firm, it entails the difficult task of measuring the conversion (demutualization) value both before and after the actions are taken.

Other actions, which we have grouped under the heading of "Outperforming the Firm's Liabilities," can be evaluated only over longer periods of time. These actions include strategic allocation of investments among broad asset classes, selection of individual assets within a broad class, timing of investment in anticipation of market moves, and so forth.[8] Our proposed performance measurement system is intended to focus on this area for enhancing firm value. It seeks to measure the performance over time of the insurer's assets relative to its liabilities (i.e., its spread over its cost of funds).

3.1 Establishing a Liability Benchmark

To determine whether its assets have outperformed its liabilities, an insurer must first determine how its liabilities have performed. Because the liabilities are not traded on an organized public exchange, it is not possible to monitor their behavior directly on a continual basis. *Therefore, a liability benchmark must be devised, based on traded securities, that will mirror changes in values of the liabilities*.[9]

Two characteristics of a liability benchmark are of utmost importance. First, the benchmark must be based on traded securities for which there is an active market. This will allow a firm to get reliable quotes on a timely basis. Second, and more importantly, the benchmark must behave in a manner that closely parallels the market value of the liabilities over time and under disparate economic circum-

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[7] Staking [1989] details a methodology for determining this.

[8] They also include some of the activities mentioned earlier, which are undertaken in anticipation of changes in market conditions in a particular direction. For example, an insurer may extend the maturity of its assets, creating a deliberate duration mismatch between assets and liabilities, in anticipation of a decline in interest rates beyond that implied by the current term structure. The market will not supply any immediate reward to these actions. Indeed, it may penalize such adventurism. Only time will reveal the wisdom of attempting to "out-guess the market."

[9] Not every variable influencing the value of liabilities can be mirrored by action in the capital markets. In life insurance the mortality risk cannot be so mirrored. A similar situation exists for fire insurance though transactions in the reinsurance markets could allow the transfer of some risk. A related possibility could occur if the insurance contract under study provided the possibility of transfer from a fixed book value account to a stock market account. If the stock market rose, it is possible that an increased rate of such transfers would occur and the value of the liability would change. While it would be theoretically possible to mirror many different conceivable variables, including the stock market, we do not advocate this. We will work only with the impacts of changes in the Treasury yield curve because the known effects of those changes overwhelm any of the more esoteric factors we could hypothesize. The extra complexity would not be worth the effort.

stances. For example, it should exhibit duration, convexity, and sensitivity to other broad market forces in which one can take an investment position similar to that of the liabilities. The difficulty of evaluating complex insurance liabilities should not be underestimated. Nonetheless, it must be the starting point for developing an appropriate investment strategy from an asset/liability management perspective.

In an earlier paper, Asay, Bouyoucos, and Marciano [1989] provided a methodology to measure the costs of various policyholder options and the interest rate risk inherent in single premium deferred annuities and other interest-sensitive life policies. The valuation methods are based on replicating the cash flows of the policy with capital market instruments and pricing the resulting replicated portfolios with market prices. This technology gives a company the ability to translate its nontraded liabilities into equivalent capital market portfolios for which there are active markets and therefore reliable price quotes. Consequently, it is possible to track the market value of an insurer's liabilities over time, even though they are not traded. This process differs from the usual approach of calculating only a yield and a duration of the liabilities as benchmarks for the asset portfolio characteristics. The mimicking portfolio has the desirable properties that (1) returns reflect the shape of the yield curve and the cost of embedded options, and (2) the effects of important sources of interest rate risk other than just duration — such as convexity and changing volatility — are directly incorporated. As noted, many companies may depend upon duration as the only characterization of the changes in the value of liabilities. However, our approach allows a richer representation of the risk and return properties of liabilities.

Using a liquid, traded securities portfolio that mimics the liabilities allows for a straightforward computation of a liability total-rate-of-return index against which the performance of the assets can be measured. Outperforming this liability index ensures that the asset managers are, in fact, acting in a manner consistent with increasing the value of the firm. *The current practice of measuring asset managers against an arbitrary index (even with the correct duration) does not ensure this result.*

While a well-constructed portfolio that mimics a mature book of business should not vary dramatically over time, its composition may change as policies age and new policies are written. Consequently, it may be necessary to reevaluate the liabilities periodically and adjust the liability benchmark if appropriate, just as a GIC portfolio must be periodically rebalanced.

3.2 Levels of Performance Measurement

Armed with the concept of liability benchmarks, we are now prepared to measure whether our assets are outperforming our liabilities. *We recommend that insurance investment managers measure their performance on a total-rate-of-return basis, and compare their performance to the total rate of return on a liability benchmark carefully constructed to reflect the costs of their liabilities.* As Thomas Messmore has stated (Messmore, [1989]), "From an investment perspective, total return in excess of liability-based benchmarks is the most meaningful measure of

progress in the creation of economic wealth." Recognizing that yield may be an important consideration in many insurance products, especially interest-sensitive products, yield could be an important constraint in managing an insurance portfolio. However, because in today's capital markets it is so easy to enhance yield by taking on one or more risks — e.g., credit risk, duration risk, call risk, prepayment risk, liquidity risk, currency risk, etc. — total return is the better objective to measure because it implicitly accounts for all the risks in the portfolio at each point in time. An alternative measure of performance is the option-adjusted spread (OAS).[10] However, this is most typically used as a measure of prospective performance, while total rate of return can be used to measure how well one has actually performed.

Ideally, insurers should calculate total returns on a daily basis, as do mutual funds. In practice, however, recognizing the time, expense, and effort required, it should be sufficient for insurance companies to calculate returns on a monthly basis. An assumption would be required for handling intra-month cash flows. Typically, these are assumed to occur in the middle of the month.

Chaining together monthly total returns allows the insurer to calculate a time-weighted rate of return over any long-term horizon. It eliminates the impact of the actual timing of insurance cash flows over which the investment manager has no control. This allows for unbiased comparisons of performance.

Simply calculating the total rate of return on the assets and comparing it with any of the widely available generic bond indexes is not sufficient. It is extremely unlikely that such an index would mirror the insurer's actual liabilities. The bond market index couldn't be expected to match the duration of the insurer's liabilities, not to mention their convexity characteristics or other measures of interest rate sensitivity (e.g., to yield curve twists or changing volatility). Hence, it is necessary to create a customized liability benchmark for each insurer's particular book of business. For the same reason, it would probably be inappropriate to compare the total return earned by one insurer on its investment portfolio with that of other insurers, unless all their liabilities were identical — a highly unlikely occurrence.

Using a liability benchmark is appropriate for asset portfolios funding the insurer's reserves. The proper benchmark for the assets funding capital and surplus, however, should be based on management's return objectives and risk tolerance. It could reflect a weighted average of indexes for diverse asset classes, such as stocks, bonds, real estate, and international securities.

A comprehensive performance measurement system will provide for evaluation of performance at several levels. We depict these levels in Exhibit 2. It will also allow performance attribution, i.e., the determination of ingredients contributing to relative performance.

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[10]See Asay, Bouyoucos, and Marciano [1989] for a description of this measure as it relates to insurance products. Babbel and Zenios [1992] set forth the limitations of this measure.

Level I. The first step is to characterize each of the liabilities or liability groupings issued in terms of its market characteristics — duration, convexity, volatility, etc.

Level II. Next we set up benchmark asset portfolios we call sub-liability benchmarks (SLBs), to mirror the behavior of each kind of liability. Our central focus here will be on the total return of the SLB at each point in time, which should mimic the total cost of the particular line of business or group of policies for which it is acting as proxy.

In designing a portfolio of securities to serve as a sub-liability benchmark, we recommend selection of U.S. Treasury securities, their derivatives, and other securities of minimal default risk. There are several reasons why we favor the inclusion and predominance of these securities:

- They are liquid and widely traded, and price quotes are easily obtained.
- They are typically the benchmark used for valuing other asset classes and are starting to be used as a benchmark for valuing insurance liabilities as well.
- Their diversity of characteristics allows them to be combined into portfolios that can emulate the market value behavior of almost any default-free cash flow stream.
- Insurance policies are very close to being considered default-free from the consumers' standpoint. Because policies are backed by the surplus and reserves of state-licensed and solvency-regulated companies, and in most cases are also backed by state insolvency guarantee programs (GICs are an obvious exception), we can reasonably impute to them near default-free standing.
- Given this near default-free standing, consumers should not expect their insurance premiums to reflect interest rates that are any higher than those on similar, near default-free securities, after factoring in reasonable loads for distribution, administrative, and capital costs.[11] To the extent the insurer must offer a premium for competitive reasons, it can add an appropriate spread to the return of the sub-liability benchmark portfolio.

Level III. These SLBs can then be aggregated into an overall liability benchmark (LB) if the insurer does not segment its portfolio. The weights used in aggregating the SLBs should reflect their relative shares of the total liabilities issued, where these shares are measured in market value units. (Note that the weights are *not* based on surplus allocated to a particular line of business.) The weights applied to each SLB will change over time as the proportions of business represented by each line or policy grouping change.

Level IV. Given the aggregate LB, the insurer can address the asset side. The first step is an asset allocation optimization where, for example, the LB becomes a constraint to the problem: *maximizing total rate of return of the assets subject to outperforming the liabilities*. This optimization could be purely a mathematical or empirical exercise. Alternatively, investment managers could exercise their views about the likely relative performance of various sectors of the market. In the former approach, managers could perform a classic asset allocation optimization.[12]

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[11] A sales force should not be rewarded for selling policies that reflect higher interest rates than these. If a company feels it must offer policies reflecting higher yields, then either it must be saddled with extraordinary distribution, administrative, or capital costs, or it may be marketing to a clientele that is seeking its products primarily for their investment characteristics rather than their insurance component, so they must compete with noninsurance investment alternatives with lower cost loadings. In either case, the company is following a practice that will reduce the value of surplus.

[12] This would use as inputs the returns and covariances between various asset classes. The result would be a mean-variance efficient asset portfolio that beats the liabilities on an expected basis (or under various scenarios). Alternatively, managers could optimize over a

In the latter approach, investment managers define the asset allocation to set up an asset proxy portfolio (APP) that reflects their desires regarding asset allocation and timing. To achieve target profit margins, they will probably include risky assets in the APP rather than limit it to just the very high quality, liquid assets of the LB. To the extent that results for their target APP differ from the LB, these investment strategists are responsible and their decisions may be evaluated over time. For example, the APP may have more credit risk, call risk, or interest rate risk than the LB, based on their view of market conditions or bets on the economy. It is important to make allowances for their strategic views in this process.

Levels V and VI. The APP can be divided into several smaller sub-asset proxy portfolios (SAPPs), or indexes, that could serve as benchmarks to individual portfolio or investment managers. While each SAPP could correspond to a particular SLB, it may be more convenient to have the investment professionals organized according to various classes of investments (e.g., corporates, mortgages, municipals, equities, high yield bonds, etc.).[13] An important characteristic of these SAPPs is that they must aggregate to the overall APP both in terms of investment characteristics and total rate of return. Some SAPPs may be sufficiently large that it will be convenient to subdivide them even further, providing indexes of total return on asset groupings as targets for the ultimate investment managers to achieve or outperform (e.g., Index B1, B2, etc.).

Level VII. Finally, we get to the people charged with actually implementing the investment program. These individuals do the investing, and the total return and risk characteristics of their investments must be tracked over time. As their universe of permitted investments will generally be constrained, their actual performance should be measured against a passive portfolio with similar investment constraints. Alternatively, their performance could be gauged against an optimized portfolio meeting the investment constraints. Appropriate constraints might include liquidity, duration, convexity, credit quality, and minimum yield requirements.

3.3 Investment Income Allocation

Comparing the total return of the asset portfolio against a benchmark related to the requirements of the liabilities is the best single measure of relative investment performance. It does not, however, reflect either the timing of cash flows or short-term accounting results. Thus, if one product line grows rapidly when interest rates are high while another grows rapidly when rates are low, the former product line should have a higher yielding portfolio and more investment income — even though they both might have the same total return performance. It may thus be desirable to develop an alternative benchmark for purposes of income allocation and tracking accounting results.

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different objective function (e.g., minimize risk), using excess asset returns over liabilities as the input.

[13]Note that the SAPPs are letters, rather than numbered, to connote an indirect connection between them and the actual liability groupings.

This can be accomplished by creating a benchmark portfolio to mirror the future liability flows under all likely future interest rate paths. This is not an easy task. To be done correctly, it requires a sophisticated modeling system that can generate an appropriate set of interest rate paths and then forecast asset and liability cash flows for each path, taking care to handle the embedded options properly.

3.4 Taxation and the Liability Benchmark

Taxation of investment and underwriting income is a complex consideration to incorporate in a performance measurement system, particularly for a property/liability company in light of the Alternative Minimum Tax. In highly regulated states, any taxes incurred by an insurance enterprise on investment income are supposed to be passed along to the ultimate consumers of insurance policies. The theoretical justification has been that the equity owners of insurance companies could invest directly in the securities held by insurers without undergoing an extra layer of taxation. Therefore, fair pricing demands that the incremental taxes be added to the policy premiums.[14] How well this works in practice is open to question, however, and an insurer minimizing the taxes to be passed along in the form of higher insurance prices may be at a competitive advantage.

In less highly regulated states, the tax issue is even more important. Much uncertainty surrounds the ultimate level of losses and the evolving nature of tax law. Therefore, it is difficult for an investment manager to optimize the tax position of the enterprise by choosing an appropriate mix of taxable and tax-exempt bonds. Nonetheless, he can make some judgments about the appropriate mix and can adjust the liability benchmark to reflect that mix, allowing performance to be measured on a pre-tax basis.

Realized capital gains and losses arising out of portfolio management also have tax implications. Given that the marginal tax rates on interest income and capital gains are the same, the only impact is really a timing difference in income recognition. (A capital gain results when yields have declined, so future income will be reduced on the reinvested proceeds.) Furthermore, capital gains and losses can be constrained in practice to reasonable levels to minimize their impact. Accordingly, they can be treated on a pre-tax basis.

4. Performance Attribution

By setting up our performance measurement system in a tiered structure as depicted in Exhibit 1, we have also made it easier to attribute performance correctly. There are people responsible at the various levels of performance measurement to ensure that the system operates smoothly.[15]

Performance attribution requires first a measure of performance so that there is something to attribute! A useful starting point is to compare the spread between the actual total rate of return on the combined investment portfolios (Level VII) and the total rate of return on the overall liability benchmark (Level III).

We refer to this as a starting point because it measures actual investment return against a proxy for liability costs. It is important to periodically perform economic valuations of the liabilities themselves and see whether their realized behavior has been well reflected by the asset portfolios that are used as proxies for them. If not,

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[14] See Cummins and Harrington [1987].

[15] In some firms, especially smaller insurers, the same individual may perform two or more of the functions identified.

there are three areas where the discrepancy may have arisen. The first would be at Level I, where the actuaries may have improperly characterized the nature of the liabilities in terms of their investment characteristics (e.g., duration, convexity, lapse, drifts). It is possible that the actuaries correctly characterized the investment attributes of the liabilities, yet estimated poorly other attributes (e.g., mortality, frequency or severity of losses) that would produce the aberrant behavior. If all is well at Level I, the problem may have arisen at Level II, where a financial technician has taken the input from actuaries and incorrectly created proxy asset portfolios (liability benchmarks) intended to exhibit the same investment characteristics. The third area where a problem may have arisen is at Level III, where the separate liability groupings benchmarks are weighted and combined into an overall liability benchmark. If the market value weightings of the books of business implied by the overall liability benchmark were incorrect, or evolved over time in a manner inconsistent with that assumed in the schedule for devising the benchmark, there could be a discrepancy between the actual behavior of the benchmark and the aggregate liabilities that it represents.

If the periodic examinations of the suitability of the overall liability benchmark prove satisfactory, we can then focus with confidence on the total-rate-of-return spread between Levels III and VII, as indicated earlier. This total spread can then be attributed to performance achieved at Levels IV, V, VI, and VII.

The individuals responsible for corporate investment strategy can be evaluated on the basis of how their overall asset proxy portfolio performed relative to the overall liability benchmark. If the strategic plan is a good one, it should show up over time by having the APP outperform the LB. It is possible that the strategic view is satisfactory but the implementation is not. The persons responsible for implementing the strategic view may demonstrate poor asset selection, or deviate from the plan on their own recognizance. It is also possible that the strategic plan is a poor one, but that the persons responsible for implementing it may exceed their targets, with the result that assets outperform liabilities. This could occur at Levels V, VI, and VII.

Assuming that the SAPPs have been designed correctly, so that they aggregate to the APP, we are next ready to measure the performance of the portfolio managers against their targets (levels V and VI). To the extent that the portfolio managers acquire securities that differ in composition from their SAPPs, or invest their available funds at different times than that assumed in the SAPPs, their performance will differ from projections.

At times the need to achieve a minimum yield spread over Treasuries will conflict with a portfolio manager's perception of relative value in the market, and therefore with his expected total-return performance over the short run. In part to account for this conflict, while at the same time recognizing the annual planning and compensation cycle at most companies, *we recommend that performance be measured over both a one-year and a rolling three-year period.*

The typical portfolio manager will have a cohort of specialists helping to acquire the investments desired on favorable terms. These specialists will be looking for undervalued assets and may exercise some discretion about the nature of assets they acquire at any time, while working over time to achieve their part of the bal-

ance desired by the portfolio manager. They may be charged with investing to beat a particular index. If they outperform their target indexes, we can undertake further investigation to determine how this was achieved. For example, did they demonstrate superior asset selection or superior timing, or did they deviate from their risk norms and win their bets?

By summing the various components of performance attribution, we should arrive again at the total rate of return spread between Levels III and VII. The information collected from this endeavor will enable us to determine more fairly which members of our investment team have contributed best toward achieving our objectives and help us readjust our investment plans for future periods.

V. Conclusion

We recommend that insurers switch from yield to total return for performance measurement. Incremental yield can always be achieved by accepting more of one or more types of risks. Only total return implicitly and fairly accounts for all of the risks in a portfolio. For those insurance products where yield is an important component, it should be a *constraint* on the investment process rather than the primary objective.

Performance should be measured relative to a benchmark index created to reflect risk and return characteristics of the liabilities. We can construct this index using the modern valuation techniques referred to in this paper. Given the liability index, members of the investment team can manage assets with the objective of outperforming this index. This ensures that both asset and liability managers have coordinated incentives consistent with increasing the value of the firm. In general, the liability benchmark will be composed of Treasuries and their derivatives (e.g., options), unless the insurance liability is closely linked to some particular sector of the stock or bond market.

Traditional accounting does not require that bonds be marked to market. Thus, in the short run, accounting results can diverge from economic total return results. Nonetheless, over time they must converge. The evidence suggests that rating agencies, equity analysts, and the market in general consider the market value of the firm's assets when trying to value it. Furthermore, there are growing pressures on insurance companies to mark their bond portfolios to market.

In the long run, the time, effort and expense required to measure total return — and to reward performance that enhances it — should increase the ultimate value of the firm and thus justify the expense involved.

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