

RECORD OF SOCIETY OF ACTUARIES 1985 VOL. 11 NO. 2

PRODUCT LINE CAPITAL ALLOCATION

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MR. REED P. MILLER: I am with Lincoln National and will be serving as moderator for this session. The panelists are Don Sondergeld from The Hartford, Bruce Dixon from Crown Life, and Dave Ingram from Penn Mutual. The recorder is Neal Arnold, who is also with Lincoln National.

There are two handouts at the back of the room; one covers Lincoln National's target surplus formula and the other covers the Hartford's formula. The prepared remarks of the panelists are intended to cover the following topics:

- o Target surplus formulas for specific product lines
- o Projecting product line surplus needs
- o How cost of capital is charged to product lines
- o Criteria to use in allocating capital to or withdrawing capital from specific product lines
- o Differing techniques appropriate for stock and mutual companies
- o Differing techniques appropriate for the United States and Canada
- o How capital allocation relates to regulatory requirements
- o How capital allocation relates to competition in other industries

This is a lengthy list to discuss in a two-hour period. We will try to cover all of them in general, and then address any questions you might have.

MR. DONALD R. SONDERGELD: I plan to cover most of the items on the program. Our main topic refers to capital. But as stock and mutual companies both have surplus, I will use the word surplus rather than capital in my remarks. There are at least two types of surplus; statutory and management reporting. The latter may or may not be on a generally accepted accounting principles (GAAP) basis.

Statutory happiness is positive surplus. Its size is a function of the amount of the conservatism in the statutory reserves, and the risk

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position of the company's various products as represented by the C1 risk (asset default), the C2 risk (pricing adequacy), and the C3 risk (related to the change in interest rates) as well as any other risks.

In my paper "Profitability As A Return On Total Capital," TSA Vol. 34, I defined benchmark surplus as the amount of statutory surplus needed for each line of business in order to reduce the probability of insolvency to management's comfort level. It is also the amount needed to cover the C1, C2, C3 and other risks.

A joint committee of the Society of Actuaries and the American Academy of Actuaries published a report in late 1984 titled The Role Of The Valuation Actuary in the United States. This may result in the creation of a specialized actuary who would be responsible for calculating something called solidity surplus, and providing a report on the financial soundness of the company to the Board of Directors and to the Insurance Commissioner. Solidity surplus represents the amount of statutory surplus that should be retained to cover future plausible deviations from expected assumptions. Although this may be more or less than the amount needed for management's comfort, I will assume target surplus and solidity surplus mean the same thing and both cover the C1, C2, C3 and other risks associated with each product line.

The excess of total statutory surplus over the sum of the target surplus for each line of business, or product line, is sometimes referred to as "free surplus" or "vitality surplus." This can be used to write more business or pay stockholders.

In a sense, surplus is actually a bad word, as it connotes something that is not needed. Ideally, the statutory blank should show surplus broken down into two categories. The first would be target surplus which might be better labeled "required" or "designated" surplus. The residue might be labeled "additional" surplus, which has been referred to as "free," "excess," or "vitality" surplus.

We can now look at Hartford's statutory target surplus formulas.

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THE HARTFORD Target Surplus Guidelines

Life Insurance

Individual Life Insurance

3% of assets, plus 25% of the expected mortality based upon the net amount at risk, less 50% of deficiency reserves. The deficiency reserve credit may not exceed 1% of assets.

Group Life Insurance

15% of written premium

Individual Deferred Annuities

Book Value Cash-Out

5% of assets, less a credit for reserves in excess of cash values. The credit is capped at 2% of assets.

Market Value Formula Cash-Out

1% to 2% of assets, depending on length of guarantee.

Variable (Unit Value) Cash-Out

3% of assets.

Group Annuities

0.5% to 2%, depending on the C3 risk.

On Benefit Annuities

2% of assets on contracts not involving life contingencies, and 3% of assets on contracts involving life contingencies.

Individual Health Insurance

Medical Care

15% to 60% of earned premium, depending on C2 risk.

Disability

30% to 60% of earned premium, plus 10% of claim reserves.

Group Health Insurance

Medical Care

10% to 20% of earned premium less 60% of claim stabilization reserves (CSR). Claim stabilization reserves represent policyholder money. This CSR credit is limited to 50% of the unoffset target surplus amount.

Disability

100% of active life reserves plus 20% of disabled life reserves.

NOTE: Assets equal cash values. If there are no cash values, assets equal reserves.

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These are the target surplus guidelines we are currently using at the Hartford. They are periodically updated and modified.

It is important to use actuarial consistency in the treatment of surplus, both in the pricing of products and in the reporting of earnings. My company's major profit objective is to produce a specified minimum internal rate of return (IRR) on its statutory investment over the life of the policy. This minimum rate of return is larger on products whose expected earnings have greater volatility. The statutory investment that I referred to includes both the first year drain on surplus, and the amount of target or benchmark surplus. This is described in detail on the paper that I referred to earlier.

My company has a corporate line of business which provides statutory surplus to each operating or product line of business each month. Similarly, any surplus that is not needed by the product line is transferred monthly to the corporate line. At the beginning of every month, each product line has a statutory surplus exactly equal to its target surplus formula. During the month, the product line will be allocated investment income on that surplus. Also, positive or negative statutory earnings from policies in force at the beginning of the month, and from new policies written that month, will be reported by product line. If the sum of these items plus the amount of target surplus at the beginning of the month produces a number that is different than the target surplus needed at the beginning of the following month, a transfer of surplus is made between the corporate line and the product line.

Projecting target surplus needs for each product line is relatively easy. As part of our business planning process, we project the monthly transfers that are needed so that each product line of business has exactly its target surplus.

Next, how is the cost of capital charged to the product lines? It isn't. In my company a corporate line of business determines the minimum internal rate of return and the target surplus for each product line. Actuaries working with the corporate line of business also review all cash flow projections, reserve items and other assumptions used in pricing each product line. The end result is that if all the assumptions are realized, the product line will report statutory earnings that implicitly include an internal rate of return equal to, or greater than, that required by the corporate line of business. A similar effect occurs on a GAAP basis, and that was treated in my paper. Results that are better or worse than expected are reflected in the earnings of the product line, and in the surplus of the corporate line. The beneficiary of the expected result is the corporate line of business which represents the stockholders of the stock life insurance company. The vitality surplus is available in both the stock and mutual companies.

Let me now provide a simple example. A nonparticipating product is priced to produce an expected 15 percent internal rate of return on the statutory investment. Benchmark, or target, surplus is expected to earn 5 percent after taxes. The expected return on the statutory

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surplus drain is 20 percent. The weighted average of the 5 percent return on target surplus and the 20 percent return on the statutory drain is the 15 percent internal rate of return that the company anticipates. If the company anticipated earning 5 percent on its free surplus, it now expects to earn 15 percent on the total amount of surplus invested in the product. As policyowners pay premiums, they are paying for the cost of capital. In effect, they are being charged an amount that will produce a 15 percent return on the statutory surplus drain and an extra 10 percent on target surplus. This is the amount built into the price.

Let me now touch on stock/mutual differences. In general, I believe identical techniques are appropriate. However, some separate considerations are in order if a participating insurance product is sold by either a stock or a mutual company. The target surplus required will probably be lower than for a similar nonparticipating product written at a lower premium rate. That is, the participating product probably has a lower C2 risk and needs less surplus.

The three rates of return that I gave you earlier were for a nonparticipating policy. I would suggest that if those are the right numbers, then a stock company writing par business might want a 15 percent return on total surplus invested in a similar par policy. Under the volatility principal, it might require a somewhat lower number, say 14 3/4 percent. This means the holders of the participating policy are paying a lower cost of capital than those holding the nonparticipating policy. This is reasonable, as the participating policyowners are reducing the company's risk by paying a larger premium. The cost of capital should therefore be lower for the participating policyowner.

Alternatively, should a mutual company price its product to yield the same overall return of 15 percent or, should it only look for the 5 percent it could otherwise earn on free surplus? I suspect that there are many answers to those questions. I will not give you my views on who owns free surplus in a mutual company. However, if 5 percent is a low risk after tax rate of return on free surplus, then it seems to follow that management of a par line -- even in a par company -- could be criticized by whoever is considered to be the owner of such surplus, for investing surplus at a risk-free rate in a product line that has risk.

MR. DAVID N. INGRAM: The way a company uses capital identifies its true nature. A company seeking to maximize its profits must have a surplus management process. Surplus is the limiting quantity on an insurance (or any business) enterprise's operation. Different companies will have different methods for selecting capital investments. Those may involve financial, quantifiable criteria or they may be based solely on strategic priorities. Whether or not a company uses financial measures will depend on management's desire to have their decision making create short- or long-term results and on how comfortable it is with the strategic direction of the company. Quantified selection that would be defined by the financial criteria is not necessarily the best. The confidence interval for projected numerical results of a proposed project could be plus or minus 50 percent, 100 percent or more. The

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choice between a new proposal and the continuation of a tried and true project hinges on management's aversion to uncertainty.

The first step in a product line capital allocation process is to determine the amount of the company's capital. Total surplus of the company must be divided between capital and other surplus. At Penn Mutual we divide our surplus into two quantities which we call "required surplus" and "investable surplus," the investable surplus is capital.

We incorporate three considerations into our determination of minimum required surplus level for a product line and the minimum acceptable required surplus for the total company: the risk of our product, the surplus held by other companies, and the legal requirements on our surplus.

First we allocate the required surplus by product, using a formula closely tied to the Society of Actuaries' definition of C1, C2, C3 and C4 risks. That is

$$RS = (AV + BC + CDV + E) / (1 - A).$$

The C1 surplus is AV in the formula. It is a percentage of reserves which varies by the investment segment associated with the product. Within each segment, investments are classified into six groups, depending on the risk level of the investment. The highest is a 33 percent group, primarily containing common stocks. The next is a 15 percent group, which has some moderate risk investments. The bulk of the assets are in 3 percent, 1 percent, and 0.5 percent classes, which generally contain very low risk investment grade bonds and policy loans. Assets having zero risk of fluctuation are assigned to a 0 percent class. An average percent is then calculated over the investments for each segment; that average is then applied to each product within the segment.

The C2 risk is BC in the formula. It is stated in terms of a percent of expected claims from the product. This figure will depend on the maximum variability of claims for a specific product. These numbers range from 0 percent for annuities to 25 percent for health insurance to 40 percent for life insurance.

The C3 part has two factors which are multiplied by reserves, and is represented by CDV. The first factor is a reflection of the maximum possible C3 loss for the investment segment associated with the product. One example of this is a segment of long-term bonds where the maximum possible market value loss would be 25 percent if they all had to be sold immediately in a high interest market. That would be the maximum loss if the entire segment would have to be cashed in. The second factor varies by product and reflects the maximum portion of C3 loss that is expected for that product. For example, if you consider an ordinary insurance line with guaranteed cash values and you think that the maximum amount of excess surrenders at any time would be 10 percent of reserves, then the D factor would be 10

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percent. The total C3 required surplus in that example would be 25 percent times the 10 percent or 2.5 percent of reserves.

The C4 or business risk required surplus, is used to target a minimum required surplus by product. Also, since we do not expect the other numbers in the formula to come up high enough for the company it is used to target a minimum required surplus total at that level. It is stated as E, but it could be a function of anything. Right now it is applied only to variable annuity products where no required surplus arises from any other part of the formula. In those cases we want to hold a minimum of one percent of assets.

Next we look at surplus held by other companies. A company cannot afford to be significantly more conservative than other companies without higher prices nor can it be at a much lower level than its competitors without running a great risk of insolvency in an adverse situation. However, these comparisons are not easy to make.

Earlier this year we performed a multiple regression study of 1983 surpluses held by thirty mutual companies. We chose regression variables that were similar to those in our internal required surplus formula. The result, shown in the display, was an eight point surplus formula. The figures from that formula did not match particularly well with those from our required surplus formula. However, we do think that it provides a good idea what surpluses thirty mutual companies are holding relative to these risk factors.

MUTUAL COMPANY SURPLUS =

0.24%	Assets
- 1.27%	Annuity Reserves
+16.44%	A&H Premiums
+36.16%	Short Term
+19.61%	Common Stocks
+10.16%	Policy Loans
+ 0.80%	Net Life Insurance At Risk
+ 5.15%	Bonds and Preferred Stocks

The factors shown were mathematically selected from a much longer list of possible variables in the regression study.

The most interesting feature of this formula is the negative coefficient for annuity reserves. An explanation could be that most mutual companies hold a lower required surplus for annuity reserves than that indicated by applying the other factors to the asset values. The latter would probably be more reflective of what a company would hold for its life insurance reserves. The high factors for short-term assets and policy loans are not necessarily reflective of associated risks. More likely, they are reflective of companies which either have experienced high C3 losses or are well aware of their C3 loss potential; that is, have either incurred high policy loans or are holding a significant amount of short-term investments to keep their liquidity position at a desired level.

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While this formula did not have an extremely high degree of accuracy in predicting specific company results, it did well enough to be worth using. The proportion of variation explained by the fitted regression, R^2 , was 53 percent, and there was a negligible amount of multi-colinearity between the variables. We expect to use these results to compare our company's surplus to that of other companies, which do not necessarily have the same mix of products and risks that we have. The surplus predicted by this formula for our company is a significant improvement over the eight or nine company average surplus to asset ratio which we had previously used for comparison purposes.

Legal requirements are then considered in setting our final required surplus. In all of my previous comments, "surplus" referred to the total statutory surplus plus the mandatory securities valuation reserve (MSVR). We regularly check our total and required surplus balances against the maximum MSVR and against our current level of MSVR to make sure that we stay above the statutory requirement. Our C1 surplus now runs about equal to the maximum MSVR and our total surplus exceeds it.

At this point we can estimate the amount of investable surplus which will be available for new business in the coming year. This is done by projecting the net gain and required surplus, assuming that there are no sales in the year. For that, we take total surplus at the end of the prior year, add the projected net gain from in-force business, and subtract the end-of-year projected required surplus on the in-force business; that is, $IS_t = TS_{t-1} + NG_t - RQS_t$.

Company goals are then set for the amount of investable surplus, total surplus, statutory surplus and statutory net gain. Goals are also set for growth in each of these items over the prior year's results. We look for the highest possible sustainable level of sales growth over a five-year period. Multiple scenario tests are performed to determine which combination of goals becomes the constraint on sales growth. The end result is a goal for total new business strain. This we define as the first year statutory net loss of sales plus the required surplus for the new business. Expected sales are then projected for each product by the sales management. An internal rate of return is calculated for each product, each line and the total company. These are based on sales expected by the marketing department. The assignment of required surplus to product in this process produces an implicit charge for using surplus. There are no direct charges for interest or for required or borrowed surplus in any of our financial reporting or calculations. However, the internal rate of return of the product book profits does include the change in required surplus. The after tax earnings on the required surplus must meet company standards.

If the expected sales and expected new business strain, projected by the marketing department, match the new business strain goal with an acceptable IRR, then the process of product line capital allocation is completed. Most years, however, they do not match at all. Projections have been too high in recent years and too low in some past years. A process is needed for selecting between products when projected strain

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is too high, and also for identifying those products requiring a greater sales effort when projections are too low.

We have considered five main strategic areas to different degrees in different years. The first is target market segments. At our company, one of our primary strategies has been to have products reach particular target markets. An example is the professional market. Each product is examined and the amount of penetration for those products is determined. Products with high penetration in the desired target markets are given a preference in the allocation process.

The second area is the product mix in the portfolio. Is a particular product line necessary for the company to maintain its desired amount of portfolio diversity? That diversity may be needed to support the marketing force, or to produce a positive synergism in sales or to create a diversity of risks.

The third area is marketing outlets. We are in the process of developing marketing outlets other than our traditional agency force. Products which can be sold through other marketing outlets are given preferential treatment. Total income produced for our traditional agency force was, at one time, an aspect of decisions in this area. The goal was for products to produce enough income to the agency force to be their sole support. We, at that time, sold products which produced high amounts of income to the field force for the sole purpose of producing that income.

The fourth area is product life cycle. We desire to generally maintain a portfolio which includes new high-growth products as well as mature products. We look at each product to see if it fills a unique niche in the life cycles of the portfolio items.

The fifth area is resource utilization. How does a particular product use the company's other scarce resources? For example, this might be the utilization of data processing, actuarial, underwriting, sales support, or any other scarce resource of the company. The conflict of needs for these resources with other products which may have equal or greater strategic desirability is considered.

As a supplement to these strategic considerations we sometimes use financial criteria in making decisions. These have not been highly utilized in our company in past years, but are becoming more and more important. The first is what I call "looking at the big numbers." Products which have very high strain, taxes, expenses or required surplus are re-examined. Small changes in product design or sales level are likely to make a maximum impact on the total strain or the internal rate of return.

The second criterion is the internal rate of return itself. Sales may be encouraged for products with the highest internal rates of return and discouraged for those with the lowest.

The third criterion is the R factors described in Dale Hagstrom's paper, "Insurance Company Growth" (TSA XXXIII). I call these the Capital

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Utilization Efficiency Ratios (Rs). Each ratio is the present value of book profits divided by the strain of the product. As suggested by Hagstrom, the ranking of these ratios becomes the primary selection method for maximizing profitability.

The fourth criterion is sales level. Dropping the products with the lowest sales level would have the least negative impact on company operations. On the other hand, those products may have the largest potential for improvement in sales.

The fifth criterion is the payback period of the product. A product with a long payback period should be selected if its rate of return is expected to be lower in the future. On the other hand, if better future profitability is expected, products with fast payback periods should be selected.

When the capital allocations have been determined, the level of sales for each product must then be adjusted to the desired strain targets. Our company has used a combination of five methods to influence sales levels. The first is the simplest. A product is simply dropped from the portfolio, resulting in zero sales.

The second method is to adjust the pricing of the product to make it more or less competitive. That's particularly easy with the new interest-sensitive products where rates are set monthly and sometimes more frequently. We can influence the sales level at any point in time, depending on the market rates and the competition. We have been making these adjustments with varying degrees of success in meeting target sales levels.

The third method is adding or dropping marketing outlets. We have dropped agencies based on financial criteria of efficiency or cost. That was also part of a process of whittling down our total sales at a time when we had more projected sales than capital. At other times we have added marketing outlets which we expect to be highly efficient. Products sold through those outlets are expected to produce a higher return to the company. We sometimes think of the product and marketing outlet as a two dimensional grid over which we do our capital allocations.

The fourth method of managing sales levels is to ration sales by marketing outlet. This rationing can be done by setting quotas for the year or by setting time limits for sales.

Finally, we manage sales by changing our marketing compensation. This is a particularly tricky method to use. Our experiences have been that small decreases in compensation have sometimes led to total stoppage of sales, while small increases have almost no impact.

Our success in meeting our desired product line capital allocation depends on our effectiveness in managing sales levels. All of these methods are inexact, but we know of no thermostat to turn sales up or down at will.

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Product line capital allocation is still a developing science at our company. As we use the financial criteria more and become more comfortable with them, the process of capital allocation will become closer and closer to what is being done in stock companies.

MR. D. BRUCE DIXON: At the beginning of the session you received a handout which describes Lincoln National's approach to allocating capital by product line. You have now heard how the Hartford and the Penn Mutual allocate capital. Each company has a different approach and each has substantially different results for similar sounding product lines. Now you'll see that Crown Life has its own unique approach.

You may be asking: "Why does each company have a different standard for similar product lines?" There are a number of possible reasons. First of all, although products sound similar, the C1, C2 and C3 risk exposures can be very different from one company to the next. They differ on policy guarantees and on investment strategies. For example, Company A may allow surrenders at book value where Company B may allow none. Company A may have an investment policy of precise cash flow matching while Company B may deliberately mismatch. Secondly, there can be differences in the amount of conservatism in the basic policy reserves. Finally, even if companies A and B issue policies with identical risks, the management of Company A and the management of Company B may differ on the amount of capital they feel is needed to be comfortable with the risk. Right now I suspect that the most important cause of the differences between companies today is that there is as yet no industry standard for solvency, and so each company is left pretty much to its own devices. Discussions like this one today should help in exposing the differences between companies, and perhaps ultimately lead us to more uniform standards.

I'm going to describe the capital allocation formula that we use at Crown Life, but first I'd like to give you a little background on the company. It's easier to understand what the formulas mean if you understand something about the company.

Crown Life is a medium-sized stock company -- a Canadian stock company. It has assets of about five billion. It sells both individual and group life, health and annuities in Canada, the United States, Great Britain, and a few other places. The individual life and annuity products are sold on both participating and nonparticipating bases.

Since it is a Canadian company, policy reserves are calculated using the assumptions set by the company's valuation actuary. The valuation assumptions are sufficient to cover the expected level of future benefits plus a margin for conservatism, which is positive but not unduly conservative. Canadian statutory policy reserves, as a rule, are less conservative than National Association of Insurance Commissioners (NAIC) policy reserves.

Internally, Crown Life is organized into profit centers by country and by market segment: group, individual and pensions. Each profit center has its own management team and is responsible for a number of product lines of business. Return on shareholder capital is used as a

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measure of the performance of the profit center management. The allocation of capital to product lines of business is a fundamental step in the measurement process.

The allocation formulas that I'm about to discuss apply to Crown Life's nonparticipating line of business. I will address the participating business later in my remarks.

For each nonparticipating product line of business, two separate formulas are applied. The first calculates the amount of capital required to meet statutory surplus reserves in Canada and the United States. The second formula is an internal Crown Life standard based on an assessment of the C1, C2 and C3 risks of each product line. After this assessment, each profit center is assigned an amount of capital equal to the greater of the two results.

Many of you may be unfamiliar with the Canadian statutory surplus requirements so I will take a moment to explain them. These surplus reserve requirements came into being in 1978. A surplus reserve does not go through the income statement. It is a part of the surplus fund of the company which is earmarked so that it cannot be distributed to policyholders or shareholders as dividends. In 1978 the Canadian Insurance Companies Act was revised to give the valuation actuary the responsibility of setting valuation assumptions for policy reserves. As I noted, the valuation assumption now must be reasonable and appropriate to the circumstances of the company, which means it covers the expected level of future benefits plus a margin for conservatism which is not unduly conservative. The objective of this change was to create a single standard for policy reserves that would be used for both statutory and GAAP statements.

The result of the new standard is that the post-1978 reserves are considerably less conservative than the pre-1978 reserves. The Superintendent of Insurance in Canada has maintained solvency standards by requiring companies to hold surplus reserves to supplement the strength of the basic policy reserves.

CANADIAN STATUTORY SURPLUS RESERVES

Investment Valuation
Cash Value Excess
Miscellaneous Asset
Health

NON CANADIAN STATUTORY SURPLUS RESERVES

NAIC Adjustment

The investment valuation reserve for life and annuity assets is calculated as 10 percent of the difference between the book value and the market value of the assets. If this difference is small or even negative, the reserve has a minimum value equal to 1.5 percent of the book value of the bond or mortgage assets.

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The investment valuation reserve for health assets is computed differently. The formula is rather complex. It depends on the market value deficiency of the health assets and also on the degree of matching assets and liability cash flows in the health line. If the cash flows are well matched, or if there is no market value deficiency, then this reserve for the health line may in fact be zero.

The cash value excess reserve comes about because Canadian valuation standards allow basic policy reserves to be less than the guaranteed cash surrender values. The reserve calculation calls for a seriatim comparison of the policy reserve and the cash value. Whenever the policy reserve is lower than the cash value, the cash value excess reserve is set up for the difference.

The miscellaneous asset reserve covers assets on the balance sheet which are of questionable worth or which are relatively illiquid. Some good examples of this might be advances to agents for furniture and equipment. These assets, prior to 1978, could not be carried on the balance sheet; they were expensed immediately in the year of acquisition.

The health reserve is equal to 15 percent of the liabilities for medical-care policies.

The last item is relatively complex. Because Crown Life is a Canadian company which does business in the United States, two separate statements for U.S. business are filed. One statement is prepared using Canadian statutory rules and the other is prepared using NAIC rules. Free surplus, that is, the surplus which appears available to be distributed as dividends, is usually bigger on the Canadian statutory basis than it is on the NAIC basis. Free surplus in the Canadian statement is reduced to the NAIC level by setting up a surplus reserve for an amount equal to the difference.

These are the pieces of the statutory formula. Remember that I said Crown Life calculates the product line capital by two formulas, the statutory formula which we have just seen and an internally developed formula which I will turn to next.

CRITERIA FOR CONSTRUCTING CAPITAL ALLOCATION FORMULA

- Reflect C1, C2, C3 Risks
- Easy to Monitor
- Understandable
- Competitive

Let me tell you what the management objectives were when the internal formula was constructed. First, the formula had to provide a solvency cushion which properly reflected the underlying C1, C2, and C3 risks of each product line. Second, it had to be relatively easy to calculate and to track with existing administrative systems. Third, it had to be sufficiently straightforward that senior management could understand it, and more important that they would use it. Last, it had to produce a result that would stand up in a competitive market environment.

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The last point is important. The company competes with many institutions -- banks and savings companies, casualty insurance companies, other life insurance companies and even various self-insurance schemes. Let me give you an example. Crown Life competes with banks and trust companies in the guaranteed investment certificate market. Large banks and trust companies have capital in the range of 3 to 5 percent of liabilities. If we were to saddle our guaranteed investment certificate product with a capital requirement higher than 3 to 5 percent, it would generate an unsatisfactory return on capital as compared to banks and trust companies. This in turn would mean that we would have difficulty in attracting new equity capital into Crown Life to finance future growth. This is a simple example and other competitive situations are much more complex, but the principle is the same. If a company wants to continue to grow, it cannot afford to require more capital than competitors require to underwrite similar risks.

CROWN LIFE CAPITAL ALLOCATION FORMULA (Internal Standard for Nonparticipating Lines)

Individual Life	2.5%	Assets
	50%	Cash Value Excess Reserve
	5%	Premiums
	30%	Expected Claims
Individual Disability		
Income	2.5%	Assets
	25%	Premiums
Group Life & Group Health	2.5%	Assets
	10%	Premiums
Annuities (Group & Individual)	3%	Assets

In the Crown Life Capital Allocation Formula, the asset factor covers the asset default risk and the mismatch risk. The assets are bonds, mortgages, policy loans and cash. Real estate and equities are not used to back basic policy reserve liabilities. The mismatch risk is also covered by 50 percent of the statutory cash value excess reserve for lines of business which have guaranteed cash surrender values. The investment strategy, wherever possible, is to minimize the mismatch risk by matching or immunizing our cash flows. However, products with guaranteed cash surrender values present a special risk because of the potential for antiselection by the policyholder, and that is why we have added the cash value excess reserve requirement.

The pricing risk is covered by the claim and the premium factors. For the life lines, the claim factor and the valuation mortality margin are sufficient to cover annual claim fluctuations of two to three standard deviations in each of the profit centers separately. The level of protection for the company as a whole, because it combines all of the profit centers, is greater than the level of protection for the profit centers separately.

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That covers the target surplus formulas; I would like to address some of the other questions on the program.

Projecting the capital needs of the profit centers is relatively easy. Each profit center projects its own capital requirements. This is done once a year as a part of the business planning process, and at the same time they project their financial statements. The capital projections are reviewed and consolidated in the corporate area.

The profit centers are not charged the cost of capital. The cost of capital is calculated and used as a benchmark for earnings in the business planning projection. That is, benchmark earnings are calculated and the projected earnings are compared against this benchmark to see if they're satisfactory.

The benchmark for return on capital is split into two separate pieces. The first is a target for the investment return which is earned by investing the capital in assets such as stocks and real estate. In Crown Life this is the function of the investment department and it is responsible for investing the capital to achieve the benchmark return.

Risk-return benchmarks for backing the profit centers' insurance operations are targeted. Each profit center is responsible for meeting its risk return benchmark. If a profit center needs to make a capital investment in the course of doing business (for example, an investment in agents' advances or in computer equipment), then that profit center must provide both the investment return and the risk return on that capital.

Crown Life does not have a formal procedure for allocating capital to or withdrawing capital from specific product lines of business. New products are tested at the profit center level to determine whether or not they are likely to reach or achieve the benchmark return on capital. Products which do not meet this benchmark are either reworked or scrapped entirely. These projections are not reviewed in the corporate area.

Are different techniques for Canada and the U.S. appropriate? Are different techniques for stock and mutual companies appropriate? I think that the same techniques can be used in Canada and the U.S. However, the results, that is the target surplus formulas, will clearly differ because of the differences between the two countries. The regulatory standards differ, the amount of conservatism in the basic policy reserves differs and the competitive environment differs, all of which should lead to different results.

In my opinion, mutual companies can use the same techniques as stock companies, but there are some differences to think about. The first is the policyholder dividend. Should the dividend stream be treated as a guaranteed benefit like a death claim? Or, should it be considered a cushion against experience fluctuations? If dividends are treated as a cushion the capital requirements of a mutual company are significantly less than if the dividend is treated as a guaranteed benefit. A second difference between stock and mutual companies is that the stock

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company has access to outside sources of capital, for example, new equity capital. I would argue that this access to outside sources of capital substantially reduces the amount of capital that a stock company would otherwise have to carry on its balance sheet.

I promised you at the beginning that I would touch on Crown's treatment of the participating lines of business. The capital allocation formula that Crown uses for the participating lines of business is very simple. It's equal to the statutory surplus reserve plus 200 percent of the current policyholder dividends. The view of the dividend stream is that it should be maintained through adverse experience fluctuations, and also that it is available as a cushion against a disastrous turn of events.

MR. MILLER: What I'd like to do now, is throw out questions to the panel. We've heard three different sets of target surplus formulas discussed, and I passed out a handout that references Lincoln National's target surplus formula. The reasoning behind the different required surplus formula factors is not always clear. I would like to ask two questions. With the great emphasis on return on capital in management reporting and capital allocation to product lines, how are these target surplus formulas developed in the various companies that we have represented here? And, what internal negotiating process is involved in agreeing on the appropriate formula?

MR. SONDERGELD: We do two things. We try to see what Lincoln and Crown and other companies are doing. We also perform our own studies to quantify what we think is needed for C1, C2 and C3 risks. Someone conducts a study, summarizes it in a paper recommending a new benchmark surplus formula, then exposes it. The financial actuaries and the product actuaries discuss it, and usually there is agreement. Even if there isn't, a resolution is made. Once the resolution occurs, the product actuaries must use the agreed upon benchmark surplus formula in their pricing. The financial reporting actuaries must use the same benchmark surplus formulas in allocating surplus to lines of business for reporting of earnings. Corporate people must also use these formulas in business planning.

I'll take the opportunity at this time to disagree with Mr. Dixon that the formula must be competitive. If you think the formula is right and that the other companies aren't setting up enough surplus to write the business they are writing, then I think your company should not write that business. I think the formula need not be competitive or consistent with what other companies are doing.

MR. DIXON: The process followed at Crown Life was quite similar to the one just described. The requirements were first put together in the corporate area. The corporate area then had one-on-one sessions with each of the profit centers to find out what its position was. Typically, the position of people at the profit centers was that they needed less capital than we in corporate thought they did. After we worked things through as best as we could on a one-on-one basis, we got together as one big happy group and had it out in a small room.

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And, there were differences, but in the end we came to some middle ground.

Resolving the question of whether or not formulas need to be competitive involves public policy. Perhaps you think that banks should hold 10 percent of their liabilities as capital, but they don't. And therefore, you might as well go out of business as try to run your product line requiring 10 percent of liabilities as capital.

MR. INGRAM: I'll mention briefly the process we use at Penn Mutual. We're in the middle of revising our required surplus formula. Some things are still undecided, but we expect to finish by the end of this year. Our process for selecting the formula itself was to first divide into separate teams for each of the classes of risks. For example, on the C1 required surplus we've formed a team of people from the product areas, the corporate area and the investment area. The team accepted a general spectrum of risk levels and then tried to place every investment into that spectrum. We wound up with a fairly complicated formula, having six classes of investments. I think that was mainly at the request of the investment people who kept saying: "Well, no, that investment is not the same level of risk as this other one; this one's more risky than the other. We have to reflect those differences because, in our pricing, we are reflecting the differences in the rates of return from those investments. So, if we don't reflect the risks on the C1 required surplus there, we won't have a fair comparison."

On the C2 required surplus, we are doing projections of risk, claims, pricing and adequacy both with and without our dividends. I believe what we will wind up doing is picking a required surplus level that will be somewhere inbetween the two scenarios. So we will not be treating the dividends as a fully guaranteed benefit, but we'll probably be closer to the required surplus level that we would expect with that treatment than if we treated them as a totally nonguaranteed benefit.

On the C3 required surplus, the format that I showed you is the desired format we expect to end up with. We are now in the stage of modeling our C3 risks. We have set up extensive models to do the valuation of our products which require certifications regarding matching. But those models are not oriented towards producing maximum loss levels, which is really what we're getting at with the required surplus. We expect that once we're done with that modeling, the C3 risk levels we find will lead to changes in our operations rather than drastic changes in our formulas. Because of competitive pressures, we feel we cannot have tremendous amounts of surplus for C3 risks, and will have to get our operations in line to minimize need for surplus there.

MR. MILLER: We at Lincoln National established our initial target surplus formula in 1977, reviewed it in 1980, and just went through a review again one year ago. There was a definite difference in the perspective of our operating people from 1977 to 1984. In 1977 and up through the early 1980s, there wasn't as much internal emphasis on return on equity or return on capital. The formula that was put

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together in 1977 didn't generate nearly as much controversy as the one put together last year. This was because people who are managing product lines in operating areas are now being charged with earning a certain return on the capital they're utilizing. To echo something mentioned earlier, in almost all cases the corporate view of the required surplus was different from the operating view. We did have to go through a one-on-one negotiating process which ended up with a final meeting for any issues that couldn't be resolved. Our chief executive officer served as a mediator. And it was an educational process.

MR. DIXON: Mr. Sondergeld, you remarked that the return that you'd require for each product line would bear some relationship to the earnings volatility of the product line. Can you tell us how you rank various product lines at this point in time? How would you distinguish, for example, between guaranteed investment contract (GIC) product line and group health?

MR. SONDERGELD: Right now we think group health has more volatility than the GIC product that The Hartford writes. We therefore require a higher internal rate of return from the total statutory investment in group health than in GIC business. But the ranking is subjective. It is based upon my stomach. I mean I don't have any scientific principles that I apply. However, Alastair Longley-Cook of Aetna Life and Casualty wrote a paper on the risk equivalent return on shareholder equity (REROSHE). He applied utility theory to determine how to differentiate between two one-year term products where one is expected to generate a 20 percent return and the other is expected to provide a 15 percent return. Which is better? If the 20 percent return has more risk than the 15 percent return, he developed a technique where you could adjust the two. If, when adjusted to a risk-free equivalent return, the 20 percent became 13 percent and the 15 percent became 14 percent, there would be some justification for choosing the less risky product which has a higher risk-free equivalent expected return.

If we had an expected internal rate of return that was calculated on policies covering several years, then were there techniques we could utilize to adjust two IRRs to risk-free equivalent IRRs? I have engaged a consulting actuary to try to develop techniques for The Hartford to use to adjust IRRs that are done on a risk basis to a risk-free equivalent basis. I don't know how useful that material is going to be. Right now I'm using my stomach to make judgments on what IRRs should be required for different products.

MR. MILLER: One other question to the panel, are any of you using a target surplus C3 risk component that varies with some measurable degree of asset-liability mismatch? I think this question was highlighted with the discussion that we had this morning at the general session. If a valuation actuary is going to be asked to sign off on the adequacy of the asset-liability match, it seems like a great deal of modeling must be done. This relates to the C3 risk and also to some of the other risks associated with the company's product lines. I was just

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curious about the degree of dynamism you've been able to put in C3 risk measures in coming up with capital utilization. For example, if

- o you have an individual annuity product line where that product manager is expected to earn a certain return on capital utilized,
- o the assets in that particular product line aren't matched with the liabilities and,
- o you don't have a dynamic charge or capital utilization charge,

there could be something gained from a short-term profit perspective by mismatching at the expense of the long term. I wonder if there are any formulas in place that you're using and also, if so, how they've worked in enabling some kind of incentive to be built into this capital allocation model. Any takers?

MR. INGRAM: We don't have anything in place, but as I mentioned, our C3 formula is something we're in the midst of developing. The exact question you're getting at is the point in using the formula that had a two-factor approach to calculating the C3 risk. One factor would keep track of that and vary it in relation to how our investment operations did in matching the product liabilities. The other factor would reflect the inherent volatility of the product. For instance, if there's a product with high amounts of guarantees without regard to possible matches or interest rate climates, then that product would have a lot of inherent volatility. We would have to have a process in place for constantly keeping track of those things, which we do not have yet.

MR. SONDERGELD: I'd just like to comment that there are big C3 risks and little C3 risks. It's our view at The Hartford that for big C3 risks, most companies are not holding enough surplus for the risk that they're taking. We would like to do what we can to permit the individual life and annuity nonforfeiture regulations to be revised to permit market value adjusted products. We think one of the problems today is the companies are not charging enough for their products based upon the risks they're taking. That doesn't mean we're not doing some of the same thing, but we would like to be able to move to the position where we would take relatively little C3 risk. We think you cannot hold enough surplus for the large C3 risk. You can develop many scenarios of where interest rates might go, but you really don't know where that will be. We have no control over inflation. Inflation is not predictable in the long-term, so the C3 risk is something that I don't think is predictable in the long-term. We would prefer not to take a big C3 risk.

MR. MILLER: At Lincoln National we try to charge a C3 risk factor that is reasonable in light of what we feel is comfortable with our total capital and surplus position. But more importantly, what we've done is to try to create an incentive for product managers to control the asset and liability match. If those are better matched, less capital and surplus have to be held, thereby making it easier to get a better return on the capital that's utilized. There's a tradeoff there and it's hard to get a formula that's going to match that tradeoff exactly. To

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the extent you have a demand deposit individual annuity product that doesn't have a market value cash out, to the extent the assets are shortened, then you basically have sacrificed yield if you're dealing with an upward sloping yield curve. At the same time, you are being held accountable for earning a return on a lesser amount of capital. The opposite extreme is true, if you want to take the risk and go out a little longer, you're going to hold more capital and you're going to have to earn a return on that greater capital base. There's a tradeoff there.

We're structured with specific business units that function autonomously in terms of product development, financial reporting, underwriting and marketing. We have product managers that work closely with investment portfolio managers for each of the various segmented portfolios we deal with. Those product and portfolio managers come to some kind of agreement on the investment mix for a particular product. This tradeoff between investment yield and capital utilized is an important feature that's built in.

We're trying to create an incentive for the product managers to match assets and liabilities and avoid the C3 risk. To the extent we can do that, it'll make the role of the valuation actuary that much easier.

MR. HENRY W. SIEGEL: I have one comment and one question. The comment is, it's interesting to note that of the three companies up there, the one that is in the public market is the one that looked at the public requirements for capital. I suspect that one of the ways of getting around the problem of corporate people thinking more capital is needed than what the line people think is to look at what the market requires. It is an outside indicator of how much is reasonable.

The question I have is, would you like to comment on what you do if you're assigning earnings goals based on GAAP surplus and GAAP earnings?

MR. DIXON: I can comment on that very briefly. As a Canadian company, our GAAP and statutory are effectively the same, so I have no problem there.

MR. MILLER: From Lincoln National's perspective, we actually allocate capital and base our whole segmented portfolio structure on a GAAP basis. One question that I have is, what are the problems and considerations associated with moving from statutory target or required surplus to a GAAP target surplus or equity employed? We have a statutory required surplus formula. But we translate that to a GAAP basis to use GAAP accounting and balance sheets for the actual allocating of capital as well as product line assets and investment income. While product pricing might be done on a statutory internal rate of return, these lines are being charged with earning a return on a GAAP equity employed. There are some interesting problems associated with this. For example, let's say you have a particular product priced to earn a 17 percent internal rate of return. Getting the GAAP accounting structured so that something similar works out in terms of spreading the capitalized acquisition costs, and such items like

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that, is a problem that we've wrestled with. Each individual product area has to wrestle with that because they have to price their products as well as perform the GAAP accounting function.

MR. SONDERGELD: I'd like to comment that the paper I referred to earlier shows the relationship between statutory and GAAP. For example, let us say you calculated a 15 percent internal rate of return on a statutory basis on a three-year product. We also calculated the expected GAAP returns. We can take the statutory book profits (that are discounted at 15 percent yielding a zero present value) and discount them at the GAAP returns to get a zero present value. Let's say the GAAP returns are 10, 12 and 20 percent. If you took the statutory book profit the first year and discounted that at 10 percent, the book profit the second year and discounted that for two years at 10 and 12 percent, and the third year book profit discounted at 10, 12 and 20 percent, you would get zero present value.

We do look at the relationship between statutory and GAAP returns. Assume we have a product that produces a 15 percent expected return on a statutory basis. What might not be acceptable is if it were a 10-year product where the expected GAAP returns were a level 5 percent for five years and then 25 percent for five years. You've seen the criticism of fronting profits, but we also don't like to see a product that is dead or retired before you report the good news. You like to experience some of the good results while you're still alive. We are therefore very interested in the pattern of GAAP earnings. But our basic pricing criterion is a return on statutory surplus.

MR. INGRAM: At Penn Mutual we're just in the process of developing a GAAP statement for our company. Currently we have chosen to set, for each product, the asset balance in each period equal to the statutory liabilities plus the required surplus, doing the transfers in and out of products so things balance just the same way you've heard it described at Lincoln National. We choose to allocate our investment income among products in that way. Some of our segments are already running that way to the extent that we have at least one product which is solely in a subsidiary and that subsidiary has to be funded more or less that way. We have segments that are not on that basis, and in that case we are allocating outside income to that segment to match up to the assets.

In doing the GAAP statement, we're not held by quite as many rules as a stock company. Where we have choices of accounting methods, assumptions and margins for adverse deviation, we tend toward choices which ameliorate the problem of the returns following a backloaded or frontloaded pattern. We're trying to get a pattern of returns which is as level as possible. We've found that, when we do level that return, it does come out exactly equal to the internal rate of return of the product on the statutory book profit basis, since we have the same assets in there.

MR. ALLEN SPOONER: I also have a comment and a question. The comment regards the question about C3 risk -- looking at the matching and determining what kind of percent to use. What we do at MONY is use a percent of reserves that varies by product type according to

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matching. If investment policy is changed, then we change the percent. But on top of that we have an empirical dollar add on for situations in in-force blocks where the matching, say five-ten years ago, wasn't as good as it is now. We do that by modeling and by projecting, looking at it every year. We're trying to develop a long-term objective that's a percent of reserves, but then we have to realize that the current portfolio isn't where we'd like to be.

The question is for Mr. Sondergeld. You commented on the question about comparing GICs and group health; that you assign a higher return on investment (ROI) to one than the other because of the feeling that you have about the riskiness. It seems that one approach you could take is to say that group health sounds a little riskier and somehow that should be considered in the required surplus or capital calculations. But then ask everybody to produce the same ROI. Would you comment on that approach.

MR. SONDERGELD: I've given that a lot of thought. I don't know what the correct answer is but I know what my view is today. I have answered that question two ways. At one time I thought that if you calculated the required surplus correctly, and if a company had a goal of 15 percent return on surplus, then every product should be priced to produce 15 percent. We've all heard the jokes about the actuary who drowned in a stream that averaged six inches deep -- he was in a hole. Too often we think only about averages and we don't think about the standard deviations and the second moments. If you've got two distributions that produce the same average, somebody may still want to pick one of those distributions over the other. I think an extra return is needed for volatility.

Assume there are two products, both priced to yield a 15 percent rate of return. Let us say that one of the products happens to be group health. It's hard to find a common denominator, but let's say you have more surplus per dollar of premium or per dollar of reserves on the group health, and you then price both to yield 15 percent returns. It is my current view that that's not the right answer. You still need an additional amount to compensate for the additional volatility of, in this example, the group health line of business.

MR. DIXON: I wouldn't mind amplifying that a little bit. We've thought about that same question and I think I agree with your second answer. You need a higher return for the more volatile product line. Providing different amounts of capital to two different product lines will give them the same likelihood of being solvent at the end of five years. But the stable product line will be in business with either a profit or a loss, perhaps of 10 percent of the capital, and the volatile product line will be in business with a profit or a loss, perhaps of 50 percent of the required capital. If you are risk-averse, which I think most of us are, you want to be compensated for the extra volatility, the extra chance of losing 50 percent of your capital rather than losing 10 percent of your capital, even though you're still in business at the end of five years.

MR. INGRAM: Our thinking has been that the risks we're trying to provide for are not necessarily proportionate to the capital, which

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would be the case using rates. If claims are volatile that would not necessarily have any relationship to the amount of strain of the sales of that product. We want to provide for the risks there.

There has been a lot of confusion, though, between what to use for the required surplus and the margins for volatility. This is because the required surplus can be thought of as covering an extreme fluctuation, perhaps as a 99 or a 99.9 percent confidence interval of the maximum amount of fluctuation. At the same time, to produce the expected margins for volatility within each assumption, it is necessary to consider each in a 5 or 10 percent confidence interval around the mean for some products. Two products with the same mean on a particular assumption may have much different spreads of losses around that mean. One would require a much higher margin than the other. But, as I said, there has been a lot of confusion from people saying: "Well, you can't charge me a lot for volatility, you're already socking me for required surplus." It's possible, I think, for products to have high required surplus with low required margins and vice versa.

MR. MILLER: I might add that we've had similar discussions of the volatility of certain products such as group health and property/casualty. Those lines have big swings in underwriting cycles. We have concluded that they probably need to have a higher benchmark return than a stable individual life product line, but we haven't seen great enough differences to actually create a new benchmark.

MR. ARNOLD A. DICKE: I'm from The Provident Mutual. I think we may be causing ourselves some problems by calling this "surplus" when, in some respects, these are fluctuation reserves. If you were fully reserving for a product, particularly on an expected basis, you'd certainly have to have something that relates to the second moments. That leads to my question. It seems to me that there ought to be some way to approach this from a theoretical or analytical basis. What we hear about are all these ad hoc list of percentages that people apply to reserves. Those are not very elegant, nor are they satisfying when you sit down to explain it to somebody else. Our reserves people understand what we're calculating, even if they don't know the details of obtaining the expected value reserves. The fluctuation reserves could have some kind of theory behind them; perhaps the probability of ruin or two standard deviations or something. Has anybody done any work along those lines that you know about? Has anybody done any work in the direction of thinking of reserving for the implicit options that are in many of the products like single premium deferred annuities (SPDAs)?

MR. DENNIS LORING: I'm with The Equitable. At my former company, we addressed that question with ruin theory models and with statistical models. We obtained some theoretical answers which reduced very nicely to things like 3 percent of reserves and 25 percent of mortality. However, in explaining it to people in management, we had to put all the models away. They understand 3 percent of reserves; they have a lot of trouble understanding a Beekman-Eowers ruin model.

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MR. DICKE: Even if management doesn't understand the models, it knows that you've done that analytical work. That puts the credibility at a different level than saying: "I called up somebody in another company and this is the percentage they were using," or, "A paper was published by The Lincoln and these are the numbers they had." That does help, but it seems to me that, as a profession we really ought to have a way to approach these problems that has some theoretical foundation. After all, what percentage of reserves is for C3 risks? The answer obviously depends on the mismatch, it's a second moment. Furthermore, there's a lot of different kinds of C3 risks. Some of them are futures risks and some of them are options risks of various sorts. It's possible that a very simple formula is the best we can do. But it seems to me if we don't even distinguish between these as a profession, and think about how they ought to come out of some theory, then we haven't really dealt with the problem yet.

MR. LORING: I think you'll find that many of the companies represented here actually do that sort of analysis. It's surprising that the results, without even peeking, come close to this sort of simple formula.

MR. MILLER: We at least looked at the possibility of an options pricing model. Given a contract holder and an option -- what's the worth of that option? What's that option costing us? Are we getting paid for that option? To the extent we aren't getting paid for the option, or to the extent we're giving the option period, it is necessary to measure the cost. We didn't get very far with the model, but we haven't quit. I've heard of it being done, but I have yet to see any practical application. I'd be curious if anyone in the audience or on the panel has had any involvement in pricing some of the options we give our contract holders.

MR. FRANK IRISH: Bob Clancy's paper is in galleys now. I think you'll find the options question pretty well addressed there. There are two other comments I would like to make.

First of all, I think at least a minor objection has to be entered to your use of the phrase "internal rate of return," which perhaps should be limited to cash flow analysis. Where invested surplus enters the equation, as it does in all the cases you've talked about here, I think you should refer to it as "return on invested surplus." That's the general phrase we use to describe this kind of calculation. Each one of you has your own special phrase like "return on surplus needs" or "return on benchmark surplus." I'd like to hear your response to that.

I'd also like to comment on the mutual versus stock question, building on some things you've said. For example, I think that mutuals are much less sensitive to fluctuation risk than stocks. Also, fluctuations in earnings are of much less importance to mutual companies than to stock companies, because they don't have to satisfy stockholders that a stable set of earnings are being produced year after year. I think Longley-Cook's paper demonstrates that mutual companies are less sensitive to variations in return than they are sensitive to the ultimate

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catastrophe risk. Another element which I think enters into the mutual company's consideration of rate of return is something Mr. Dixon mentioned, the availability of capital. A mutual company looks to its returns as its only supply of capital. Therefore, its long-term needs for capital are frequently the determinant of the target rate of return. This could lead to a much lower rate of return requirement than is desirable in a stock company. Provided you have a mutual company that's growing relatively slowly, it might not have much need for capital. Therefore it might not want to make a very large rate of return. Your comments on this would be interesting.

MR. INGRAM: As a mutual company representative, I ought to go first. In response to the statement that we are less sensitive to fluctuations in earnings, I'd have to say that's true. It's not something we heavily consider in our pricing and our treatment of surplus. The small, short-term fluctuations are not a major consideration. Those do become considerations in operational planning from year to year, but we make no general provisions.

In response to the comment about the level of the return, I'd have to say that its relation to the growth of the company is a key item of discussion in our company now. We feel we have the ability to grow at a significantly higher level than the current returns from our products. That puts us in a position of being very low on capital, both short and long-term. We think that, traditionally, our products were priced to receive a fairly low return. But then our growth had been fairly low. Keeping those two things in balance is a primary aspect of managing a mutual company. If the rate of return is significantly higher than the rate of growth, the company will start throwing off surplus which will have to be put back into the dividend formula, which, in turn, will depress the rate of return. I think it's something that naturally stays in balance through the dividend process. Our company has already gone into other areas for growth, for instance, it acquired a brokerage firm. So, when we think in terms of growth, we have to think in terms of growth of usages of our capital, not just in growth in our insurance sales.

MR. SONDERGELD: On your first point Mr. Irish, my reference to statutory internal rate of return considered the return we get for a product or a line of business. On a product, it's the return we get on the statutory book profits and the change in benchmark surplus. That's the present value of the stream, discounted at the internal rate of return to equal zero.

I was not talking about internal rate of return on cash flow. You need to have assets to set up benchmark surplus for a particular line of business. One of the things that I've debated with myself and other people in my company is whether the benchmark surplus should be calculated on a book or a market value basis. We do it on a book basis, but I'm not so sure that's right. If anybody has any comments on that I'd be interested to hear them.

Let's say you have a company that has \$1 billion in assets and \$20 million in statutory surplus. I know that it's wrong to just revalue

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your assets to market. If you revalue your assets to market you should also do some appropriate adjustment in calculating liabilities. However, if bonds are currently worth 50 percent on a market basis, maybe there actually isn't \$20 million in statutory surplus. Let me change my example a little bit to say the \$20 million is free, or vitality surplus. If you wanted to go out and spend that \$20 million, maybe you'd find that figure was a book basis, but not a market value. You really don't have that much money. You might be writing individual life business with a statutory drain from paying commissions and you've got to convert that surplus to cash by selling bonds in the market. You might be writing an annuity contract where there's no cash drain, but there's a benchmark reserve strain. You might just take some surplus that's sitting and change its name from surplus to reserve. But if you had to get the cash, you'd have to sell those bonds at 50 percent. So I am concerned about whether or not surplus used in pricing products should be at the market value of the assets used to write those products. At my company, we haven't done anything about that concern except talk about it.

MR. DIXON: I'll comment on that briefly from our point of view. We also use the book value of our surplus to see if we have enough to cover the requirements we think we need. In our case, I think the book value of our surplus probably isn't far off its market value. Something else, though, that falls into the same category of measuring surplus is the liquidity of the surplus. If your surplus is tied up in real estate, even if it has a good market value, it may not be very liquid. Do you have any constraints on the form of assets in your surplus pool backing these capital requirements?

MR. WILLIAM B. WAUGH: I'm with Canada Life. I want to ask a question about transfers from corporate surplus into the fund surplus. One panelist said they transferred every month; another said they never transferred or haven't done it yet. At Canada Life, the assets are physically earmarked securities so monthly transfers would be quite an administrative problem. That could also affect the vested income. I would like the panelists to comment on whether they maintain their funds at target surplus on a continuous basis. If not, do they, as we do, look at the differences rather than actually maintain them.

MR. SONDERGELD: We have three life companies with a total of ten segments. Just the availability of different companies provides some segmentation. Then within each of those companies, we have more than one segment. The rules we are currently following are that each segment must contain the statutory reserve. We do not put the benchmark surplus in the segment.

I'll give an example with one of these companies. Let's say it has three segments -- product line A, product line B, and corporate. Product lines A and B must each have statutory reserves in its segment. There aren't any more reserves. Corporate, or the third segment, includes all of the surplus of the company. It has the benchmark surpluses of product lines A and B, and the free or vitality excess surplus (which we hope is not a negative amount). Each month we make sure that the reserve is in each segment and we also do cash flow projections to

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determine that we've done a good job of matching our expected asset and liability cash flow. We have not had a problem yet where a segment needs to borrow from another segment. But we've got operational provisions that one segment could borrow from another, short-term at a money market rate, if there was a cash flow problem. To date, we're just moving the partition in the third segment back and forth each month. This theoretical problem that you've mentioned for us today is not a practical problem.

MR. MILLER: Lincoln has a group of segmented corporate accounts that are based on this. Actually it's on a GAAP equity employed basis, which uses the statutory required surplus level as an initial base. Using those segmented portfolios along with a centralized corporate short-term pool, we do actually go through the calculation monthly in deciding what level of capital is utilized in each particular area. We also go through the process of transferring cash, and it's always a cash transfer which could potentially be a problem if there were any wide and rapid swings in levels of surplus. We haven't had that problem, but we do make a cash transfer from one corporate account to another on a monthly basis, then rebalance all of those corporate accounts back to their level of equity employed with any excess or deficiency added to or subtracted from a central corporate unallocated segment.

MR. DAVE SUNDERLAND: I'm from The John Hancock. I'd like to make a comment on the question about how you measure the benchmark surplus at book value or market value. As I was thinking about the question, I had to ask myself why was I worried about the calculation of benchmark surplus. The answer I came up with is that most people worry about it because what you're trying to do is provide an amount of benchmark surplus that will keep you solvent on a statutory basis. So, given that's why you do the calculation, you measure assets as they would be determined on a statutory basis. Most of the time, that's book value.

MR. SONDERGELD: That may be the right answer. But, what if you need all your benchmark? If you need to convert all your benchmark surplus to cash, it might not be there.

MR. SUNDERLAND: I think the measure of C1, C2, or C3 risk would affect how you get the value. If you're worried about that amount of surplus on a cash conversion, you provide for that in the amount of benchmark surplus you set up. So here we go on a circle.

MR. SONDERGELD: It's a good answer, though.

MR. MILLER: I had one final area of questions. What use of target surplus formulas might be appropriate from a regulatory perspective? Is it possible for regulators to apply a specific formula, or will they need to simply rely more heavily on the valuation actuary to certify such things as the asset and liability matching question? Right now the regulators have their own set of rules that, at Baldwin United, were not adequate. Any comments from the panelists or audience?

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MR. DIXON: I can comment on the Canadian scene. As I mentioned in my remarks, there are surplus reserves, of a sort, in place right now in Canada. They were not designed with careful consideration of the C1, C2 and C3 risks that a company might have; they were ad hoc to some extent. The Canadian Insurance Department right now is in the process of trying to develop solvency standards which are more formal and which relate better to the C1, C2 and C3 risks. They have, in fact, circulated a preliminary paper on that. The end result of that process will be solvency standards which come from the Department of Insurance and which, if they're reasonably designed, will probably become the industry standards for all companies, just like the legislated standards that exist for trust companies.

MR. INGRAM: I think we have to be careful of one thing. If our internal surplus requirements become external ones, we'll find ourselves holding surplus to make sure it doesn't get below mandated level. This procedure could start pyramiding.

MR. SONDERGELD: The comment I would make is that diseases are catching. I know the actuaries in the United Kingdom (U.K.) weren't too happy that becoming part of the common market forced them to adopt the EEO solvency standards. When that occurred, the actuaries took some of the conservatism out of their reserves. I hope the required surplus formulas in Canada right now are just a trial balloon. They're much closer to us than the U.K. is.

I think that if actuaries in the U.S. develop standards and work with the NAIC, there's a possibility the valuation actuary will sign a statement about the adequacy of a company's surplus. On the other hand, there's also a possibility that regulators in the U.S. won't wait much longer to come out with formulas that may not be applicable to a particular company's book of business. They will want something rather than nothing. Either the actuarial profession will come up with something that's acceptable to the states, or the states will just go ahead and do something. I would bet on the latter.

PRODUCT LINE CAPITAL ALLOCATION

UPDATE - MANAGING LIFE INSURANCE COMPANY SURPLUS ON A FORMULA BASIS

Richard S. Robertson

Introduction

Lincoln National Life Insurance Company and Lincoln National Pension Insurance Company use a formula as a guide to managing the level of surplus maintained in the companies. Conditions change and perceptions of risk levels change. As a result, the target surplus formula needs to evolve and change over time. An earlier version of the formula is described in the paper "Managing Life Insurance Company Surplus On A Formula Basis," by Richard S. Robertson and Richard K. Kischuk. This update to that paper describes recent changes in the formula and the rationale for these changes.

Revised Target Surplus Formula

The following is the target surplus formula currently used by Lincoln National:

1. Asset Depreciation (Cl Risk):

- Short-term investments (0.5 percent of assets)
- Bonds and mortgages (1.5 percent of assets)
- Preferred stocks (2.5 percent of assets)
- Real estate (5 percent of assets)
- Common stocks (25 to 50 percent of assets, a function of the dividend yield of the Standard & Poor's 500 Index)
- Other invested assets (5 percent of assets)

NOTE: The minimum level of asset depreciation component for any given product line is one percent of assets. Offsets may be applied where product design allows a full or partial pass-through of capital losses to the policyholder.

2. Pricing Inadequacy

Mortality

One-fourth of tabular cost of mortality, as shown on page six of statutory statement (Analysis of Increase in Reserves), adjusted by a five-year moving average of ratios of actual-to-tabular cost of mortality.

Morbidity

Group insurance - six percent of "equivalent premiums," less margins in claim reserve

Individual insurance - 25 percent of premiums

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3. Interest Rate Change (C3 Risk):

Percentage of cash values which varies as a function of the yield and average maturity of the underlying invested assets. The factor is reduced to the extent product design reduces interest rate risk.

4. General Contingency Loading (C4 Risk):

One percent of liabilities, excluding separate accounts and Mandatory Securities Valuation Reserve

5. Less:

Mandatory Securities Valuation Reserve and other items in the nature of surplus.

6. Plus:

Statutory market value of subsidiaries, excluding any excess of each subsidiary's statutory surplus over its target surplus.

7. Other:

To the above amounts, add any additional surplus needed to meet state licensing requirements, or for marketing or other considerations.

Rationale Behind Changes In the Target Surplus Formula:

The following are reasons for the major changes in the Lincoln National formula:

1. A new asset category has been added for short-term investments. When the earlier version of the formula was developed, short-term investments were a very small percentage of invested assets. The new version of the formula recognizes that, with the more interest-sensitive nature of product liabilities, it will be necessary to maintain a permanent liquidity reserve of short-term investments. At the same time, a lower factor was chosen, recognizing a reduced exposure to capital losses compared to less liquid investments with longer maturities, such as mortgages and private placement bonds.

Finally, the minimum asset depreciation factor for any given product line is one percent, regardless of the percentage of short-term investments held. Combined with the "general contingency" component of the formula, this sets a maximum degree of leverage equal to fifty dollars of assets for every one dollar of statutory surplus if assets and liabilities are perfectly matched. Since it is unlikely that assets and liabilities will be perfectly matched, the actual degree of leverage will typically be lower.

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2. The new version of the formula provides for 25 percent extra mortality, compared to the earlier version of the formula which provided for extra mortality of one-third. This recognizes a shift in the mix of business in force to universal life insurance, as well as various forms of participating and experience refunding insurance. For example, universal life insurance provides the flexibility to increase mortality charges to the customer if mortality experience increases beyond levels contemplated in the original product design. Also, participating and experience refunding products provide the ability to share adverse mortality experience with customers.

The formula was also revised so that the mortality factor will adjust automatically as mortality experience emerges. This is done by using an average of mortality experience over the past five years. The five-year period represents a compromise. A longer period might prevent changes in mortality experience from being reflected on a current basis. On the other hand, a shorter period might cause target surplus to rise and fall due to normal experience fluctuations.

3. Statutory claim reserves for group health insurance are typically maintained on a basis which includes a margin for adverse experience. The revised version of the formula recognizes that this margin is available in the event of very adverse claims experience. Accordingly, the formula was increased from 5 to 6 percent of "equivalent premiums," but includes an offset for margins held in the claim reserve.
4. In the earlier version of the formula, the factor for individual health insurance varied from 25 to 50 percent, depending upon the type of coverage and the ability to adjust premiums and/or benefits in renewal years. The revised version of the formula uses a factor of 25 percent, reflecting product design changes and a shift in the mix of business away from the more risky types of coverages.
5. The "interest rate change" component has been revised from static factors to dynamic factors. For each product line, the factor which applies depends upon the yield and average maturity of the underlying invested assets. The factor may be lowered as a result of product design which reduces interest rate risk.

For example, consider an individual annuity product where the policyholder may withdraw funds on demand without a significant surrender charge. If assets are invested in one-year maturities yielding ten percent, no additional surplus would be required for interest rate risk. If the average maturity of assets is increased to three years, additional surplus equal to two percent of assets would be required. The target surplus level would rise to 5.5 percent at a five-year average asset maturity, and would continue to increase as funds are invested in longer maturities. At a 15-year average maturity, the target surplus level would rise to 8.7 percent of assets.

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Looking at a portfolio of assets with a five-year average maturity, the factor would fall from 5.5 to 4.3 percent if the underlying investments yielded 12 percent instead of 10 percent. The factor would fall further to 3 percent if the investments yielded 14 percent.

As an example of product features which reduce interest rate risk, consider a product which provides for the cash value to be paid out in five annual installments, with the first installment paid out immediately. In the first year, two installments would be paid out. After that, it may be assumed that interest rates would return to more moderate levels and/or management actions would be taken to restructure assets and liabilities. Accordingly, for contracts with this feature it may be appropriate to use 40 percent of the factors which would apply if all of the cash value were payable immediately upon demand.

The factors are recomputed annually based upon averages of interest rates over the past five years. Again, this represents a compromise between reflecting recent experience, while preventing target surplus levels from rising and falling due to experience fluctuations.

6. All other factors in the formula remain essentially unchanged. The revised formula is more dynamic and better able to adapt to changing conditions. However, it will still be necessary to re-evaluate the formula on a systematic and ongoing basis, and continual changes are expected.