Article from:

The Actuary

Contingencies *cont'd*

● wanted to make sure that *Contingencies* would not disproportionately drain funds from other deserving Academy projects and programs. This is an especially important consideration for a nonprofit organization like the Academy.

For this reason, we signed Judy Solomon Associates of Bethesda, Maryland, as the ad rep for *Contingencies*. In her work for other association publications, Ms. Solomon has posted dramatic increases in ad income. Several other ad reps we interviewed wanted quite hefty "media development" fees, so Ms. Solomon's willingness to take on our project on a straight commission basis is a boon for our budget.

In September of last year, preliminary contacts with potential advertisers revealed a keen interest in advertising in *Contingencies*. Prospects include insurance companies, reinsurance companies, actuarial consulting firms, and purveyors of computer software; several companies have signed on to appear in the inaugural issue.

● Now, the full-scale campaign to solicit advertising for *Contingencies* is under way. The principal tool for attracting advertisers to a magazine, the media kit, has been designed and printed. To help advertisers target their ads to specific markets, we developed an "ad calendar," which provides advertisers with a general idea of the content of each issue, selected readership demographics, and a rate card that details the cost of various sizes of ads and printing specifications of the magazine.

During the next several months, Ms. Solomon will contact each of the 350 firms identified as potential *Contingencies* advertisers.

Developing guidelines

One of the less visible, but vital, aspects of starting any new publication is fashioning the "rules of the road" that govern such procedures as the selection and editing of manuscripts. To ensure consistency among the articles in each issue (and from one issue to another), as well as to maximize continuity in a world where ● high job turnover is a reasonable expectation, we have developed three basic documents:

- A style manual that specifies, for example, what terms are capitalized;

- An editorial policy manual that provides guidelines for procedures such as how manuscripts are selected and edited, and how copyrights are transferred from authors to the publisher;

- A set of specifications for each department itemizing elements such as anticipated length, audience, and appropriate tone.

Where you fit in

There are limits to what an editor, even when working with an inspired Editorial Advisory Board like the one guiding *Contingencies*, can accomplish. A professional magazine, in a word, can be only as good as the input from the profession. Working in Washington, D.C., we see a gamut of professional magazines. Some could compete handily against anything for sale on a newsstand for elegance of design and quality of content; others are meager pamphlets, carrying the same tired articles every month.

We would therefore like to extend both an invitation and exhortation to SOA members to participate in the publishing of *Contingencies*. If you are interested in writing for the magazine, send us samples of your writing. If you have a finished manuscript sitting in a file somewhere, send that to us. Or if you are one of the apparently vast number of people who do not care much for writing, please contact this office anyway with an idea for a story. If it has merit, we will work with you to produce an article.

If you hear of a company or vendor that might find *Contingencies* a useful vehicle for advertisements, please give us a call about that, and we will pass the word along to our ad rep.

We hope *Contingencies* will engage and excite you and that the finished product will make you proud of your profession.

Dana H. Murphy is Editor, *Contingencies*. She is not a member of the Society.

Study manuals for SOA exams

Study manuals for Courses 110, 120, 130, 135, 140, 150, 151, 160, 162, 165, EA-1, and EA-2 are available from Actuarial Study Materials. For a complete list of manuals, write to A.S.M., P.O. Box 522, Merrick, NY 11566.

Varying the ROE target by profit center depending on risk

by Joseph H. Tan

A recent SOA regional meeting featured discussion on an age-old actuarial debate: Within the same company, should the return on equity (ROE) target vary by profit center (PC) depending upon the risk of the PC? For example, should company management (represented by the Corporate area) demand a different ROE from the Group Health line versus the Ordinary Life line?

In actuarial literature and discussions, several arguments for not varying the ROE target for various profit centers have been presented. The main argument is:

> If the allocated required surplus (RS) of the PC already reflects its associated risk, and such RS is a part of the basis for the PC's net investment income allocation and is included in the denominator of the ROE formula, the PC's ROE calculation already implicitly reflects the risk of the PC. In this case, there is no need to require higher ROE from the riskier PC, because requiring higher ROE from the riskier PC would result in double counting. A uniform ROE target should therefore be used for all PCs if RS is included in the ROE formula.

Most actuaries would agree that return should be commensurate with risk and higher return should be expected from riskier PC. Here's where the confusion arises: If RS already reflects risk and is incorporated in the ROE formula, should the ROE target still vary by PC?

Arguments against uniform ROE despite the existence of RS

This section presents arguments to show that ROE target should still vary by PC, even if the PC's RS reflects risk and is included in the PC's ROE calculation. To simplify our discussion, we assume that each profit center sells only one product, and we will use the terms – profit center and product – interchangeably.

Varying ROE cont'd

Also, the following acronyms will be used:

a) TI stands for Total Investment. This is the company's total investment in a PC, i.e., including the RS needed to support the PC.
b) IERS stands for Investment Excluding Required Surplus. This is equal to TI minus RS.

The basic argument for uniform ROE across all PCs is that RS already covers the PC's risk and, thereby, results in the same risk on the total investment (TI) for each PC. That is, the larger RS of the riskier PC reduces its risk, thereby making the risk of TI the same for all products.

The author disagrees with the above argument and will argue that it is unlikely that the risks of the resulting TIs of the various PCs are the same.
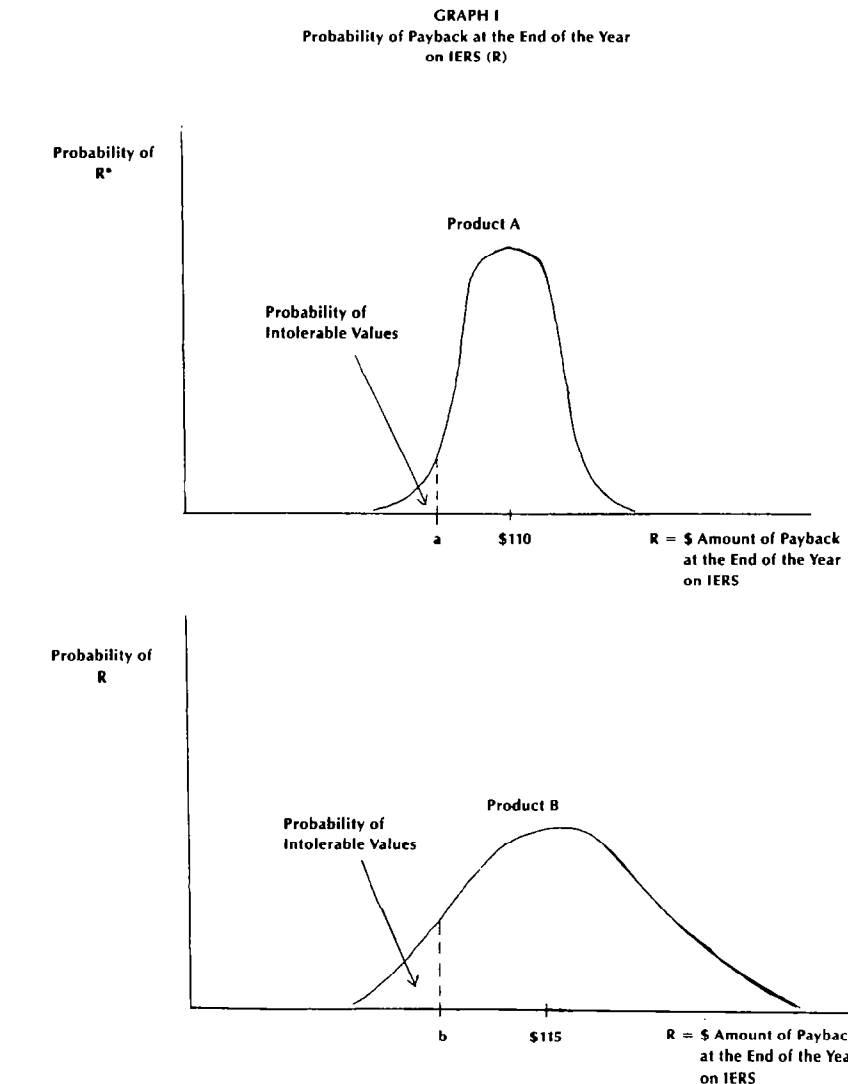
I. Situation without required surplus

To aid in the explanation, let us consider a simple example involving the corporate area wanting to sell two one-year products. In real life, situations are more complicated, but the arguments are essentially the same. Product B is considered riskier (i.e., more potential for income fluctuation and losses) than Product A. Without any RS provision, Corporate determines that it is reasonable to expect an average 15% return on IERS from Product B, versus 10% from Product A. For instance, a $100 IERS on both Products A and B should pay back, on the average, $115 for Product B and $110 for Product A, at the end of the year. The term payback will be used to refer to the total amount received at the end of the year, i.e., the original principal plus the return on the principal. The $5 average additional payback for Product B is deemed by Corporate to be an appropriate reward for Product B's riskier nature.

Graph I depicts the above situation. Because Product B is riskier and has more uncertain results:

- The spread of its probability distribution of R (the payback from IERS at the end of the year) is wider, and
- The probability of obtaining a loss and the magnitude of such a loss is greater

as compared to Product A. However, since Product B returns higher on the average, Corporate views the returns of the two products as equivalent. That is, the additional $5 is deemed

GRAPH I
Probability of Payback at the End of the Year
on IERS (R)

*Note: We are not requiring that R be Normally distributed.

an appropriate reward for the extra risk of Product B.

Also shown in Graph I are points a and b, the minimum payback amounts that management will tolerate. The values of a and b can be equal or different and can be negative, zero, or some positive numbers less than $110 or $115. Reasons for not tolerating values below a and b may include:

- Statutory insolvency,
- Apparent company's insolvency or weakness in public eyes,
- The manager of the Corporate area will lose his/her job.

Whatever the reason, the manager of the Corporate area (or top management) determines that values below points a and b are intolerable and requires that before the products are sold, additional assets need to be set aside to guard against such intoler-

able situations. We will term such additional assets as required surplus (RS), even though RS is often used to refer to assets set up for insolvency concern only.

As seen in Graph I, the probability (i.e., the area under the probability curve) of having intolerable values (i.e., values less than a and b, respectively) is greater for Product B than Product A. This is due to the riskier nature of Product B.

II. Situation with required surplus

Assume Corporate determines that RS of $10 is needed for Product B, and $5 for Product A. Also assume Corporate decides to invest RS in risk-free investment earning a 5% after-tax yield. Graph II depicts the paybacks resulting from TI of $110 in Product B and $105 in Product A.

Varying ROE cont'd

Since RS is invested in risk-free investment, the shape of the probability curve of R* (payback from TI) is the same as that of R (the payback from IERS). The curves merely shift to the right by:

$5 (1 + 5%) = $ 5.25 for Product A
and $10 (1 + 5%) = $10.50 for Product B

This is because a product's claim and persistency experience, actual expenses, and the investment experience of the product's IERS are not affected by the setting aside of assets equal to RS. For instance, it is just as likely for 200 policyholders to die with or without RS. That is, the occurrence of a product's C1, C2, and C3 risks is not affected by its RS. (In reality, if RS is not invested in risk-free investment, the shape of the probability curve of TI payback will change somewhat. And the C1 and C3 risks of TI will be somewhat different from those of

IERS. However, those differences are quite immaterial unless RS is extremely large as compared to IERS.)

Looking at Graph II, we see that the probabilities of having intolerable values (i.e., values less than a and b respectively) have been substantially reduced. And Corporate is now comfortable with the magnitudes of such probabilities.

Table I summarizes the average rates of return of the two products.

Table I

	Product A	Product B
IERS	$100	$100
Average return on IERS	10%	15%
Risk Index of IERS*	2	3
RS	$5	$10
Composite Yield of TI	9.8%	14.1%

*This represents a relative measure of risk for the product. We assign a risk index of 1 for RS.
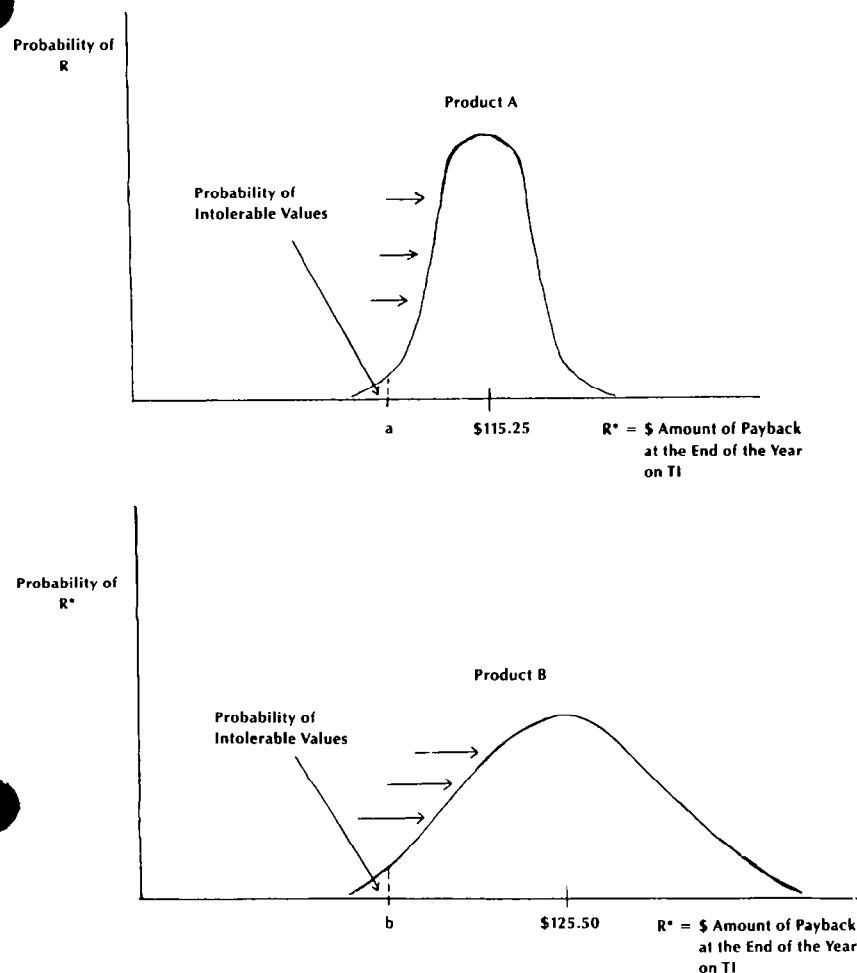
Without RS, Corporate views the average differential of 5% as appropriate. Based on our example, 4.3% (i.e., 14.1%-9.8%) should be the appropriate average return differential for TI. However, it can be argued that an appropriate average return differential for TI should be somewhat less than 4.3%. The reason for this relates to the point we raised earlier – in reality, RS is often not invested in risk-free assets, thereby making the C1 and C3 risks of TI somewhat different from those of IERS. This will have a greater effect on Product B than A due to the larger RS of Product B. But, as argued earlier, the magnitude of such effect should not be material unless RS is extremely large compared to IERS. Hence, the appropriate average return differential for TI should be around 4% to 4.2%, but not 0%.

Based on our analysis, under what circumstances is it appropriate for Corporate to demand a uniform rate of return on TI for Products A and B? These circumstances, with corresponding counterarguments, are shown below:

1. Corporate views it appropriate to demand the same return on IERS from both products.

This can be discarded because we started with the premise that various products have different risks requiring varying return on IERS.

2. The magnitude of RS is extremely large as compared to IERS. And such magnitude is large enough to "mold" (reshape) the probability curve so that the resulting probability curves of TIs are the same for the various products.

As argued earlier, the possibility of having RS of such huge magnitude is unlikely. Also, even if unusual "molding" of the probability curve took place, it will be only by coincidence that the resulting probability curves of the two TIs would be viewed as identical by Corporate. Hence, Corporate should generally demand ROE on TI to differ by product.

3. RS works in such a way that the left tail of the probability curve is shortened. Examples of the resulting probability curve for Product B are shown in Graphs III and IV. (The resulting curves for Product A are not shown since they are similar to Graphs III and IV.) In Graph III, the left tail of the probability curve is somehow "molded" so

GRAPH II
Probability of Payback at the End of the Year
on TI (R*)

Probability of R

Product A

Probability of Intolerable Values

a $115.25   R* = $ Amount of Payback at the End of the Year on TI

Probability of R*

Product B

Probability of Intolerable Values

b $125.50   R* = $ Amount of Payback at the End of the Year on TI