TITLE: PRICING FOR CORPORATE OBJECTIVES

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The Determination of a Profitable Rate Level

The exercise of determining a rate level for some future period usually takes place within the context of an already existing rate level. Some amount of experience is usually available under the current rates and under other older rate levels which can be adjusted to current levels through a mathematical process which is familiar to us all. In any event, data is usually available for at least a somewhat credible determination of the adequacy of the current rates. So ordinarily the ratemaking process is actually a rate review process as the results of the analysis are usually expressed in terms of changes to the present rates. When the process is considered as a review of current rates, major steps in that process naturally follow. They are:

1. Determination of the adequacy (or excessiveness) of the present rates for the present time.[1]
2. Identification of the perceived differences between the present time and the future time and quantification of those differences.
3. Translation of the results of steps 1 and 2 into changes to the current rates to create adequate but not excessive rates for some future period.

Step 1 requires that experience period premiums and losses be adjusted to reflect the current levels of premium collections and loss incurrments.[2] This step requires judgments as to, among others,

[1]Possibly it would be more precise first to speak of the adequacy of current rates for the time represented by the experience, but that would just slow us down without adding significantly to the discussion.

[2]The reader is advised not to attempt to find "incurrments" in any standard English dictionary. Instead let us define by analogy: pay is to payments as incur is to incurrments.

data sufficiency and accuracy. This type of judgment deals with somewhat known quantities and events of the past and present rather than with predictions of future conditions or events. Such judgments are usually suseptable to a rather objective deductive type of reasoning. Let us refer to such judgments as deductive judgments.

In step 2 we compare the present with the future and therefore we must make judgments about events that have not yet occurred and conditions that may not yet exist. The usual procedure for doing this involves the examination of phenomena of the recent past such as inflation rates and frequency trends and extraction from those phenomena of inferences about the future. Let us therefore call those types of judgments inferential judgments. Inferential judgments usually weigh quite heavily in the amount of trend that will be used to bridge the gap between the present and future periods.

Step 3 involves the application of trends and other perceived differences between the present and future periods to the current rate level, with adjustment for the current inadequacy or redundency, to derive the required rate level for the future period. We now have the basis for a new set of rates which, if our reasoning, assumptions and inferences are good, will bring us to within epsilon (defined by chance variation, the law of large numbers and luck) of a profitable position in the future period.

But let us look at step 2 once more. There we identified the differences between the current and future periods. However, there are differences that could not possibly have been evaluated at that

time; they are the differences caused by the change in rate level itself determined in step 3. These differences could include the change in the company's competitive position with other companies writing in the same market place, changes to the types and amounts of coverages purchased by present and prospective insureds prompted by the movement in rates, and the amount and kind of new business that will be generated by the new rate level. We make both deductive and inferential judgments many times along the way to arriving at a rate level. Now we see that some additional judgments are necessary. We must decide whether the rate level that is a product of our assumptions and judgments is compatible with those assumptions and judgments. This final judgment is an inferential one in that it involves prediction of the future rather than deductions about the past or present. For example, we may have assumed in step 2 that our own book of business would experience a frequency trend which does not differ from that of the rest of the industry, i.e. that the relative quality of our book of business will *not change between the present and future periods.* But *given the* rate level change derived in step 3, can we expect to be able to attract risks that are as good as the ones we have been attracting with the current rate level? If the rate change indication is for a substantial increase, that assumption could be questioned, especially if the competition is not expected to take similar rate action. Or suppose the data indicate a substantial decrease in rate level. The resulting improvement in competitive position could be

enough to cause a significant increase in the number of new risks. This influx of new business with its usually higher loss ratios may contradict our assumptions about the new/renewal split in the future and could create an inadequacy in the indicated rate level. A small judgmental reduction in the indicated decrease could bring that rate level into equilibrium with its underlying assumptions.[3]

So we see that both deductive and inferential judgments are an appropriate and necessary part of the rate review process and that inferential judgments must be made both during the process and in the evaluation of the compatibility of the results with the underlying assumptions. So rate level is both cause and effect. It is the effect of a certain level of losses but it also is, in a sense, a cause of those losses since the rate level determines the type and quality of risk that will be written.

For example, suppose we are to determine the rate level for Company A in a very competitive and price conscious environment such as private passenger automobile. The current rate level situation is:

	Rate level as % of Company A Level	% of Total Market
Company B	95%	20%
Company A	100%	4%
Companies C, D, E	105%	25%
Others	120%	45%
Involuntary	150%	6%

3 The question of whether an assumed change in the new/renewal distribution should be reflected in the rate level at all is an interesting and important one and the answer is not at all clear, but neither is it pertinent to this discussion.

Now suppose our rate level indication is for a 25% increase in rates. Such an increase would totally change the competitive picture for Company A. Instead of being in a position to attract some of the best risks, Company A would have the highest rates in the voluntary market. The indication for +25% assumes the ability to attract the better risks, for that was implied by the competitive position during the experience period which produced that indication. But clearly that assumption is incompatable with our taking that increase. Yet we need the higher rate level to support the level of losses that we expect. What should we do?

Look at the table of rate levels again. If we, as Company A, need a 25% increase in rate level, then either we are doing something very wrong or Companies B, C, D and E will also need large increases in the near future. Assuming the latter, we should increase rates by 10% or so and plan to increase again later after the other companies have changed. In this way we have preserved as nearly as we can the equilibrium between our determined rate level and the assumptions underlying it.

This dynamic relationship between rate level decision and actual rate level needs is a strong argument for making the actuary a part of the decision making process instead of merely a provider of information. Let us now explore further the role the actuary might play in company decision making. Specifically let us examine company goals as they relate to the actuary or decision maker.

GOALS AND INFERENTIAL JUDGMENTS

The first question to be addressed by the actuary with regard to company goals might be: How does achievement of the stated goal in some future period change the rate level need for that period? An

equally important question but one which may not be as obviously within the strict domain of the actuary is: How can the product be priced to give the stated goal the best possible chance to be achieved with the greatest positive implications for profitability? A slightly more immediate question which should also be of interest to the actuary is: What information that the actuary is most qualified to obtain and interpret would be most useful in making final pricing decisions in light of the stated goals? Let us examine these questions through a model. Suppose a nationwide insurer of private passenger automobile is considering a growth goal for itself that translates into a 100% countrywide increase in new business writings for the coming year. That growth goal need not translate into a doubling of the new writings in each state; only the countrywide goal is important to the company. The company enjoys a renewal ratio of 90% and is currently in a no growth (in exposures) situation and is earning a 2% underwriting profit on premiums. If an effective annual investment rate (that is, considering the amount of time for which policyholders' funds are held for investment) of 3% on premiums is earned and 8% is earned on invested surplus, then the current overall rate of return on surplus given a 2 to 1 premium to surplus ratio is:

$$2(2.0\% + 3.0\%) + 8.0\% = 18.0\%$$

The overall return of 18%[4] is considered adequate but is generally not sufficient to attract significant amounts of new capital. If new business generates loss ratios which are 20% above those for renewal business, the premium dollar may have components like the following:

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4 Let us simplify by ignoring taxes and other peripheral nuisances.

	New (10%)	Renewal (90%)	Combined
Losses	72.0%	60.0%	61.2%
Expenses[5]	36.8	36.8	36.8
Profit	- 8.8	3.2	2.0
Total	100.0%	100.0%	100.0%

A doubling of new business spread equally among the states would result in a combined loss ratio of about 62.2% as follows:

	New (20)	Renewal (90)	Total
Losses	72.0%	60.0%	62.2%
Expenses	36.8	36.8	36.8
Profit	- 8.8%	3.2	1.0
	100.0%	100.0%	100.0%

The return on surplus would then be:

$$2.2\ (1.0\% + 3.0\%) + 8.0\% = 16.8\%$$

We have given up some current earnings for growth which we hope will translate into future higher earnings. But suppose the insurers domain consists of only two states, each with one half the total premium volume and with experience as follows:

	State A		State B		
	New (5)	Renewal (45)	New (5)	Renewal (45)	Total
Losses	66.0%	55.0%	78.0%	69.0%	61.2%
Expenses	36.8	36.8	36.8	36.8	36.8
Profit	- 2.8	8.2	- 14.8	- 1.8	2.0
Total	100.0%	100.0%	100.0%	100.0%	100.0%

5 Of course new business expenses are higher but that isn't needed here; the point is that the profit is negative.

Now if our growth goal countrywide can be achieved by writing all our extra new business in State A, the profit picture would be quite different. The countrywide loss ratio would be 61.6%, the underwriting profit would only be reduced to 1.6% and the rate of return would be:

$$2.2\ (1.6\% + 3.0\%) + 8.0\% = 16.1\%$$

a higher current rate of return on surplus with achievement of our growth goal, the best of both worlds. But notice that the level of new business writings would have to triple in State A to achieve this result. Such a level of new production may go beyond the efficient limits imposed by either internal manpower constraints (such as the number of underwriters familiar with that state) or the availability of such a large number of new and acceptable risks in the state. It is probably more reasonable to assume that the loss ratio, the expense ratio or both would increase for new business in State A as we do the things, such as advertising or loosening of underwriting standards, which are necessary to attract large numbers of new risks. The result would probably reduce the rate of return to a figure below the 18% no growth rate. The model could be taken further to include such factors; but let us instead return to the three questions of interest to the actuary and attempt to answer them within the context of the model.

The first question was: How does achievement of the goal in the future period change the rate level need for that period? The question could be addressed each time a state's rates are reviewed, but we have already seen that it is better from a

profitability standpoint to concentrate growth in the profitable states within certain limitations. To address the question state by state is to give an incomplete and unsatisfactory answer. How then should we proceed? We must answer the question on a country-wide basis by developing a state by state plan of growth that adds up to the countrywide objective. Each state's part in the overall goal can then become a factor in the inferential judgments used to develop the "goal oriented" rate level indications for that state. But this cannot reasonably be done without reference to the second question of interest to the actuary: How can the product be priced to give the stated goal the best possible chance for achievement with the greatest positive implications for profitability? For example, suppose the stated goal is moderate growth with no reduction to the overall rate of return. Most probably the influx of unprofitable new business would have to be offset by an increase in the general rate level so that the same overall rate of return is achieved. But if we want to concentrate our growth in the profitable states, those states would require a substantially higher growth rate prompting an equally substantial offsetting rise in the overall rate level. This rise in rate level may not be possible without compromising the competitive position in the state and destroying the possibility for the desired growth, a "Catch 22" situation. The solution may be to concentrate the growth in the profitable states but spread the

needed rate level increase among all states so the effects on competitive position will be negligable.[6]

THE NEED FOR A PRICING POLICY

The details of the particular problem of growth and profitability being discussed here are not important. What is important is the generalization that springs from the exercise. The best way to achieve the overall corporate goal in this case is to plan a strategy for each state so that the sum of the states' objectives equals the countrywide objective. But all states' goals must be set at the same time to insure that the whole will equal the sum of its parts. But the nature of the task will not allow all states' rates to be reviewed at the same time. Therefore, it is imperative that the corporate objective be translated into a state by state pricing strategy which can be referenced as each state's rates are reviewed. It can be argued that if the role of the actuary, or more precisely the function of the pricing area of the company's actuarial department, is to derive the best possible estimate of the future rate level needs in each state, then the corporate goals need not be translated into a pricing policy at all; they need only be recognized by management as it makes state by state rate level decisions (as contrasted with the calculation of rate level needs). Then the decision maker would receive two separate inputs: the overall corporate goals on the one hand and the state by state "no goals"

6 Such action should not ordinarily cause regulatory concern since the rates state by state are usually at such a point within the range of reasonableness that small increases would not produce excessive rate levels.

rate level indications on the other. The decision maker's task then would be to synthesize the two to determine the rate level that will actually be used in the future. No doubt corporate goals could be addressed in this way but the method needlessly obscures the ramifications for the overall goal of the individual state decisions. The decision maker is left in the position of having to make an inferential judgment with practically no guidance. For example, he may have a rate change need of +10% in a particular state in which he wishes to generate substantial growth. He may estimate that, with growth, the rate level need would be +12% so that growth has virtually eliminated the 2% profit in the state. This is a rather subjective foundationless inference.

Now remember the third question of interest to the actuary: What information that the actuary is most qualified to obtain and interpret would be most useful in making final pricing decisions in light of the stated goals? The answer here is that if corporate goals are translated into pricing strategy which is then communicated down to the level at which the rates are actually reviewed, then "no goal" rate level needs and "corporate objective" rate level needs can both be calculated and compared. The decision maker can then see precisely what the goal is costing in profitability and competitive position. He can also see the ramifications for the countrywide goal of choosing the "no goal" rate indication for a particular state. In this way the decision maker can constantly reevaluate the goal itself in terms of its profitability cost and

also track the state by state progress toward the goal as each state is reviewed. The decision maker can do all this because the actuary, aware of corporate goals and armed with a pricing policy based on them, has provided a precise calculation of the relationship between those goals and the otherwise applicable rate needs for each state. The need for inferential judgments has not been eliminated, but a vehicle has been provided by which those judgments can be made within the rate review process itself. That vehicle is a pricing policy based on overall corporate objectives. We have replaced the 12% vs. 10% crude judgment of the decision maker above with the mathematical evaluation by the actuary based on statistical knowledge of the relationship between new and renewal loss ratios.

Let us summarize in just a few sentences. Rate level indications are not static inputs into the decision making process, rather they form a dynamic interrelated system with decisions, either rate level or growth decisions, so that indicated rate level needs determine and are determined by those decisions. This realization does two things. First it argues persuasively for including the actuary in the decision making process. Second it demonstrates the need for a direct link between corporate goals and the rate level calculation (a pricing policy) so the actuary can calculate rate levels in a manner consistent with those goals and provide other information of value in the decision making process.