

## CHAPTER TWO

### FUNDAMENTAL BUILDING BLOCKS OF INSURANCE PROFITABILITY MEASUREMENT

*By Russell E. Bingham*

#### OVERVIEW

There are numerous approaches to the measurement of insurer profitability and ratemaking. On the surface, these approaches appear to be quite different since the results produced by them can, and often do, yield conflicting results. Certainly confusion is created when figures and results differ, and it is unclear as to the cause of the difference. This is especially true in the area of ratemaking, given the perspectives and agendas of the various parties involved. In order to assist in furthering the dialogue among interested parties, it is important that the sources of differences be understood. These differences can result from the data used, from the models used to process and present the data, from the assumptions used in the model, and from fundamentally different philosophical approaches.

Certain fundamental building blocks, successfully understood and employed, can provide a common, unifying structure which allows results produced by various models and approaches to be more readily compared. These building blocks provide a framework within which the differences in data, models, assumptions and philosophy can be argued to resolution.

The key building blocks, or principles, are:

- ◆ The existence of an accounting structure consisting of a fully integrated set of *balance sheet, cash flow and income statements*.
- ◆ Differentiation between accounting by *policy period*, the fundamental unit of insurance exposure, and accounting by *calendar period*. Calendar period accounting is an aggregation of activity emanating from the current and previous policy periods.
- ◆ Recognition that much of what is reported as "*actual*" results in insurance accounting is based on estimation (e.g. IBNR) and that *future development* affecting subsequent calendar period balance sheet, cash flow and income statements is necessary to fully measure the ultimate financial results of a given policy period. Insurance is unique in that most of product costs are unknown at the time the product is priced and sold, and furthermore, "historical" policy period results, which form the basis for estimation of these costs, will not be fully known for some time.

- ◆ Using two valuation methods in which financials are viewed:
  - on a *nominal* basis, essentially using results as they develop and are reported over time, as well as
  - on a *present value* basis, which references all financials to a common point in time, by reflecting the time value of money.
- ◆ Identification and explanation of the key driving *principles and philosophy*, as well as the *parameters and statistics* to be employed in the analysis. Understanding the meaning of the key assumptions and how they are derived along with the statistics used to present the results is critical to ratemaking and insurance financial analysis.

### ACCOUNTING STRUCTURE

The existence of a fully integrated set of balance sheet, income and cash flow financial statements is invaluable whenever any form of analysis is to be performed. Their existence provides a fuller view of the financials embodied in any particular ratemaking or performance measurement process. In addition, questionable assumptions and inconsistencies are less likely to occur when these three perspectives are maintained and reviewed. Financial ratios used to determine profitability and rate of return are also derived from the relationships between variables in one or more of these three views. There seldom is a good reason not to build a financial model with these three critical perspectives.

### POLICY PERIOD VS CALENDAR PERIOD

It is generally accepted that an understanding of calendar period incurred losses requires a breakdown into current and prior accident period contributions as presented by the Schedule P "triangles". Losses that are reported in any given calendar period emanate from accidents that occurred over the current accident period as well as possibly several prior accident periods. Calendar period losses, in and of themselves, may have little in common except the fact that their financial activity occurred during the same period. The losses could well have come from policies with differing exposures and pricing. In order to properly match insurance costs to premium revenue, losses need to be associated with the same period and exposures for which premiums were charged. This is critical to both the establishment of an historical ratemaking base and to the measurement of profitability.

It should be noted that "accident" period as a frame of reference is used for simplicity, however, "policy" period is the more appropriate classification, since this represents the real product unit of exposure. Of course, if all policies were of one year terms and effective on January 1, the results would be identical.

To set rates and measure financial performance of any given period, it is important that revenues and expenses be properly matched. Comparing premiums earned in 1995 with losses incurred in 1995, for example, may lead to improper results to the extent these losses arise out of policies sold (and rated) in years prior to 1995. The ideal solution is to expand the loss "triangle" concept to the complete package of balance sheet, income and cash flow statements, by policy period. In particular, the existence of surplus in this manner would render it possible to determine the ultimate profitability of any given policy period book of business (from the shareholder perspective).

Essentially, this ideal suggests that separate books be maintained for each policy period of exposure along with the policy period's respective contribution to calendar period reported financials that follow in time. Such books would clearly identify all elements of the particular book of business, such as revenue, expense and surplus committed and all manner of performance measures would be possible. The following schematic demonstrates this perspective.

TABLE 1  
POLICY/CALENDAR PERIOD TRIANGLE  
BALANCE SHEET, INCOME, CASH FLOW

Policy Period	Calendar Period					Total Ultimate
	1993	1994	1995	1996	1997	
Prior	X	X	X	X	X	→ Sum
1993	X	X	X	X	X	→ Sum
1994		X	X	X	X	→ Sum
1995			X	X	X	→ Sum
1996				X	X	→ Sum
1997					X	→ Sum
	=====	=====	=====	=====	=====	
Reported Calendar	Sum	Sum	Sum	Sum	Sum	

#### TIME FRAME OF ANALYSIS

Insurance, perhaps more than any other major business, involves pricing and selling of a product for which the major costs (loss) can only be estimated, and furthermore, the actual amount of which may not be known for many years to come. Whenever insurance financials are analyzed, it is important to understand that the view is of less than fully "developed" results. Older policy (or accident periods) may be largely resolved, but the closer one gets to the current time, the less this is so. Also, as noted in the previous section, the results reported in any given calendar period are an amalgamation of many different originating exposure periods.

Therefore, an important part of the analysis of insurance results is the proper slotting of calendar activity into the appropriate cell of the policy/calendar period development triangle, and the subsequent interpretation of the cumulative development pattern emerging. A major role of the actuary is to project the development of losses to their ultimate final estimated value based on these observed patterns.

Two important principles are involved:

- ◆ Historical, "actual" calendar results are a combination of current and previous policy periods.
- ◆ The results reported to date are incomplete and must be projected to ultimate by some technique. The greater the incompleteness in the reported results, such as in long tail lines of business, the greater the amount of additional development that must be projected to arrive at ultimate value.

It is vital that the ratemaking process both distinguish policy period historical cost from calendar period costs reported and that it further incorporate a method to project costs to their ultimate value, especially for more recent policy periods. It should be noted that a fundamental shortcoming of the rate filing process lies in the tendency of regulators to rely on financials as reported. There is a feeling of concreteness to them regardless of the fact that they may be significantly flawed for the reasons mentioned: they are an aggregate of several older policy periods and they are not fully developed. In essence, the policy/calendar period triangle must be filled out into the future for current and prior policy periods in order to provide a proper analytical foundation for ratemaking and financial analysis.

This point is so important that it bears repeating. *Calendar period financial data (a main source of regulatory information) is fundamentally flawed, and at best can only be an approximate estimate of true current performance depending on the consistency of insurance exposures over time, the speed at which prior policy periods are resolved, and a relatively stable economic environment, especially as regards to interest rates and inflation.*

#### VALUATION METHODS

Reported results are on a nominal basis, that is to say, not discounted in terms of present value in any way. In the ratemaking process the focus is on the next period in the future for which the rates will apply. The financial profitability and rate of return for this business involves the development (and estimation) of calendar period activity many periods into the future. Since rates are being developed in the present there is a need to relate this future activity to the present in some way. Here the process of discounting comes into play whereby this future financial activity is adjusted for the time value of money. Discounted cash flow models are used for this purpose and, as a result, the value

of profit and rate of return for this period is estimated in present value terms. Of course, additional assumptions relative to discounting are required to perform this accounting.

Although not explicitly stated, this process of discounting utilizes the financial "triangles" structure, by summarizing across the calendar period dimension for the particular future policy period for which rates are being developed. To fully judge the success of these models, it is necessary to maintain an historical record in the policy/calendar period triangle form (balance sheet, income and cash flow statements), which is seldom done.

### PHILOSOPHY, PARAMETERS AND STATISTICS

Once the structural and valuation methodologies are established consistently, the differences that remain in ratemaking approaches are those truly of fundamental philosophical orientation. For example, should profitability be defined from the investor perspective and total rate of return on surplus be used, or should profitability be defined using a return on sales approach wherein surplus need not be assigned to lines of business. The parameters and statistics utilized in support of a particular position are driven largely by this orientation.

The differences in underlying fundamental philosophy influence the selection of parameter values and thus the final outcome.

### PUTTING IT ALL TOGETHER

A "complete" approach to ratemaking and insurance financial analysis generally embodies all of the several building blocks mentioned. These include:

#### **Structure**

- the existence of supporting balance sheet, cash flow and income statements
- triangle structure differentiating policy (or accident) and calendar period dimensions.

#### **Quantitative Approach**

- focus on policy period dimension, including projections to ultimate value, in effect, "filling in" estimated future calendar period activity related to the given policy period
- valuation on both nominal and present value basis, again focusing on policy period dimension when constructing present value.

It is suggested that every financial model of insurance, whether to be used in ratemaking or measurement of profitability, should be all-inclusive of the above. *Structurally* the model should have balance sheet, cash flow and income statements which are available in triangle form, in the two dimensions of policy period by calendar period of **development**. *Quantitatively* the valuations need to focus on the policy period dimension inclusive of projections to ultimate and a method for determining the net present value of this policy period. Given these underpinnings, the remaining philosophical differences and parameter estimations can be addressed in a common format which should facilitate the discussion and resolution of differences.

Much of the confusion today exists needlessly because of a lack of common structure and quantitative approach.

**Quite simply, if balance sheet, cash flow and income statements exist in a policy/calendar period triangle form, and if the policy period dimension is projected to ultimate and discounted to present value, the only remaining differences that need to be explained are in philosophy. In the end these are the only differences that matter.**

All forms of ratemaking and profitability measurement can benefit if these structural and quantitative principles are followed. Virtually all of the supposed different ratemaking "models", for example, can be reconciled to one another. Some of the apparent differences that remain are due more to the form of presentation than to fundamental philosophy. At a minimum it becomes possible to provide a focus on the true differences in philosophy and parameter assumptions that underlie each respective approach.