reviewer greatly appreciated reading. Mr. Harwayne's papers are therefore a welcome addition to our literature, notwithstanding the before mentioned objections to certain of his methods and conclusions.

DISCUSSION BY F. J. HOPE

In the introduction of his paper, Mr. Harwayne cites the serious need for insurance premiums which will be adequate in the face of an inflationary economy. He suggests that this need can be met, in part at least, by taking steps to bridge the time-gap between the cut-off date of basic ratemaking data and the effective date of rate revision. Certainly there can be little quarrel with either the need for adequate rates or the desirability of achieving them through use of the most recent factual information available.

In general design, his proposal to narrow the time-gap is patterned after the rate level adjustment factor widely used in Workmen's Compensation ratemaking. In this approach, the detailed elements which constitute the basic ratemaking data are adjusted by a single factor derived from more recent data available in "bulk" only. In Workmen's Compensation, the "bulk" data are calendar year earned premiums and incurred losses reported by state at six months' intervals. Mr. Harwayne proposes the use of premiums written and losses paid. He suggests the use of the latest policy year of such data, since that is readily available in the New York Supplemental Insurance Expense Exhibit, but points out the possibilities of adapting his proposal to other types of compilations, such as calendar-accident year.

Although the paper is divided into five parts, it can be summarized as being based on these two fundamental premises:

1. That policy year incurred loss ratio data evaluated as of 36 months or later can be projected to "ultimate" by a simple adjustment of outstanding losses, and
2. There is a consistent and measurable relation between policy year paid losses as of 12 months and "ultimate" incurred losses.

The first premise is familiar to most of us under the name of loss development. It is generally assumed that reserves on outstanding losses include what might be termed a "margin of safety". Mr. Harwayne terms this the "conservative practices required by prudent company operations". When a body of ratemaking data includes a number of reserves on open claims, it has been common practice to adjust the data to reflect future developments. The traditional approach has been to develop factors based on the ratio of incurred losses at a later date to the same losses as of an earlier date, and to apply these factors to more recent data. The theory appears to be that, in the aggregate, reserving practices demonstrated in the older years have continued with respect to later years. The factors are usually, but not always, less than unity, as might be expected. Mr. Harwayne adopts a somewhat different approach, suggesting that since the sav-

ings derive from reserves on outstanding claims, the loss development factor should be one applicable to outstanding claims only. On the basis of several years of experience, he demonstrates in Exhibit II that for stock and mutual companies in New York, a "discount" factor of 12% would be appropriate for Automobile Bodily Injury. The obvious step, then, is to discount outstanding losses by the appropriate factor, leaving paid losses unmodified.

Both approaches to loss development depend upon an overall consistency in reserving practices, not only as to intent, but as to accomplishment as well. Claims men, collectively, may feel that their reserves at a given point in time have a "margin of safety", but if they have erred in their judgment, then the data evaluated as of that time upsets the required continuity in reserving practices. This is one of the hard facts of life in ratemaking, with no apparent answer other than the basic tenet that if we apply our procedures with reasonable consistency (and stay in business long enough) aberrations from average conditions will be balanced out.

As compared to the more traditional loss development method, Mr. Harwayne's approach seems to have some advantage in the event of a general change in rate of settlement. If, for purposes of discussion, we assume that claims men collectively did reserve with a 12% margin of safety, but changed the rate at which claims were settled, it would take several years for the traditional method to catch up with the change. Since Mr. Harwayne's method modifies outstanding losses only, adjustment to the change in rate of settlement would be immediate. There remains the very important and debatable question of whether a change in rate of settlement would affect the size of the settlements, thereby upsetting results under either method. That possibility could be the subject of separate study.

In Exhibit II, the ratios of Savings to Outstanding are consistent enough to warrant considerable respect for Mr. Harwayne's conclusions. He readily acknowledges and demonstrates that one could expect considerable variation among different types of carriers, and for various combinations of carriers. The writer of this review can add that, from his own company's countrywide data for eight consecutive policy years, he found no such consistency in savings percentages from year to year, nor from one evaluation date to the next, except that developments between 36 and 48 months seemed to be quite consistent in all except two years.

In Table B of Part I, Mr. Harwayne has adjusted actual loss ratios to a discounted basis, using 12% of outstanding losses, for several policy years at consecutive evaluation dates. The fact that they are very consistent when so adjusted is called "dramatically revealing", but to this writer it seems only the logical consequence of Exhibits I and II. The actual loss ratios are identical with the Incurred Losses in Exhibit I, except for number of digits. Exhibit II demonstrates that there was quite consistent development in those Incurred Losses from one evaluation date to the next. Also, the proportion of Outstanding

to Incurred as of the various evaluation dates was quite consistent among the several policy years studied, so that application of a discount factor to Outstanding approximated the application of a different factor to Incurred. It seems only natural, therefore, that when adjusted to reflect consistent development, the results themselves are consistent. This seems to be a test of conclusions on the same data from which they were drawn, perhaps for want of any other data to test.

With respect to the first of Mr. Harwayne's two premises, it is this writer's opinion that his approach warrants continued study, perhaps on a countrywide basis, and in such a way that tests could be applied to other than the source data of the study. For the purposes of this paper, development of losses to "ultimate" appears to be an intermediate step, and whether it be accomplished by his method or another is somewhat of a separate issue, although a very important issue in itself. If rigorous tests demonstrate that Mr. Harwayne's method is wanting, the more traditional method could be used. Therefore, with complete reservation as to whether the 12% "discount" is a truly valid figure, and recognizing the limitation on any type of loss development procedure, it will be assumed that losses developed to an "ultimate" basis by Mr. Harwayne are sufficiently accurate for the purpose they serve in his paper.

Mr. Harwayne's second and more novel premise is that policy year paid losses as of 12 months or 24 months bear such consistent relationship to ultimate incurred losses that the former can be used to establish an acceptable estimate of the latter. Since written premiums as of 12 months represent ultimate earned to a substantial degree, the way is open to put a recent but incomplete bulk of policy year data on an incurred to earned loss ratio basis in a method quite different from the recently abandoned "earned factor" approach.

In brief, Mr. Harwayne suggests that policy year paid losses as of 12 months or 24 months could be adjusted to ultimate incurred through dividing by 6.99% or 42.37% respectively. It is unfortunate that he had only three policy years from which to develop his ratio, but those three do show a remarkable consistency. Again referring to countrywide data for his own company, this writer was able to develop similar ratios, on the basis of losses paid as of 12 months to losses paid as of 60 months. For seven consecutive policy years the ratios, while different from the above ratios, remained within 1.0 points on each side of the arithmetic average. Similar percentages for losses as of 24 months ranged within 5.0 points around the average.

The concept of projecting a full policy year of incurred losses on the basis of what might be termed an "advance sample" seems a little bold on first examination, yet the facts thus far seem to warrant its serious consideration.

In a further refinement, Mr. Harwayne has used his observed values to fit a curve and develop a formula by which the percentage of paid

to ultimate incurred can be developed for any evaluation time "t". Since he has supplemented this section with further notes, comment on this section will be made separately.

In conclusion, Mr. Harwayne puts forth a suggestion for a rate level adjustment factor to be based on the latest Policy Year Paid/Written Loss Ratio, to be used in conjunction with Calendar/Accident Year ratemaking data. The exact form of the factor is quite similar to the Compensation factor, except that it includes a neutral zone of plus or minus .025. If actually put into practice, the use of the latest incomplete policy year could take any one of several forms. Initially it might be given only a moderate weight in the overall rate level, until such time as its reliability has been demonstrated in actual usage.

Certain practical but not insurmountable difficulties would present themselves in a procedure of this type. As Mr. Harwayne points out, the data as now reported in New York is for all types of automobile, with no breakdown by private passenger, commercial, etc. At present there is no requirement for this type of data in many other states. However, once the concept had been adopted in principle, the details of how to get the data could undoubtedly be worked out.

For universal use, as always, there would be the problem of credibility in the smaller states, especially in a procedure requiring that a small amount of paid losses be "inflated" by the use of factors such as a divisor of .0699. It might be that such factors would have to be based in large part on countrywide data. Even in the larger states, it is probable that, initially, less than 50% weight would be given to a factor of this type in the overall rate level.

Mr. Harwayne has put forth a fresh approach towards solving a problem of the first magnitude, with interesting statistical data to demonstrate the validity of his arguments. The Society is indebted to Mr. Harwayne for this paper, and the subject deserves not only further discussion, but active study and analysis of similar type data wherever available.

AUTHOR'S REVIEW OF DISCUSSION

In his discussion of my paper Mr. Cahill begins by relegating the theoretical aspects to others, and directs his attention solely to the practical aspects. He sees "little merit in embarking on the use of complicated formulae in ratemaking to ascertain what is disclosed by other available statistics that are both relevant and up-to-date".

The author investigated the time situation as respects the availability of summaries within the New York State Insurance Department. It was found that the experience covering transactions during 1957 had been summarized by June 1958. It was also found that the National and Mutual Bureaus had submitted their statistical data on October 27, 1958, and had furnished the summaries used for filing on the same day. In addition, transactions during the year 1958 were summarized by the New York Insurance Department in final form by