DISCUSSION BY CHARLES C. HEWITT, JR.

Mr. Simon's work is a modern "labor of Hercules." Both he and his employer, which made its facilities so readily available for this project, well deserve the epithet "good citizen" from the entire casualty insurance industry.

My remarks are not intended to encompass the job recently completed, but, except for a mathematical note appended, are designed to take up from the point where this paper leaves off. For convenience they may be divided between mathematical and non-mathematical, but are treated in reverse order.

Non-Mathematical

To anyone on the commercial side of the casualty insurance business it has been obvious that net Table M charges have been inadequate in most situations for a long time. What is particularly disturbing, however, is the abundant evidence that the new Table M (even before filing) may already be inadequate in some instances, and almost certainly will become inadequate tomorrow. Intuitively it should be obvious that for "fixed expected loss amounts" the variance of loss ratios will increase as "severities" increase (and "frequencies" decrease). Thus in the normal situation in which selected maximum and minimum ratios produce "charges" in excess of "savings," net insurance charges will be inadequate during any period of increasing severities. Does anyone recall any evidence of decreasing severities in the liability lines in recent years?

Furthermore, there are areas of the commercial liability business in which Table M ratios derived from workmen's compensation experience have been and are now clearly inadequate. A good example in commercial auto liability is long haul trucking. We must produce adequate "Table M"s for all liability lines because retrospective rating (even "retro-type" dividend plans) are being used more and more.

Mr. Simon realizes all of this and suggests a number of constructive steps which ought to be started upon right away. Such a program might include:

(1) Finding an appropriate mathematical model for risk loss-ratio distributions. (Let's rid ourselves of this craven idolatry of raw numbers!)

(2) Determining sets of parameters so that:

  (a) values may be substituted in the model for separate lines or even sub-lines of insurance, and

  (b) values may be updated frequently without recourse to the arduous labors apparent in the current effort.

(3) When necessary, using convolutions from loss distributions of a single claim developed either analytically, or by approximation or Monte Carlo techniques.

(4) Allowing for the effects of anti-selection, if such anti-selection exists.

Mathematical

Recently I came upon a report of the California Inspection Rating Bureau dated January 31, 1963 entitled "California Experience Rating Statistics – Series II – By Interval of Subject Premium Loss Ratio." With only minor smoothing and ignoring the breadth of the premium intervals, I obtained an excellent fit for loss-ratio distributions by using a Gamma-function (Pearson III); this is the same distribution familiar to us from the recent papers on the negative binomial and referred to in Mr. Simon's current paper. All Chi-square tests were met for subject premium intervals from $5,000 and up. Below $5,000 a problem is created by the substantial frequency of risks with *no losses*. Even so, I developed a Gamma-function parameter for all premium intervals down to and including the less-than-$500 risks.

The interesting point is that I found an empirically-developed relationship among the various Gamma-function parameters of the form:

$$\log (p+1) = a \log P - b$$

where p = the Gamma-function parameter (used in Pearson's tables)

P = premium size

and a and b are constants obtained by "least squares".

I hope to expound this point more fully in a future paper, but obviously my ideas have not crystallized sufficiently at this stage. Perhaps someone else may make use of these findings in the meantime.

Mathematical Note on Appendix C

Sketches *1* and *2* are incompatible since

$F(r_0) = Pr\ (r \leq r_0)$, therefore

$F(0) = f(0)$. This error also appears in (C6), which does *not* follow from (C5).

Thus (C7) becomes $F(r) \geq f(0)$ for $(0 \leq r \leq \omega)$ and (C10) becomes $G(0) = f(0) - 1$.

Again our gratitude must be expressed to Mr. Simon for accomplishing this awsesome chore.