EQUIMODAL FREQUENCY DISTRIBUTIONS

By

Edwin D. Mouzon, Jr.

The object of this paper is the determination of a set of frequency curves, each of which will give a better fit to the modal neighborhood of the data to which it is applied than is often found in the existing methods. Interest in this subject was aroused in the following way. First it was discovered that a great number of distributions of data derived from a study of the financial ratios of public utility companies conformed to the same general type of curve. Second, it developed that the type of curve designated by the Pearsonian criterion quite often yielded a very poor fit to the data. The mode determined by the theoretical curve was obviously unsuited to the actual data. Furthermore, in some cases, on the left extremity of the distribution, the rise of the curve to the mode was too steep for a good fit. The accompanying chart (p. 140) presents a particular instance of these conditions, together with the curve fitted by the method developed in this paper.

The curves which were used in this study of financial ratios were those developed by Pearson and Elderton from a consideration of the various cases which arose in the solution of the differential equation

$$\frac{dy}{dx} = \frac{y(x-a)}{F(x)}$$

where $F(x)$ was assumed to be expansible in ascending powers of x. The other assumptions made were that $F(x) = b_0 + b_1 x + b_2 x^2$, and that the constants a, b_0, b_1, and b_2 were determined by equating the moments of the raw data to the moments of the theoretical distribution. Here we will modify these assumptions, and under the new conditions determine the principal types of curves which arise when the polynomial in the denominator is of the third or lower degree.

The new assumption is that the value of the constant, a, the mode, is determined first from the observed data, and equated to the value of the mode in the theoretical distribution. This method of procedure is particularly adapted to economic data, as it assures a good