The Canadian Merit Rating Plan for Individual Automobile Risks, by HERBERT E. WITTICK.

The paper gives an outline of the Canadian merit rating plan for individual automobile risks.

The practice of merit rating individual automobile risks is now in its ninth year of successful operation in Canada. It has been universally applied and uniformly coded so we have excellent statistics. When the program was started in 1953 it was applied only to Third Party Liability on Class 1 private passenger risks. Since then it has been gradually extended and now applies to all classes of private passenger and commercial automobiles. There are four merit rating classes. The basic of B rate is for a new risk or a risk which has had a loss within the past twelve months. There are then discounts of 35% for an A risk, that is with three or more years claim free licensed operation, 20% for X risks with two years claim free operation and 10% for Y risks with one year claim free operation.

In the article statistics are given showing frequency of loss for the various classes of private passenger and commercial risks. On Class 1, that is private passenger risks with no male operator under age 25, the relative frequencies are as follows:

	Third Party Liability	*Collision*
B risks	100%	100%
Y risks	84%	76%
X risks	74%	67%
A risks	56%	59%

Actual claim frequencies on a Canada-wide basis are not exactly those now being used for rating but the matter is being studied and no doubt a change will be made in the not too distant future. The relative frequency of claims on commercial risks and on other classes of private passenger risks varies somewhat from those of Class 1. However the general pattern is the same.

L. H. LONGLEY-COOK

Accidents to Young Motor Cyclists—A Statistical Investigation by CHRISTOPHER SCOTT and STUART JACKSON.

In the United Kingdom the minimum age at which licences may be obtained to ride motor cycles is 16 years and a recommendation of the Report on the Minimum Age for Motor Cyclists issued by the Committee on Road Safety of the Ministry of Transport and Civil Aviation was to the effect that "an attempt should be made to obtain further data by undertaking special surveys of age distribution and riding experience".

Insurers have long had a practice of charging an additional premium for novice drivers and the terms for insuring young motor cyclists are considerably more stringent than for older drivers, but appropriate statistical information on the real underlying situation has been lacking, partly because of the inherent difficulties of the compilation of suitable data and partly because insurance company experience is not suitable as it relates to the experience under insurance policies which will differ from the pure underlying risk situation.

This investigation is of considerable interest to insurers because of the light it throws upon the risk variation in a critical area, and although it was found possible to control only a limited number of the known variables and there were some significant gaps in the data some useful results were obtained.

The basic information on which the investigation was made consisted of (a) records relating to all motor cycle owner riders under the age of 21 years involved in a personal injury accident in a specified period of three months in 1958 (the difficulties of compiling reliable records of this type are well brought out in the report) and (b) a sample of about 10,000 motor cycle owners selected at random throughout the country. The ultimate proportion of defective cases under (a) was 6% and the ultimate response rate under (b) 5%.

The main findings were derived from an analysis of accident rates for owner rider under age 21 per head and per mile, by age of rider and by size of vehicle and their relation to the rider's experience; and the extent to which riders of one type of motor cycle have had experience with another type. Various subsidiary tabulations were developed and some miscellaneous data covering motor cycle owners of all ages.

The conclusions of the report, which are set out below, indicate the extent of the various cross classifications made and bring out clearly the feature that driving experience is the most significant factor in the level of accident rates in this particular area.

1. Motor cyclists of age 16 appear to have appreciably more accidents both per head and per mile than those aged 17, but when account is taken of the differing riding experience of the two groups and the different sizes of motor cycle they tend to ride, this gap vanishes.
2. The same conclusion holds as we go up the age-range from 17 to 20. The older the rider the lower the accident rate, but in every case the difference can be accounted for entirely in terms of riding experience and size of machine. Thus there is no evidence that age *as such* has any effect.
3. Although there is no evidence that age as such has an effect, the survey does not *prove* that age as such has *no* effect.
4. Motor cyclists with less than 6 months' experience have about twice as many accidents both per head and per mile as those with over 6 months' experience. After 6 months there is no appreciable sign of a continuing fall in the accident rate. These conclusions remain true if account is taken of the differing age of the riders and the differing sizes of the machines they ride.
5. The more powerful the machine the higher the accident rate. This trend is extremely marked if the accident rate is computed per head (i.e. per rider): on this basis light motor cycles have over 5 times the accident rate of mopeds, and the largest motor cycles have twice the rate of the light motor cycles. If the rates are worked out *per mile* the trend is still found but it is much less marked.
6. If accidents involving only slight injury are excluded, the above conclusions are virtually unaffected, except that the advantage in favour of mopeds becomes even more marked. It is already known from accident statistics that for the heavier machines a higher proportion of accidents are serious or fatal, and this tendency was observable in the results of the present survey.

7. With slight accidents excluded, data are also available for comparing the accident rates of motor scooters with other motor cycles of the same cylinder capacity. There is no evidence of any difference in the accident rates.
8. Few riders change from one category of two-wheeled machine to another. Among riders under 21 the commonest change is from moped to motor cycle, but this accounts for only 10 per cent of those riding motor cycles. Very few motor cyclists gained their first experience on a motor scooter.
9. All findings involving *mileage* are subject to the motor cycle owner's accuracy in reporting his mileage over the "last four weeks". Independent evidence suggests that moped owners considerably overstated their mileage but other motor cyclists were, as a group, reasonably accurate.

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Some significance tests for identifying deviating accident risks of large industrial enterprises, by J. VAN KLINKEN. *Actuariële Studiën*, January 1961.

In the paper "Ein theoretischer Beitrag zur statistischen Erfassung der Gesamtbetriebsunfallkosten" ("Mitteilungen der Vereinigung schweizerischer Versicherungsmathematiker", Band 58, Heft 1) the author, H. Bühlmann, gives a model for the representation of the net liabilities in the form of a product-distribution. This model forms the basis of the report in question, but, instead of only one type of accident, the author considers a few types in such a way that the distribution used is representative for each of these types. The method offers some advantages, especially if the frequency distribution of the benefits is not unimodal. The numbers N_i of accidents of type i are assumed to be Poisson-variables with parameters λ_i (not specified by Bühlmann); thus $n_i = N_i/w$ (w = number of man-years) has a normal distribution $N(\lambda_i, \lambda_i/w)$. For the second class of stochastic variables the costs of one observed accident of type i related to the wage level l, a transformated Γ-distribution with parameters α_i, β_i, γ_i is assumed (Bühlmann takes an ordinary Γ-distribution, defined in $[0, \infty]$). If there are k types of accidents the sum of the net liabilities related to the amount of wages is simply $\sum_{i=1}^{k} n_i x_i$, where $x_i = X_i/(N_i l)$ (X_i = sum of the accident compensations of type i), and its distribution can be derived by means of the assumptions mentioned.

The determination of the parameters λ_i, α_i, β_i, γ_i is done by usual estimation procedures. For λ_i the MLH-estimator is given; the α_i, β_i, γ_i ($\alpha_i \neq 0$) are estimated by the method of moments, whilst in the special case $\alpha = 0$, two other possibilities are indicated with the solution of the MLH-equations and the rather simple use of expectation and mode.

The main object of the paper is to find some methods for deciding whether accident-risk differences between a certain enterprise and the assumed risk level of the industrial group into which the enterprise is classified, are significant or not. This problem is solved by the use of significance tests. Starting from the described probability model the author proposes for the general case and for special assumptions several statistics which are appro-