A MODEL OF INDUSTRY GENERAL LIABILITY NET WRITTEN PREMIUMS

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Abstract

The paper presents an econometric model of industry general liability net written premiums. The model is fit using a multiple linear regression program. The reasons for using a log-differencing form are explored. Exposures, rate levels and pricing are the three most important influences on written premiums. Time series of values measuring these influences are compiled as input to the model. Several statistics are discussed that indicate an excellent fit to the data. Short term forecasts of the change in general liability written premiums are presented. The model's usefulness is in its ability to separate and quantify the impacts of exposure changes, rate level changes, and pricing cycle changes on general liability net written premiums.

I. PREFACE

Underwriting results for general liability during the last decade have been very volatile. Combined underwriting ratios in excess of 115% were common in the industry in 1974 and 1975. Three years later, in 1978, significant underwriting profits were typical. Many forces working together produce such swings in underwriting fortune, but the most important ingredient appears to be the pricing of the general liability insurance product. The question addressed by this paper is: What changes in underlying variables precipitate the irregular pattern of annual changes in general liability premiums?

II. THE MODEL

We chose what is basically a log-differencing form to model general liability premium changes. The equation for the model is:

$$\ln(CP) = b_1 \ln(CFS) + b_2 \ln(LR36/E \text{ lag } 2) + b_3 \ln(Price1 \text{ lag } 1) + b_4 \ln(Price2 \text{ lag } 3) + b_5 \text{ Dummy} + \text{error}.$$

In this equation, CP is the dependent variable, 1.0 plus the annual change in industry general liability net written premium. Alternatively, $\ln(CP)$ could be expressed as a difference, ln(current year written premium) minus ln(prior year written premium); hence, the term log-differencing.

The symbols b_1, b_2, b_3, b_4, and b_5 represent coefficients for the respective independent variables in the model. An error term is included here by convention; it serves as a reminder that the model does not describe the real world situation perfectly. The independent variables are discussed in the paper and defined in the appendix.

We chose to fit changes in the variables instead of the actual values of the variables. Fitting actual values of inflation sensitive variables can often lead to problems such as:

1. The colinearity of independent variables;
2. The model missing turning points; and,
3. The true magnitude of error being masked.

There are several important reasons for using the logarithmic form:

1. Coefficients are elasticities (discussed further in the appendix).
2. The fit is more robust.
3. We believe the independent variables should be applied multiplicatively.
4. An inflation-sensitive time series is deflated to a constant.

The log-differencing form of the equation used for modeling is shown above. Transformation from the logarithmic form shows the more direct equation with which we are working:

$$CP = CFS^{b_1} \cdot (LR36/E \text{ lag } 2)^{b_2} \cdot (Price1 \text{ lag } 1)^{b_3} \cdot (Price2 \text{ lag } 3)^{b_4} \cdot e^{b_5 \text{Dummy}} \cdot e^{\text{error}}.$$

The multiple regression modeling program, in a package produced by Data Resources, Incorporated (DRI) was used to compute the model coefficients. Exhibit I shows information defining the model and presenting important statistics concerning the model.

III. THOUGHTS UNDERLYING THE MODEL

This model explicitly considers three major influences on general liability premiums: changes in exposures, changes in rate level, and changes in underwriting pricing. Other influences are addressed in the last section of this paper.

Inflation has led to annual increases in payroll and sales exposure bases. ISO data indicates that these are the exposure bases for at least two-thirds of the general liability business. The entire effect of such exposure changes is generally converted into premium increases. Exposure also measures changes in more general economic conditions, such as periods of recession, which influence general liability premiums.

Rate revisions are the second major influence on premium changes. For a portion of the general liability business, rate revisions are relatively large because the exposure base used (area and frontage) is not inflation-sensitive. Rate revisions are necessary to adjust for the amount by which changes in the compounded levels of severity and frequency differ from the economic trend as measured by the exposure base.

Pricing is as important as the first two factors. There is a great deal of pricing flexibility available in the general liability line. Through the optional use of experience rating, schedule rating, loss rating, and "a" rating, the underwriter has a great deal of latitude in what he may charge for a particular liability exposure. Because of the relative inflexibility of pricing for workers' compensation and the often small volume of commercial auto insurance, the general liability line is used to compete in price for casualty accounts. This has been very apparent in the 1980 and 1981 commercial lines marketplace.

IV. REQUIREMENTS OF INDEPENDENT VARIABLES

In order to model the annual change in general liability net written premium, we wish to include at least one variable for each of the major influences described above. Values for each variable should be available for a significant number of years (say, 20) on a consistent basis, if possible. Data should be from recognized authoritative sources, such as the U.S. Department of Commerce or A. M. Best, if possible.

The correlation between independent variables should be low. That is to say, colinearity of independent variables should be minimized.

V. THE VARIABLES

The dependent variable we wish to model is 1.0 plus the annual change in industry general liability net written premium (excluding malpractice) and is called *CP*.

We expected to utilize at least three independent variables in order to include the influences of exposure, rate revisions, and underwriting pricing in the model. It was difficult to find a combination of independent variables to achieve a good fit in the model. We tried many variables, often specified in several different ways. Calculating the correlation coefficient between each proposed independent variable and the dependent variable helped to limit the search. The correlation coefficient between each pair of proposed independent variables pointed out potential problems with colinearity.

We finally arrived at four independent variables plus a "dummy" applied to two years. We chose annual change in final sales in the United States, *CFS*, for the exposure variable. The variable is input in the form, final sales in the year being modeled divided by the final sales in the previous year (*FS* divided by *FS* lag 1). The final sales variable is based on Department of Commerce statistics, is available for many years, is fairly stable and predictable, and is forecast by DRI.

The rate revision variable was the most difficult to specify. There is no long-term rate level index available as in workers' compensation. Rates are made separately for each of several sublines within general liability. Virtually all sources of data include malpractice through 1974. The variable we decided upon is the general liability Schedule P loss plus adjustment expense ratio as of 36 months divided by a permissible loss ratio. The variable is lagged two years since rates are made prospectively. There were significant obstacles in the way of compiling a reasonably long-term history of this variable. *LR36/E* is further described in the appendix.

To define a pricing variable or variables, we began with the premise that competition dictates pricing decisions. Corporate managements define underwriting or premium writing goals that are interpreted and pursued by field personnel. We see these decisions and goals as the main cause of the "underwriting pricing cycles" in general liability. Financial strength and recent underwriting results seem to be prime motivators in establishing pricing decisions and premium goals. We, therefore, arrived at two independent variables to include the effect of pricing in the model.

The first pricing variable, *Price*1, reflects financial strength. The basis of the variable is the premium-to-surplus ratio. The form of the variable entering the model is 1.0 plus the premium-to-surplus ratio minus a goal (or benchmark) premium-to-surplus ratio. The idea is to quantify how the industry views its financial strength. If this variable is less than 1.0, industry management will envisage financial strength and will be willing to compete vigorously for business. If the value is greater than 1.0, industry management will be concerned that their financial strength has eroded, price competition will subside, and there will be an increase in prices and premiums.

The establishment of the goal (or benchmark) premium-to-surplus ratio to be used in calculation of *Price*1 is somewhat problematic. The method by which the "goal" ratio is established is described in detail in the appendix. The variable enters the model lagged one year. This results from the time lag between the perception of a change in financial strength and the implementation of effective marketing programs.

The second pricing variable, *Price*2, deals with the effects of pricing on recent underwriting results. Many forms of variables were tried before arriving at what is essentially a modified time series variable. Premium changes in the second, third, and fourth prior years are significantly correlated with the premium change in the current year. The second prior year change is indirectly included in the ratemaking variable. Therefore, we concentrate on the third and fourth prior years. We adjust the third and fourth prior year premium changes by dividing by the change in the Consumer Price Index during the same two years. The variable is designed to measure the cycle in general liability underwriting pricing. Our logic is that when premium has been growing significantly faster than the CPI for three or four years, experience will improve and competition will intensify. On the other hand, when the ratio is low due to a soft general liability market, this cannot continue indefinitely. Deteriorating underwriting results will lead to a tightening of the general liability market and premium increases. This variable is more fully defined in the appendix.

The last independent variable entering the model is "Dummy," which equals 1.0 in 1971 and 1972 and zero for all other years. There were two disrupting influences which affected general liability premium changes in 1971 and 1972. First, federal price controls were a major influence which severely limited the magnitude of rate increases during these years. Second, the rate of premium growth for commercial multi-peril was greater in 1971 and 1972 than in any other years. This drained an abnormal amount of premium out of the general liability line in the same two years. Therefore, "Dummy" makes a special adjustment to the model in the 1971 and 1972 years.

It was determined that a constant did not improve the model. The major effect of inserting a constant was to replace other variables. Especially vulnerable to being excluded, based on its t-statistic, was the exposure variable, *CFS*. Since we believe it is more valuable to include the exposure variable without dilution by the constant, we eliminated the constant from the model.

Exhibit II shows historical values of the independent and dependent variables entering the model.

VI. THE MEANING OF THE STATISTICS

The statistics shown on Exhibit IA provide important information concerning the significance of the variables and the quality of the model.

The block of data at the top of Exhibit IA provides information regarding the five independent variables. The coefficients in Column 2 are calculated by multiple regression. They are the coefficients which result in fitted values which are closest to the actual values of the dependent variable. The sign of the coefficient for each variable agrees with our *a priori* expectations. An increase in final sales implies an increase in premium. A loss ratio larger than the permissible loss ratio in the rate revision variable implies an increase in premium. A premium-to-surplus ratio larger than the goal in the *Price*1 variable implies an increase in premium. Premium increases exceeding increases in the prior years' CPI by more than the average amount in the *Price*2 variable imply a premium decrease. Dummy equal to 1.0 in 1971 and 1972 has a negative coefficient, indicating a limiting of premium increases in those years.

The standard error of the coefficient of an independent variable is the estimated standard deviation of the coefficient. This statistic is used to test the significance of the coefficient of the independent variable. The "true" value of the coefficient is within two standard errors of the calculated coefficient 95% of the time.

This can be restated in terms of the t-statistic, which equals the coefficient divided by the standard error. If the t-statistic is greater than 2.0, the coefficient, and thus the variable, is said to be significant for the regression. The t-statistics show that all independent variables in this model are significant.

The F-statistic is the ratio of the explained variation to the unexplained variation of the dependent variable. Our F-statistic should be compared to a critical value for an F with 4 and 15 degrees of freedom. For alpha equal to .05, the critical value is 3.06. Since our F-statistic is greater than 3.06, the regression is significant.

The R^2 statistic is the common measure of the proportion of variance of the dependent variable accounted for by the relationship of the dependent variable to the independent variables. Regarding this model, it may be said that the model explains 90% of the annual change in written premium.

The R-Bar Squared statistic is the R^2 statistic adjusted for degrees of freedom. It may be thought of as R^2 refined for further accuracy. This statistic is defined in more detail in the appendix.

The Durbin-Watson statistic provides the standard test for autocorrelation. Autocorrelation occurs when the error between the fitted and actual value is not independent from one observation to the next. A Durbin-Watson statistic between 1.5 and 2.5 indicates that there is not serious autocorrelation. A Durbin-Watson outside this range indicates the probability of autocorrelation. The model described here has no significant autocorrelation indicated. This statistic is discussed in greater detail in the appendix.

The standard error of the regression measures how close the fitted values have been to the actual values for the history being modeled. This statistic is calculated so that, for 67% of the historical observations, the fitted value is within ± 1 standard error of the actual value. The fitted value is within ± 2 standard errors 95% of the time.

Exhibit IB shows the actual and fitted values of $\ln(CP)$. Exhibit IC shows a graph of these values.

VII. FORECASTS FROM THE MODEL

Given accurate forecasts of the independent variables, we believe this model will provide good indications of future annual changes in general liability written premiums. The model was originally fit with 20 data points (1960–1979). Although general liability written premiums had not shown an annual decrease in at least 25 years, the model correctly forecasted a negative change in premium in 1980. We believe that forecasts will improve when the model is refit with each new data point since "pure" general liability experience will be added.

Based on data through 1980, as shown on Exhibit II, the model forecasts that the change in industry general liability net written premium, excluding malpractice, for 1981 is −1.0%. A. M. Best Company, Inc., published estimates in January 1982 placing the change in premium at −2.8%. Thus, the model has again correctly indicated a decrease, apparently with accuracy within one standard error (3.5%). The authors find this result quite satisfactory.

Forecasts of 1982 general liability written premium have two potential sources of error. These are the error of the model and the error in forecasting the independent variables. We feel fairly comfortable with the DRI projections of final sales and the Consumer Price Index. However, it is necessary for us to select a premium-to-surplus ratio for 1981 and a general liability accident year loss ratio as of 36 months for 1980. We selected an increasing loss ratio and a slight decrease in the premium-to-surplus ratio as shown on Exhibit II. These inputs generate a forecast of a 9.0% increase in general liability written premiums for 1982.

The model leads us to believe that premiums will increase by more than 9.0% in 1983.

VIII. FINAL THOUGHTS

We recognize that this model has not explicitly included the effects of several other factors influencing general liability premiums. Among these factors are high deductible and captive modes of handling general liability exposures, movement to package policies, and the ebb and flow of retro adjustments. These factors are having some impact on premium changes. In general, we view changes based on these factors as being gradual. We believe that these gradual effects on premium are partially accounted for by the fitted values of the coefficients. In particular, we believe the coefficient of the exposure variable, *CFS*, would have been slightly larger if captives and high deductibles had not reduced premium changes in recent years.

If this model is reasonably accurate in describing the interrelationship of general liability pricing and the forces that drive it, the wide swings in underwriting results and market conditions are likely to continue for the near future. A cycle peak loss ratio is likely in 1982. This industry seems to have learned little from the lessons of the mid-1970's. Perhaps this model provides a first step for better understanding the "underwriting pricing cycle" for general liability. The challenge to the industry is to understand and control the factors causing the cycle so as to dampen its amplitude in the future.

APPENDIX

Definitions of Variables

CP — *CP* is the dependent variable. It is 1.0 plus the change in industry general liability calendar year net written premium. *CP* excludes medical malpractice for calendar years 1976 to 1980. It contains data for stock and mutual companies as compiled in *Best's Aggregates and Averages*.

CFS — *CFS* is the annual change in final sales. The values of the final sales variable were obtained from DRI and are in billions of dollars. Final sales data is compiled by the U.S. Department of Commerce, Bureau of Economic Analysis. It is a measure of the total final sales of the United States, where final means the last sale of a new product. For example, car sales to a consumer are included, but if General Motors buys a part for the starter of the car from the Bendix Corporation, this is excluded.

LR36/E — *LR36/E* is a proxy ratemaking variable. Ideally it would be the accident year loss and loss adjustment expense ratio as of 36 months, for GL (BI and PD), excluding malpractice, for the entire industry, divided by the permissible loss ratio. Permissible is assumed to be 62% (57% ISO permissible + 5% profit and contingency loading). This was our goal, but we ended up using approximations of these loss ratios in many instances.

We obtained our loss ratio data by compiling information from *Best's Reproductions of Annual Statements* for 26 major general liability writers. We compiled losses and premiums from annual statements for 12 years (1969–1980), obtaining somewhat more than 60% of the industry premium volume. In certain periods, the data we wanted was not available, so we were forced to use substitutes. The following is a list of situations where substitute data was used:

1. All data for 1974 and prior accident years includes medical malpractice.
2. Data from 1975 and prior annual statements excludes Commercial Union Insurance Company.
3. All data for accident year 1970 and prior excludes property damage.
4. Policy year data was used prior to 1969, as Schedule P was on a policy year basis.
5. For policy years 1962–1966, evaluations of the loss ratios later than 36 months were used, as the 36-month evaluations were not available to us.
6. For years prior to 1962, we had neither policy year nor accident year data available, so we assumed that the change in the accident year loss ratio was the same as the change in the calendar year loss ratio.

The reliability of this variable is reduced by the large number of adjustments that we found necessary. However, we believe it is better than using calendar year loss ratios throughout the period. This opinion is partially based on a recognition of the reserve strengthening which has occurred in the industry since 1973.

The variable is lagged two periods in the model for two reasons. First, the difference between the evaluation date of data entering ratemaking and the average effective date for policies utilizing revised rates based on the data is approximately two years. Second, the data entering ratemaking calculations is mainly from accident years lagged 2, 3, and 4 years from the effective year of the rates. However, premiums from calendar years lagged 3 to 4 years are included in the pricing cycle variable, *Price*2. Therefore, this variable concentrates on the accident year loss ratio lagged two years.

There is some overlap in function betweeen *LR*36/*E* and *Price*2.

*Price*1 — *Price*1 is a modified premium-to-surplus ratio which attempts to measure the premium-to-surplus ratio against a benchmark or goal. The premium-to-surplus ratio (*PSR*) was obtained from *Best's Aggregates and Averages*. There are two problems with using the *PSR* as given in Best's.

First, the series double counts surplus for members of an insurance group. However, the series is also available for eight years (1973–1980) on a consolidated basis (excluding the double counting). Over this time period, the ratio of the two *PSR's* (excluding to including double counting) is very stable at 1.265. Therefore, *PSR* as taken from *Best's Aggregates and Averages* was modified by a factor of 1.265 in our analysis.

A second problem concerning the premium-to-surplus ratio was encountered. We feel that the *PSR* that the industry used as a goal or benchmark changed during the period from 1961 to 1980. This was caused by:

1. A growing percentage of total business being casualty, which may be written at a higher *PSR* than property business.
2. Higher investment income caused by:
   a. A higher level of reserves in casualty lines.
   b. Higher interest rates.

To attempt to measure this change over time, we fit a least squares line between the premium-to-surplus ratio modified by a factor of 1.265 (*PSRM*) and time for the period 1945–1979. The fitted line is called "*PSRM* goal." The difference between PSRM and the fitted line (*PSRM* goal) is a measure of how strong the industry perceived itself to be.

*Price*1 is obtained by adding 1.0 to the residuals (actual minus fitted values) of the above regression. The 1.0 is added to make the variable appropriate to enter the model in log-differencing form.

The authors wish to acknowledge the help of James F. Golz who proposed the technique of fitting a least squares line to *PSRM* to remove the time trend.

Price2 — *Price2* is the ratio of the two-year change in general liability written premium to the two-year change in the consumer price index divided by the mean of this ratio over time.

$$Price2 = [(CP_t \cdot CP_{t-1})/(CC_t \cdot CC_{t-1})]/\text{Mean}$$

CP_t is the calendar year change in general liability written premium in year t.

CC_t is the one-year change in the CPI in year t.

Mean is the 23-year mean of $(CP_t \cdot CP_{t-1})/(CC_t \cdot CC_{t-1})$.

We calculated correlation coefficients between CP_t and CP_{t-x}/CC_{t-x} where x varied from 1 to 5. Significant correlations were found at $x = 2$, 3, and 4 years. Since the change in premium lagged two years was indirectly accounted for in our ratemaking variable, we used the lag 3 and lag 4 years relationship in this variable. The variable enters our regression lagged three years. The numerator of the variable entering the regression is the product of the ratios CP_t/CC_t lag 3 and CP_t/CC_t lag 4.

Dummy — Dummy is a variable equal to 1.0 in years 1971 and 1972 and zero in all other years. It is entered into the model to reflect circumstances unique to those two years. First, federal price controls severely limited rate increases filed and approved in 1971 and 1972. Second, the growth in CMP premiums was approximately 25% in each of those two years, but averaged approximately 16% in years prior and subsequent. Thus, more general liability premium than usual was lost to CMP during 1971 and 1972.

Elasticities

One advantage of using the log-differencing form is that the regression coefficients of the variables are the elasticities. An elasticity is the amount by which the dependent variable is changed by a 1% change in an independent variable. Thus, the coefficient of final sales (0.688) means that a 1% change in final sales causes a 0.688% change in written premium. This is a reasonable result since at least two-thirds of the general liability exposures are inflation sensitive.

R-Bar Squared

R-Bar Squared is a statistic used by DRI to measure the fit of a model. It is basically R^2 adjusted for degrees of freedom. The formula given by Johnston in *Econometric Methods* is:

$$R\text{-Bar Squared} = \frac{1 - K}{N - K} + \frac{R^2(N - 1)}{N - K}$$

where:

R^2 is the portion of the total sum of squares explained by the regression,
K is the number of parameters fit, and
N is the number of observations.

The following equivalent form shows that R-Bar Squared is always less than R^2:

$$R\text{-Bar Squared} = R^2 - \frac{(K - 1)(1 - R^2)}{N - K}$$

While R^2 always increases as more variables are added to the model, R-Bar Squared may decrease if the added variable has little value.

Durbin-Watson Statistic

The Durbin-Watson statistic is the standard test for autocorrelation. It is given by the following formula:

$$D = \frac{\sum_{t=1}^{N} (\hat{E}_t - \hat{E}_{t-1})^2}{\sum_{t=1}^{N} \hat{E}_t^2}$$

where:

$\hat{E}_t$ is the difference between the actual value and the fitted value for observation t.

D is approximately equal to $2(1 - R_1)$ where R_1 is the first order autocorrelation coefficient. Thus, D ranges from 0 to 4. The acceptable range for D is from 1.5 to 2.5. If D is in this range, no significant autocorrelation exists. It is interesting to note that this means that R_1 is between $-.25$ and $.25$. Thus, an acceptable Durbin-Watson implies a small first order autocorrelation coefficient.

EXHIBIT IA

MODEL OF CHANGE IN INDUSTRY GENERAL LIABILITY NET WRITTEN PREMIUM MULTIPLE LINEAR REGRESSION

ANNUAL (1961 TO 1980) 20 OBSERVATIONS
DEPENDENT VARIABLE: LN(*CP*)

Independent Variable	Coefficient	Standard Error	t-Statistic
ln(*CFS*)	b_1 = .6884	.2368	2.907
ln(*LR*36/*E* lag 2)	b_2 = .4361	.1063	4.103
ln(*Price*1 lag 1)	b_3 = .0991	.0302	3.288
ln(*Price*2 lag 3)	b_4 = −.2586	.0783	−3.301
Dummy	b_5 = −.0866	.0270	−3.202

Regression Statistics

F-Statistic: 37.32
R Squared: .9087
R-Bar Squared: .8843
Durbin-Watson Statistic: 2.007
Standard Error of the Regression: .0348

EXHIBIT IB

LISTING OF ACTUAL AND FITTED VALUES OF THE REGRESSION

Dependent Variable: ln(*CP*)

Year	Actual	Fitted	Year	Actual	Fitted
1961	.061	.075	1971	.107	.115
1962	.035	.039	1972	.071	.063
1963	.030	−.003	1973	.056	.082
1964	.018	−.018	1974	.083	.139
1965	.023	.016	1975	.283	.272
1966	.059	.066	1976	.319	.297
1967	.096	.105	1977	.320	.273
1968	.097	.148	1978	.103	.161
1969	.158	.129	1979	.017	.000
1970	.222	.192	1980	−.025	−.049

EXHIBIT IC

GRAPH OF DEPENDENT VARIABLE

ln(CP)

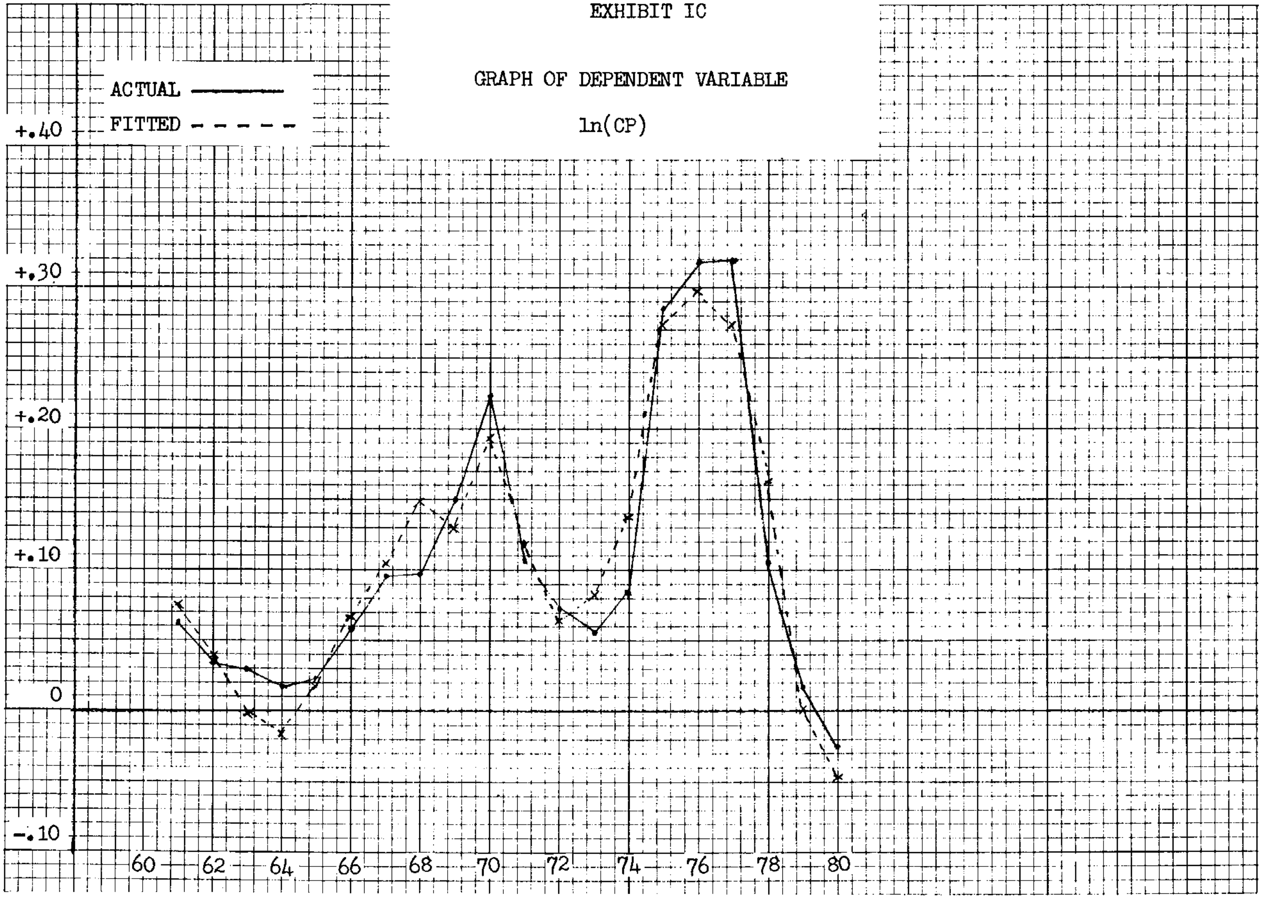

EXHIBIT II

Data Histories for Variables Used in Modeling Annual Change in Industry General Liability Net Written Premium

Calendar Year	Change in GL Net Written Premium +1.00 *CP*	Change in Final Sales +1.00 *CFS*	Accident Year Loss & LAE Ratio as of 36 Months *LR*36	*LR*36/*E*	Best's Premium/ Surplus × 1.265 *PSRM*	*PSRM* Goal	*PSRM* − *PSRM* Goal +1.00 *Price*1	Change in CPI +1.00 *CC*	$[(CP_t \times CP_{t-1})/(CC_t \times CC_{t-1})]$ /Mean *Price*2
1956	1.094	—	—	—	1.466	1.636	.830	1.015	—
1957	1.093	—	—	—	1.727	1.662	1.065	1.035	.992
1958	1.067	—	.727	1.173	1.519	1.688	.832	1.028	.955
1959	1.112	—	.702	1.132	1.532	1.713	.819	1.008	.998
1960	1.117	1.044	.690	1.113	1.588	1.739	.849	1.016	1.056
1961	1.062	1.037	.644	1.039	1.341	1.764	.577	1.011	1.007
1962	1.035	1.070	.612	.987	1.435	1.790	.645	1.012	.937
1963	1.030	1.057	.637	1.027	1.380	1.815	.565	1.012	.907
1964	1.018	1.070	.664	1.071	1.364	1.841	.523	1.013	.891
1965	1.023	1.078	.683	1.102	1.483	1.866	.616	1.017	.881
1966	1.060	1.089	.735	1.185	1.796	1.892	.904	1.029	.903
1967	1.101	1.064	.740	1.194	1.723	1.917	.805	1.028	.906
1968	1.102	1.097	.821	1.324	1.723	1.943	.780	1.042	.986
1969	1.172	1.079	.821	1.324	2.211	1.969	1.243	1.054	1.025
1970	1.249	1.059	.769	1.240	2.245	1.994	1.251	1.059	1.142
1971	1.113	1.081	.741	1.195	1.986	2.020	.966	1.043	1.096
1972	1.073	1.099	.803	1.295	1.763	2.045	.718	1.033	.966
1973	1.057	1.112	.862	1.390	1.984	2.071	.913	1.062	.901
1974	1.087	1.086	.926	1.494	2.734	2.096	1.637	1.110	.849
1975	1.327	1.096	.838	1.352	2.498	2.122	1.376	1.091	1.038
1976	1.376	1.096	.718	1.158	2.457	2.147	1.309	1.058	1.378
1977	1.377	1.112	.609	.982	2.472	2.173	1.299	1.065	1.466
1978	1.108	1.125	.614	.990	2.315	2.199	1.116	1.077	1.160
1979	1.017	1.123	.639*	1.031*	2.123	2.224	.899	1.113	.819
1980	.975	1.098	.690*	1.113*	1.833	2.250	.583	1.135	.683
1981	.990f	1.104f			1.800f	2.276	.524f		
1982	1.090f	1.078f							

f = forecast
* = Estimated 36-month values

E = adjusted expected loss ratio
$E = .57 + .05 = .62$

Mean = mean of the series
$(CP_t \cdot CP_{t-1})/(CC_t \cdot CC_{t-1}) = 1.148$