Projections of Surplus for Underwriting Strategy

William R. Gillam

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Abstract

The paper presents a specific modeling approach to the projection of surplus.

The model uses assumptions on growth, underwriting results, underwriting cash flow, interest and tax to simulate the operating results of an insurance company. Investible assets are incremented by cash flow and surplus by after tax income on an iterative basis for the years of the projection.

Results of several possible underwriting strategies of a multi-line company are compared according to several financial tests.

The vehicle for this model is an APL program, whose specifications are part of the paper.

It is hoped that the value of a model will be evidenced by this exposition. In addition, some of the components of this particular model may be useful in themselves, and conclusions I have made at least thought provoking.

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I. Need for a Projection of Insurance Company Surplus

Of course, anyone connected with the management of an insurance company would like to be able to predict income or surplus for the years of the foreseeable future. This is more than just wishing for a crystal ball; good estimates of future income may be necessary for several purposes. Among them are the following:

1. Part of a valuation
2. Planning for management
3. Reports to stockholders or a parent company
4. An aid to underwriting strategy

This paper is primarily about the last, although the methods presented have been used for item 3. and could easily be used for 1. or 2.. I have included an example of the prediction of surplus for a fictitious multiline company, and some conclusions about underwriting strategies the company may adopt. The input data for this company is hypothetical, but the cash flow patterns resemble those of a casually oriented reinsurer, an example which should best exhibit the distortions inherent in statutory accounting.

Specifications of the program are listed in III and hard copies of programs and outputs appear in Exhibits C and D.

II. Need for a Computer Model

I probably need not defend the use of modeling to the actuarial community. Power and flexibility to handle a variety of situations are a primary consideration. Ease of use and modification should also characterize a good model. APL, which I have used for this particular model, allows satisfaction of both criteria. This model could also probably be executed on a spread sheet package such as LOTUS 1-2-3, although the reader will have to write his/her own.

Another advantage of a model which is not so obvious is that it forces the creator to be more aware of each of his assumptions, its effect, or whether it is even necessary. In my model, future growth, underwriting results, interest rates, and transaction cash flow patterns will be assumed. The computer does the accounting. The computer is no better at predicting the future than the user, but for testing the effect of varying some selection of input parameters while holding others fixed, it excels.

III Specifications of the Model

For the purposes of this paper, I have studied a hypothetical company with eight years of underwriting experience, 1977 to 1984. The growth rate of the company during those years was greater than one would be willing to project into the next 22 years. Underwriting results during the eight experience years are spotty, but show clear deterioration from 1980 to 1984, so resembling reality.

I have separated company business into two groups, Property and Casualty, distinguished by respective faster and slower loss payment patterns, premium volumes and underwriting results. I would probably want to use more groups to better model a particular company, but these should suffice for the tests I wish to make.

It should be noted that the calendar year results are taken to be the same as the accident year, or, put another way, reserving is perfect.

A. The entries in the output matrix are either input directly or computed per the specifications which follow. Some other input items are as follows:

1. The cash flow pattern of each of the groups was selected based on my experience in portfolio reinsurance and my study of some Annual Statements. These patterns appear on the output as percents of the total paid by calendar year, and are shown below.

	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th
Premium Collection	55	35	10									
Expense Payout	50	40	5	5								
Property Loss	25	35	20	10	5	5						
Casualty Loss	5	18	12	10	10	10	8	7	5	5	5	5

2. Surplus and investible assets for 1984, $100 and $300 thousand respectively. For the purposes of this paper "assets" will mean investible assets, unless otherwise noted.

3. Effective interest rates by year. I selected +10% by year, starting 1985. For a cyclical pattern, I selected a ten year cycle, which starting in 1984 is

   11, 10, 10, 8, 8, 8, 9, 10, 11, 12%

4. Tax rate of 46%, ignoring any surtax exemptions.

5. An arbitrary portion (20%) of investment income was designated tax free. This could be due to tax free bonds and/or the 85% dividends received deduction. In practice, it would be adjusted to better fit a company's results and investment portfolio strategy.

6. A provision for a tax loss carry forward of seven years and a paid tax recovery of three.

B. Items 1 thru 9 are calculated separately for each group as follows:

1. Premiums Written PW_i, year i	These are entered exactly for (presumably) historic years and as annual growth factors for years to be projected.
2. Accident Year Loss Ratio LR_i	These are input as a ratio to premium earned.

3. Expense Ratio

ER_i

These are ratios to premium written, as entered.

4. Premium Earned

$PE_i = \alpha PW_i + (1-\alpha) PW_{i-1}$

Where $\alpha = \dfrac{\sum_2^H PE_j - PW_{j-1}}{\sum_2^H PW_j - PW_{j-1}}$

H = number of historic years

These are entered for historic years and calculated for the years of the projection, based on an average premium earnings pattern.

5. Premium Collected

$PC_i = \sum_{j=1}^{5} CF_j \; PW_{1+i-j}$

CF_j = input collection factor

This is a sum of the respective percents of the present and four prior years' written premium collected.

6. Expense Incurred

$E_i = ER_i \cdot PW_i$

Extension of premium written by expense ratio.

7. Expense Paid

$EX_i = \sum_{j=1}^{5} EF_j \cdot E_{1+i-j}$

EF_i = input expense payment factor

A sum of respective portions of present and four prior years' incurred expenses.

8. Losses Incurred

$L_i = LR_i \cdot PE_i$

Extension of premium earned by loss ratio.

9. Losses Paid

$LP_i = \sum_{j=1}^{15} LF_j \cdot L_{1+i-j}$

LF_j = input loss payment factor

A sum of respective portions of present and 14 prior years' losses incurred.

Items 10 and 11 are calculated for all groups combined.

10. Underwriting Profit

$U_i = PE_i - (L_i + E_i)$

Premium earned less losses and expense incurred.

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11. Underwriting Cash Flow

$$UC_i = PC_i - (EX_i + LP_i)$$

Premium collected less loss and expense paid.

Items 12 thru 20 are calculated sequentially by year for total business, starting at a selected "last historic" year.

12. Investment Income

$$I_i = (A_{i-1} + 0.5\,UC_i) \times R_i$$

Where R_i is the annual effective rate

Extension of prior year's ending invested assets plus one half of underwriting cash flow by rate of interest.

13. Gross Operating Income

$$GI_i = U_i + I_i$$

Total underwriting profit and investment income.

14. Taxable Income

$$TI_i = U_i + \beta I_i$$

Underwriting profit plus taxable portion of investment income.

15. Effective Taxable Income

ATI_i

(see APL)

This is adjusted income on which tax is actually paid, after loss carry forward or prior paid tax recovery.

16. Tax Paid

$$TP_i = TR \times ATI_i$$

Per input tax rate on effective taxable income.

17. Dividends or other decrements to income.

D_i

As input

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18. Ending Investible Assets

$$A_i = A_{i-1} + UC_i + I_i - (TP_i + D_i)$$

Previous year ending assets plus U/W cash flow and investment income minus tax paid and dividends.

19. Ending Surplus

$$S_i = S_{i-1} + U_i + I_i - (TP_i + D_i)$$

Previous surplus plus U/W and investment profit minus tax and dividends paid.

20. Discounted Surplus

$$DS_i = S_i + \prod_{H+1}^{i} \frac{1}{1+R_j}$$

At a rate 1/10 greater than the rate of interest income, to reflect an arbitrary premium for risk.

21. GAAP Adjusted Surplus

$$S_i + 0.15 \sum_{1}^{i} PW_j - PE_j$$

Ending surplus from 19. plus 15% of an approximation for the unearned premium reserve, this being cumulative written less earned premium.

IV Comparison of Some Underwriting Scenarios

A. General characteristics of the projection.

These comments pertain to the information graphed in Exhibit A. Each scenario 1 through 6 is a combination of growth vs. no growth in premium volume and underwriting results which remain poor, improve, or follow a cyclical pattern.

1. Flat writing, retain high loss and expense ratios.

Probably a worst case result for underwriting would be continued writing at a combined ratio almost as high as the worst year, 1984, and not increase volume. The ultimate combined ratios are 106 and 115% for Property and Casualty respectively.

Surplus and assets both increase steadily and immediately, at a reasonable rate which is, however, less than the 11% target rate of discount.

The ratio of premiums written to prior surplus drops steadily to less than 1.1 in 1995, so a company in such a position could pay substantial dividends or expect a takeover by a capital hungry purchaser.

The leverage ratio (assets-surplus) ÷ surplus also drops steadily, again indicating unused capital. (Investible assets minus surplus is used as a somewhat imperfect measure of liabilities).

Statutory and GAAP surpus are parallel after a year or so.

2. Flat writing, decreasing loss ratio.

This may be an actual short-term goal of some insurance company management. The ultimate combined ratios I have projected are 102 and 108% for Property and Casualty respectively, which may be as good as we can hope for.

The increase in surplus is steady and immediate as for Scenario 1, but the rate of increase flirts with 11% for more than 10 years. After 1997, discounted surplus drops consistently as returns to equity become more and more disappointing.

The premiums written to surplus ratio drops precipitously as does the leverage ratio (Assets-Surplus) ÷ Surplus. This is very inefficient use of capital, and the same comments as for Scenario 1 apply.

3. Growth, retaining high loss and expense ratio.

What would happen if a company continues to chase cash flow by increasing volume at the expense of effecting any underwriting control?

Surplus and assets both eventually increase, but surplus does decrease for a year after the particularly poor 1984 underwriting year. It is not until 1990 that surplus increases at a rate greater than the target 11%.

The test ratio Written Premium ÷ Prior Surplus is high, especially in 1986, but remains less than three. This would not be the case for much higher growth rates than the selected +8% for Casualty and +6% for Property.

The leverage ratio (Assets-Surplus) ÷ Surplus remains fairly constant and as such seems within control, although this favorable appearance may be a distortion due to my approximation for liabilities.

Surplus increases at a rate greater than 11% after 1989, but GAAP surplus is already growing faster than +11% in 1987.

4. Steady growth, decreasing loss ratio.

This would be an ideal situation. Recovery from the exceptional 1984 year really only begins in 1986, but after this growth and vital signs all appear good. The leverage ratio steadily decreases and a payment of dividends would be in order.

Somehow, I feel we do not need to spend much time admiring this scenario.

5. Growth, with cyclical underwriting results.

Surplus and GAAP surplus increase unevenly, as might be expected.

Premiums to surplus is almost three in 1986, coming off the bad underwriting year 1984. Our leverage ratio is worst in 1987.

After this year, most vital signs are under control and surplus increases at a rate alternating above and below the target 11%.

In general, we observe a 2-3 year lag for financial results following underwriting results.

6. Growth, with cyclical underwriting results, which lag a cyclical pattern of interest rates by two years.

This may or may not resemble reality, and I have included it for curiosity's sake. My comments are nearly the same as those for Scenario 5 above, except results are worse due to lesser investment income. It is interesting that surplus discounted along rates which follow the fluctuations (plus the premium) remains significantly worse than discounted surplus in the case of a uniform 10% rate, seen in Scenario 5. This may be the result of continuing to write to a high combined ratio when interest rates are falling, just as in current industry results.

B. Some comparisons of the projections.

These comparisons are graphed in Exhibit B.

1. Flat premium writings with improving underwriting vs. growth at expense of continued high loss ratio, A2. vs. A3.

Writing to a lower loss and expense ratio at the expense of growth has some bad characteristics mentioned above, but the

effect on statutory surplus is quite desirable. In this case, the strategy produces higher surplus for 15 years than that for continued growth at a high combined ratio.

This comparison holds even for GAAP adjusted surplus, which recognizes equity in the unearned premium for commissions paid but not yet earned, so the regulatory strategem of curtailment of premium writings for too rapidly growing companies may make more sense than it seems, at least if underwriting results improve.

2. Flat premium writings, no improvement in underwriting vs. growth with no improvement in underwriting, A1. vs. A3.

Even when the curtailment of premium writings does not result in better underwriting, statutory surplus will be better in the case of no growth than in the case of growth for some eight years. The effect is not great, but it even occurs in GAAP surplus for five years.

The retention of a high leverage ratio in the growth case ultimately leads to greater income, but with a significant time delay if underwriting results are poor.

The effect on statutory surplus of no growth, even if underwriting does not improve, may still justify regulatory procedure.

3. Growth with poor loss and expense ratio vs. growth with cyclical underwriting results, A3. vs. A5.

Surplus may be expected to vary more if underwriting results are cyclical than if they are steady. So it is here, where the surplus under cyclical underwriting snakes around the surplus of the steady case.

It may be observed from the graph that the surplus from the cyclical underwriting case averages higher than that for the stable scenario. This is in spite of the fact that the premium weighted 20 year average loss and expense ratios for the cyclical case, 80.1 and 31.4%, are higher than those in the steady state, 80.0 and 31.1. I would be a little hesitant to recommend this as a strategy, but if positive cash flow can be maximized at time preceding high interest rates, the cycle may make economic sense.

V Conclusions

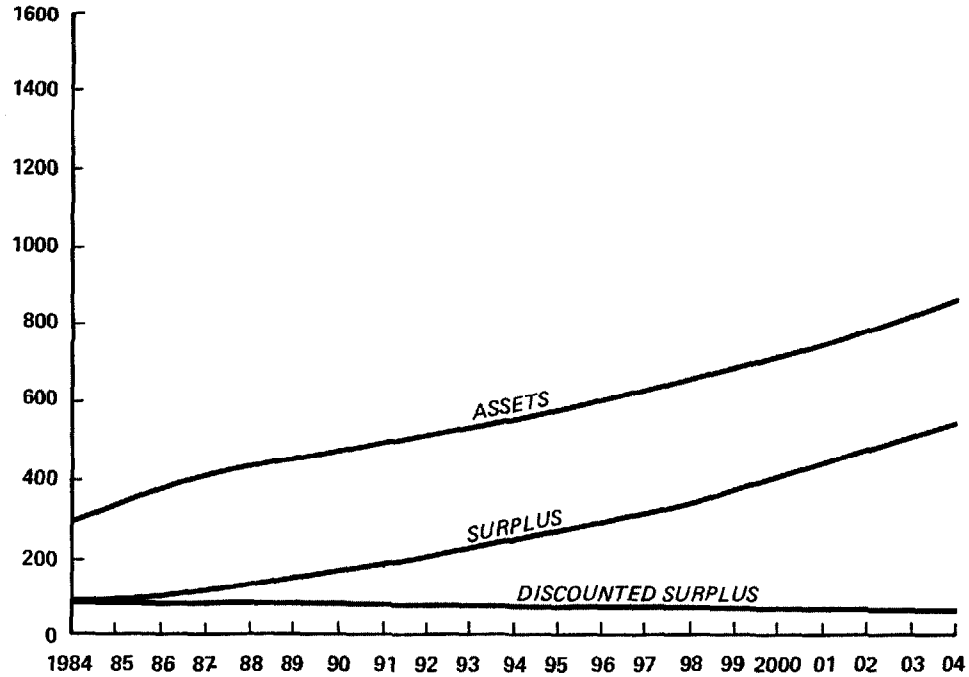
The following conclusions are based on a fairly simple computer model and a set of assumptions which may not be fully justified, so are open to debate. I hope: 1. the shortcomings of the model are minimized when comparing results of different ingoing strategies under the same assumptions, and; 2. a debate is actually opened, resulting in improved modeling techniques. It may be the case the conclusions of my research are no more than what is common knowledge of financial planners, but even at that, the viability of a model will have been demonstrated.

A. Conservative underwriting, even at the expense of growth, results in higher income than growth with continued poor underwriting. This is even true for GAAP adjusted surplus.

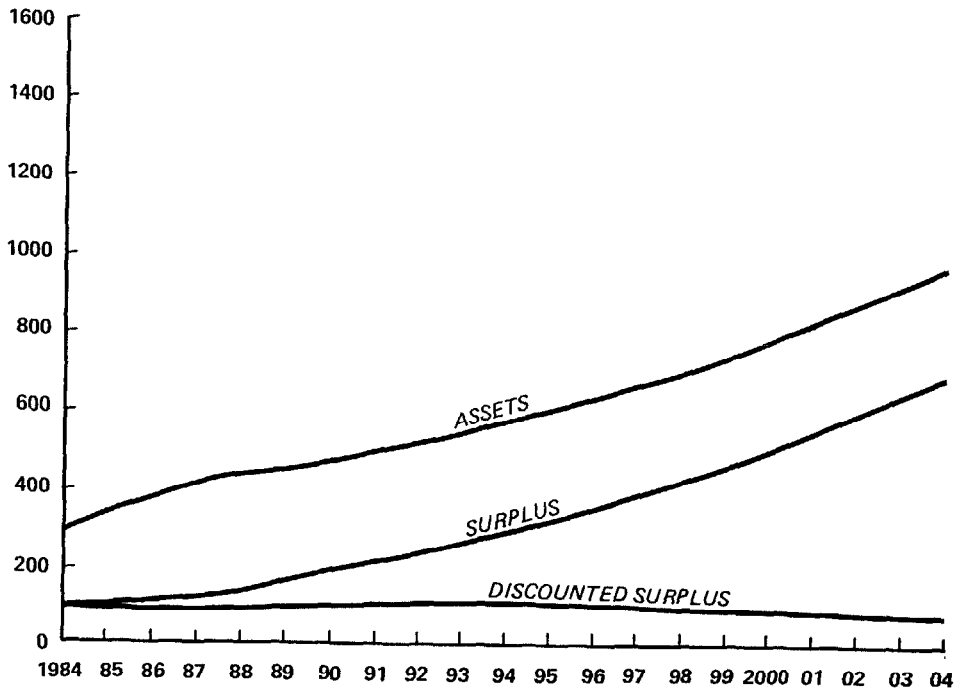
B. There is a need for other than a statutory approach for measurement of results. My simple proxy for a GAAP adjustment suggests even GAAP may hide the true picture. I believe discounting reserves and better monitoring of cash flow would be parts of such an approach, as well as a true GAAP adjustment.

C. A cyclical underwriting pattern may have desirable effect on ultimate income. This is especially true, of course, if cash flow can be timed to take full advantage of changes in interest rates. It is also known that the underwriting cycle may well have adverse effects on down years' financial results, which this model shows lag poor underwriting years by 1-3 years. Management may find reporting such results undesirable, even when there need be no cause for alarm.

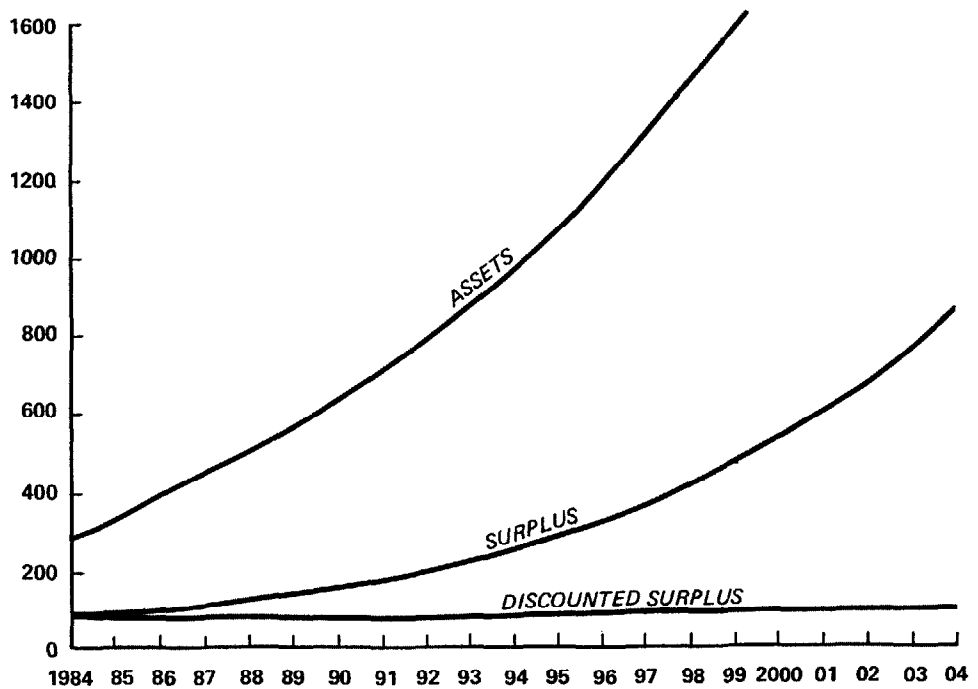
1. FLAT WRITINGS CONTINUED POOR LOSS RATIO



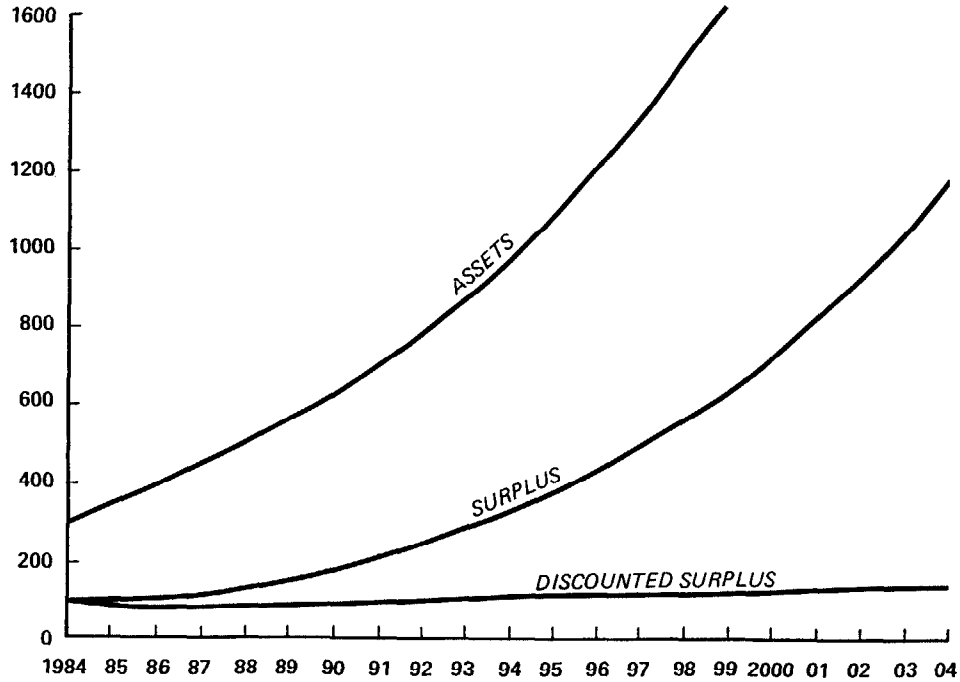
2. FLAT WRITINGS, IMPROVING LOSS RATIO



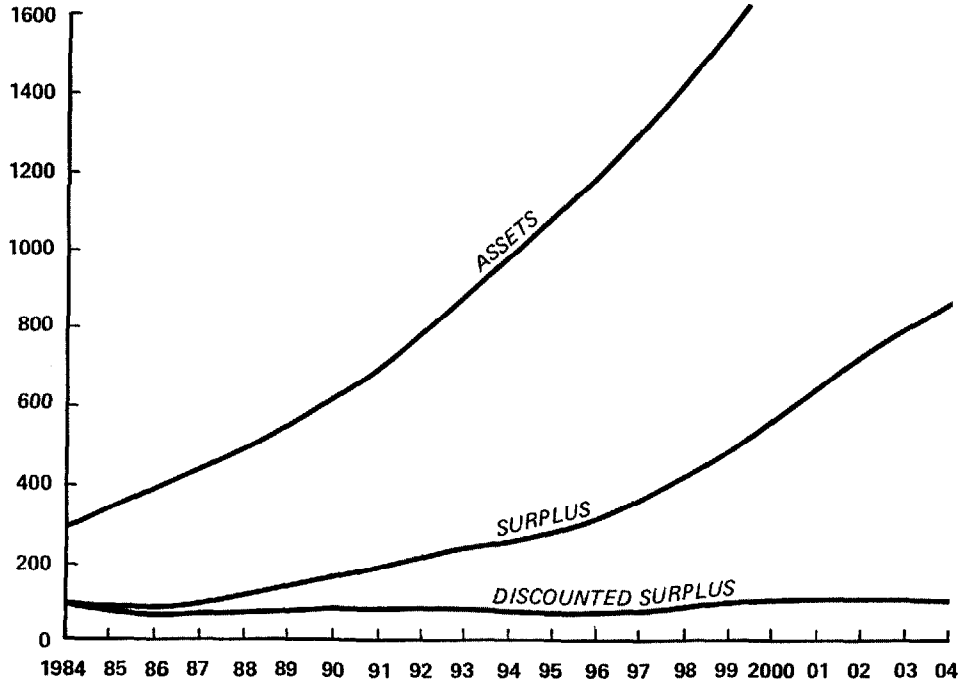
3. GROWTH, RETAIN HIGH LOSS RATIO



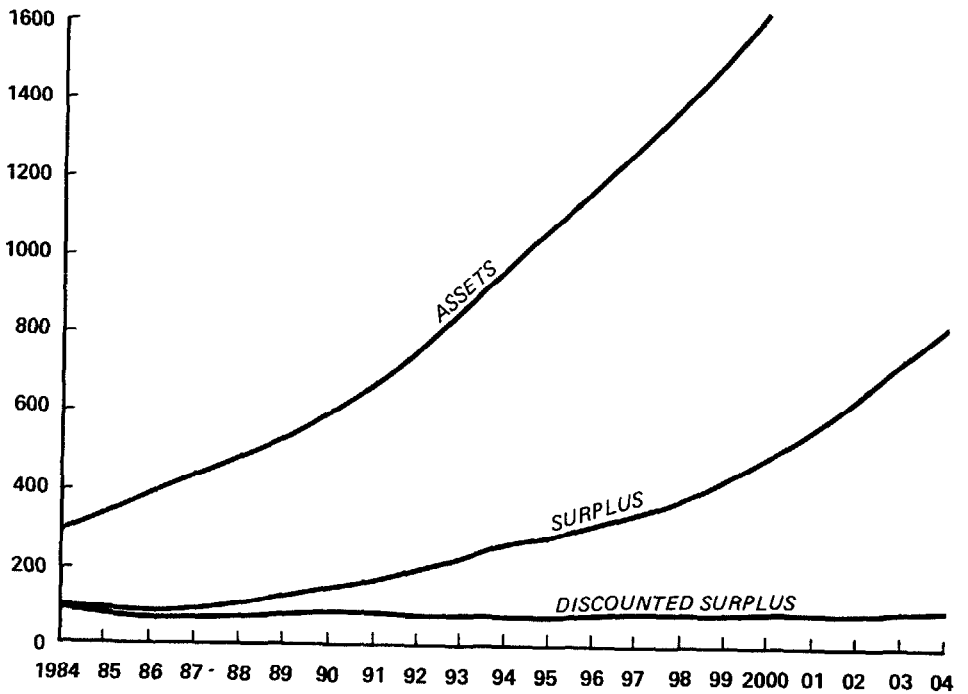
4. GROWTH, IMPROVING LOSS RATIO



5. CYCLICAL UNDERWRITING RESULTS

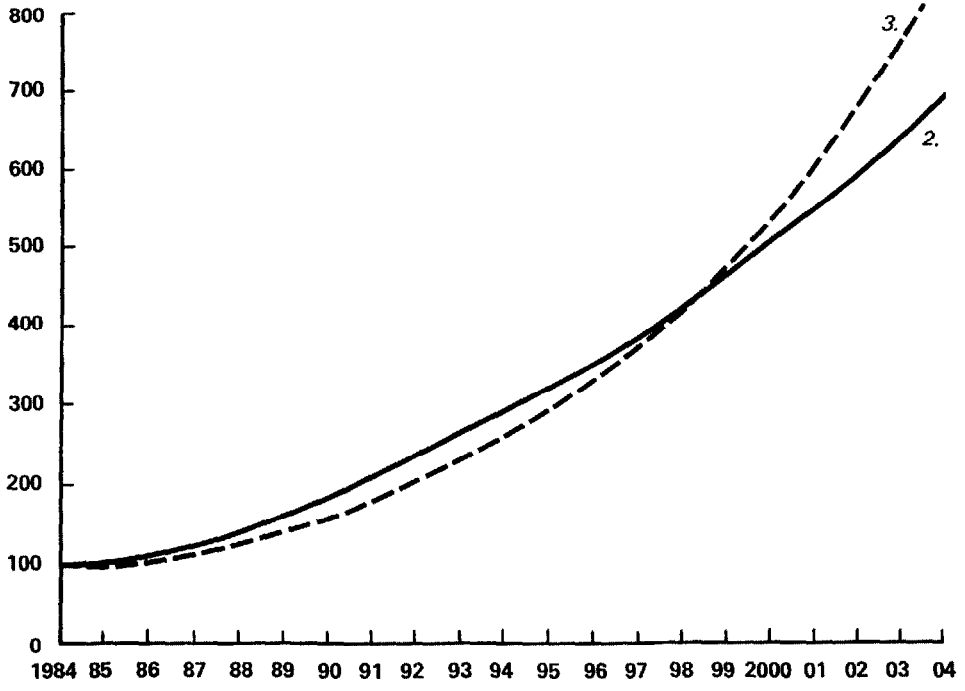


6. CYCLICAL UNDERWRITING, FOLLOWING INTEREST CHANGES



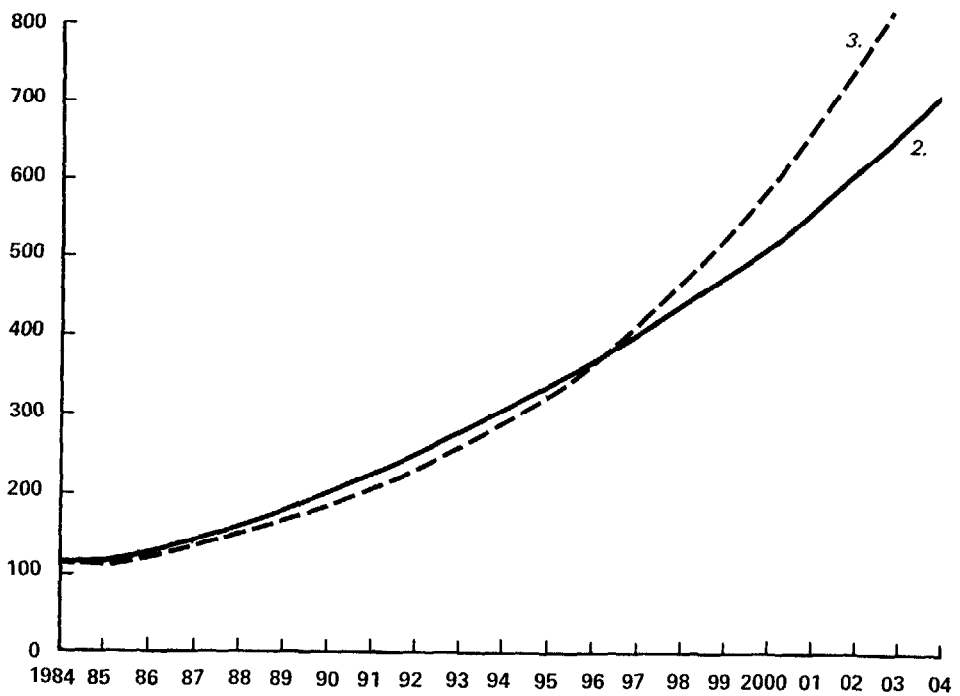
SURPLUS COMPARISON

2. Flat Writings, Improving Loss Ratio
vs
3. Growth, Retain High Loss Ratio



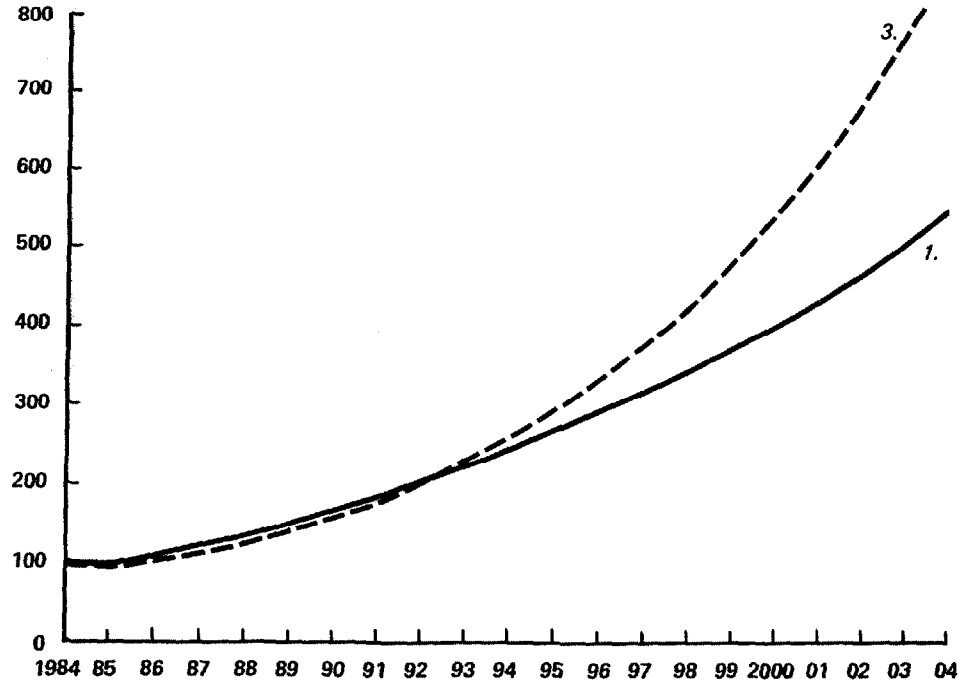
GAAP SURPLUS COMPARISON

2. Flat Writings, Improving Loss Ratio
vs
3. Growth, Retain High Loss Ratio



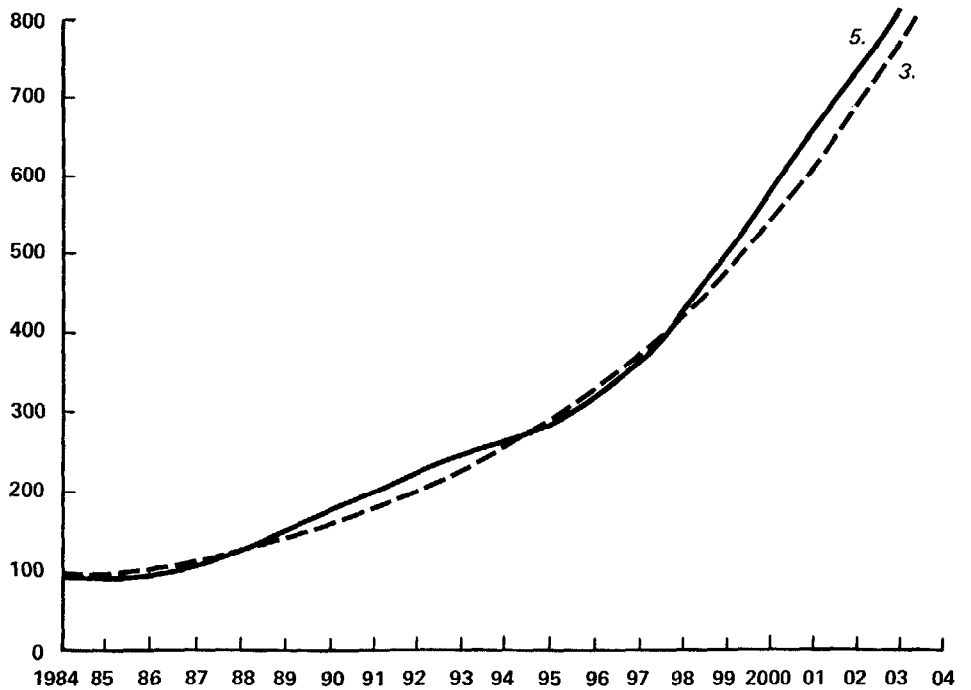
SURPLUS COMPARISON

1. Flat Writings, High Loss Ratio
vs
3. Growth, High Loss Ratio



SURPLUS COMPARISON

3. Growth, High Loss Ratio
vs
5. Cyclical Underwriting Results



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      ∇MASTERSP[□]∇

    ∇  MASTERSP;STRT;BSC;NAMES;LAG;ALPHA;RG;RATES;SA;SS;LOCAL;ANFG;TXR
[1]    'ENTER STARTING YEAR OF U/W RESULTS'
[2]    STRT←□ -1
[3]    'ENTER THE MATRIX OF GROUPS'' HISTORIC AND PROJECTED UNDERWRITING RESULTS'
[4]   ⍝THIS SHOULD BE IN THE FORM GROUPSx4xYRS, WITH FOUR ROWS FOR WRT PREM, L/R, E/R, ERND PREM
[5]   ⍝GROUPS ARE CHARACTERIZED BY COLLECTION AND PAYOUT LAG PATTERNS AS WELL AS THE PARAMETERS IN THE ABOVE 4 ROWS
[6]   ⍝YRS SHOULD BE 10, 20, OR 30.  THE NUMBER OF GROUPS IS VARIABLE WITHIN REASON.
[7]   ⍝WRT PREM MAY APPEAR AS FACTORS FOR ANNUAL INCREASE, STARTING AT ANY YEAR IN THE PROJECTION
[8]   ⍝ERND PREM NEED BE ENTERED FOR HISTORIC YEARS ONLY.  THE REST WILL BE CALCULATED.
[9]    BSC←□
[10]   'ENTER A GRPSx25 MATRIX OF 5 COLLECT LAGS,5 EXPENSE PAYOUT LAGS, AND 15 LOSS PAYOUT LAGS FOR EACH GROUP'
[11]   LAG←□
[12]   'ENTER THE RESPECTIVE NAMES OF THE GROUPS IN QUOTES, AS  /GP1/GP2/  .,ETC'
[13]   NAMES←(↓0)ROWNAMES□
[14]   'ENTER YEAR AT WHICH ENDING ASSETS AND SURPLUS WILL BE INITIALIZED'
[15]  ⍝THIS WOULD PRESUMABLY BE THE LATEST YEAR OF HISTORICAL DATA
[16]   ANFG←□
[17]   'ENTER ENDING (INVESTIBLE) ASSETS FOR THAT YEAR'
[18]   SA←□
[19]   'ENTER ENDING SURPLUS FOR THAT YEAR'
[20]   SS←□
[21]   'ENTER TWO ROW MATRIX OF INTEREST RATES (AS DECIMALS) AND PAID DIVIDEND AMOUNTS BY CALENDAR YEAR'
[22]  ⍝THESE SHOULD BE EFFECTIVE OR COMPOUNDED RATES
[23]   RATES←□
[24]   'ENTER THE TAX RATE AS A DECIMAL'
[25]   TXR←□
[26]   'ENTER THE DECIMAL PORTION OF INVESTMENT INCOME WHICH IS TAX FREE'
[27]   ALPHA←1-□
[28]   'ENTER A NAME FOR THE GLOBAL VARIABLE IN WHICH THE TOTAL SURPLUS PROJECTION MATRIX WILL BE STORED'
[29]   'AFTER ENTERING,YOU SHOULD DELIBERATELY TURN TO THE TOP OF A NEW PAGE'
[30]   GLOBAL←□
[31]   LOCAL←RATES SURPROJ RG←LAG CASH BSC
[32]   ⍎GLOBAL,'←LOCAL'
    ∇
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      ∇CASH[□]∇

    ∇  Z←A CASH B;M;N;AEP;YRSEP;RATE;I;TEM;Y;EPF;SZ;G
[1]   ⍝CASH SPRANG PARTIALLY GROWN FROM THE FOREHEAD OF G, VENTER
[2]   ⍝A IS AN ARRAY OF 5 COLLECT LAGS, 5 EXPENSE PAYOUT LAGS, AND 15 LOSS PAYOUT LAGS FOR EACH CATEGORY
[3]   ⍝B IS AN ARRAY  WITH ROWS FOR WP, L/R, E/R, EP, A COLUMN FOR EACH YEAR, AND  PLANES FOR EACH GROUP
[4]    Y←((G←(1↑⍴B)),11,M←¯1↑⍴B)⍴0
[5]    SZ←⌊0.5+M÷10
[6]    Y[;1 2 3;]←B[;1 2 3;]
[7]    N←0
[8]   TOP:N←N+1
[9]   ⍝FIRST FILL IN WRITTEN PREM USING ANNUAL INCREASES
[10]   TEM←(TEM>0)/TEM←(⍳M)×Y[N;1;]<10
[11]   Y[N;1;TEM]←Y[N;1;](¯1+L/TEM)]××\Y[N;1;TEM]
[12]  ⍝FOLLOWING IS THE EXTENTION OF EARNED PREM USING HISTORIC ERND TO WRTN RATIO EPF
[13]   YRSEP←+/(B[N;4;]≠0)
[14]   AEP←YRSEP↑B[N;4;]
[15]   EPF←(+/B[N;4;(1↓⍳YRSEP)]-B[N;1;(¯1↓⍳YRSEP)])÷+/B[N;4;(1↓⍳YRSEP)]-B[N;4;(¯1↓⍳YRSEP)]
[16]  ⍝EARNED PREMIUM
[17]   Y[N;4;]←(EPF×Y[N;1;])+(1-EPF)×0,¯1↓Y[N;1;]
[18]   Y[N;4;⍳YRSEP]←AEP
[19]  ⍝PREMIUM COLLECTED
[20]   Y[N;5;]←+⌿((⍳M)∘.≤⍳M)×(-0,⍳M-1)⊥(M↑5↑A[N;])∘.×Y[N;1;]
[21]  ⍝EXPENSES INCURRED
[22]   Y[N;6;]←Y[N;1;]×Y[N;3;]÷100
[23]  ⍝EXPENSES PAID
[24]   Y[N;7;]←+⌿((⍳M)∘.≤⍳M)×(-0,⍳M-1)⊥(M↑5↑5↓A[N;])∘.×Y[N;6;]
[25]  ⍝LOSSES INCURRED
[26]   Y[N;8;]←Y[N;4;]×Y[N;2;]÷100
[27]  ⍝LOSSES PAID
[28]   Y[N;9;]←+⌿((⍳M)∘.≤⍳M)×(-0,⍳M-1)⊥(M↑10↓A[N;])∘.×Y[N;8;]
[29]   →(N<G)/TOP
[30]  ⍝UNDERWRITING PROFIT
[31]   Y[;10;]←Y[;4;]-+/[2]Y[;6 8;]
[32]  ⍝UNDERWRITING CASH FLOW
[33]   Y[;11;]←Y[;5;]-Y[;7;]+Y[;9;]
[34]   I←0
[35]  LP:I←I+1
[36]   I PRINTC Y
[37]   →(I<G)/LP
[38]   Z←+⌿Y
[39]   Z[2;]←100×÷⌿Z[8 4;]
[40]   Z[3;]←100×÷⌿Z[6 4;]
    ∇
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      ∇SURPROJ[□]∇

    ∇  C←R SURPROJ UW;IND;TI;LCF
[1]   ⍝PROGRAM DEVISED BY R. GILLAM WITH  ENCOURAGEMENT AND TECHNICAL ADVICE FROM J. STANARD
[2]   ⍝PROGRAM LOOPS THRU CALANDAR YEARS, INCREMENTING SURPLUS BY INCOME LESS TAX AND DIVIDENDS
[3]    C←(10 0 +⍴UW)↑UW
[4]    IND←ANFG-STRT
[5]    C[18;IND]←SA
[6]    C[19 20 ;IND]←SS
[7]    C[21;IND]←SS+0.15×-/+/C[1 4 ;⍳IND]
[8]   ⍝INITIALIZE LOSS CARRY FORWARD
[9]    LCF←0
[10]  LOOP:IND←IND+1
[11]  ⍝INVESTMENT INCOME
[12]   C[12;IND]←(C[18;IND-1]+0.5×C[11;IND])×R[1;IND]
[13]  ⍝GROSS OPERATING INCOME
[14]   C[13;IND]←+/C[10 12 ;IND]
[15]  ⍝TAXABLE INCOME
[16]   TI←C[14;IND]←C[10;IND]+ALPHA×C[12;IND]
[17]  ⍝EFFECTIVE INCOME ON WHICH TAX IS PAID, AFTER LOSS CARRY FORWARD OR PREVIOUSLY PAID TAX RECOVERY
[18]   C[15;IND]←ETI←((0⌈TI+¯1↑LCF)×TI≥0)+(0⌊TI⌈-+/¯3↑C[15;⍳IND-1])×TI<0
[19]  ⍝TAX PAID
[20]   C[16;IND]←TXR×ETI
[21]   LCF←¯7↑(-1↓LCF)+LCF←0⌊(((LCF,¯1↑LCF)+TI)×TI≥0)+(LCF,((TI-ETI)+¯1↑LCF))×TI<0
[22]  ⍝DIVIDENDS OR OTHER DETRIMENTS TO INCOME
[23]   C[17;IND]←R[2;IND]
[24]  ⍝ENDING INVESTED ASSETS
[25]   C[18;IND]←C[18;IND-1]+(+/C[11 12 ;IND])-+/C[16 17 ;IND]
[26]  ⍝ENDING SURPLUS
[27]   C[19;IND]←C[19;IND-1]+(+/C[10 12 ;IND])-+/C[16 17 ;IND]
[28]  ⍝DISCOUNTED SURPLUS
[29]   C[20;IND]←C[19;IND]÷×/1+1.1×R[1;⍳(IND-ANFG-STRT)]
[30]  ⍝GAAP ADJUSTED SURPLUS
[31]   C[21;IND]←C[19;IND]+0.15×-/+/C[1 4 ;⍳IND]
[32]   →(IND<(¯1↑⍴UW))/LOOP
[33]   PRINTP C
    ∇
```

```
      ∇PRINTC[□]∇

    ∇  P PRINTC L;II
[1]    II←¯1
[2]    2 2 ⍴' '
[3]    ((L(130-⍴NAMES[P;])÷2)⍴' '),NAMES[P;]
[4]   PLNS:II←II+1
[5]    2 2 ⍴' '
[6]    ('YEAR                          '), 10 0 ⍕STRT+(10×II)+⍳10
[7]    ' '
[8]    ROWTITLES,(11 4 ⍴' '), 10 0 ⍕Y[P;;(10×II)+⍳10]
[9]    2 2 ⍴' '
[10]   →(II<L¯0.5+M÷10)/PLNS
[11]   'COLLECTION FACTORS:          ', 6 2 ⍕5↑A[P;]
[12]   'EXPENSE PAYOUT FACTORS:      ', 6 2 ⍕5↑5↓A[P;]
[13]   'LOSS PAYOUT FACTORS:         ', 6 2 ⍕10↓A[P;]
[14]   10 10 ⍴' '
    ∇

      ∇PRINTP[□]∇

    ∇  PRINTP PR
[1]    4 2 ⍴' '
[2]    (64⍴' '),'TOTAL'
[3]    2 2 ⍴' '
[4]    K←¯1
[5]   CIR:K←K+1
[6]    ('YEAR                          '), 10 0 ⍕STRT+(10×K)+⍳10
[7]    ' '
[8]    XX\RWTTLS,(21 4 ⍴' '), 10 0 ⍕PR[;(10×K)+⍳10]
[9]    3 2 ⍴' '
[10]   →(K<L¯0.5+(¯1↑⍴PR)÷10)/CIR
    ∇
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PROPERTY LINES

YEAR	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
PREMIUMS WRITTEN	45000	65000	80000	105000	110000	125000	130000	150000	150000	150000
CAL/ACC YR LOSS RATIO	53	63	58	64	70	75	78	80	78	76
EXPENSE RATIO	25	25	25	28	28	28	30	30	30	30
PREMIUMS EARNED	35000	50000	70000	90000	107000	115000	127000	140000	150000	150000
PREMIUMS COLLECTED	24750	51500	71250	92250	105250	117750	126250	140500	148000	150000
EXPENSE INCURRED	11250	16250	20000	27400	30800	35000	39000	45000	45000	45000
EXPENSE PAID	5625	12625	17063	24075	28973	32290	36510	41390	44200	44700
LOSS INCURRED	18550	31500	40600	57600	74900	86250	99060	112000	117000	114000
LOSS PAID	4638	14368	24885	36765	51083	65840	79298	92321	103512	109814
U/W PROFIT	5200	2250	9400	3000	1300	-6250	-11060	-17000	-12000	-9000
U/W CASH FLOW	14488	24507	29302	31410	25195	19600	10442	6789	288	-4514

YEAR	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
PREMIUMS WRITTEN	150000	150000	150000	150000	150000	150000	150000	150000	150000	150000
CAL/ACC YR LOSS RATIO	76	76	76	76	76	76	76	76	76	76
EXPENSE RATIO	30	30	30	30	30	30	30	30	30	30
PREMIUMS EARNED	150000	150000	150000	150000	150000	150000	150000	150000	150000	150000
PREMIUMS COLLECTED	150000	150000	150000	150000	150000	150000	150000	150000	150000	150000
EXPENSE INCURRED	45000	45000	45000	45000	45000	45000	45000	45000	45000	45000
EXPENSE PAID	45000	45000	45000	45000	45000	45000	45000	45000	45000	45000
LOSS INCURRED	114000	114000	114000	114000	114000	114000	114000	114000	114000	114000
LOSS PAID	112266	113453	114050	114150	114000	114000	114000	114000	114000	114000
U/W PROFIT	-9000	-9000	-9000	-9000	-9000	-9000	-9000	-9000	-9000	-9000
U/W CASH FLOW	-7266	-8453	-9050	-9150	-9000	-9000	-9000	-9000	-9000	-9000

YEAR	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
PREMIUMS WRITTEN	150000	150000	150000	150000	150000	150000	150000	150000	150000	150000
CAL/ACC YR LOSS RATIO	76	76	76	76	76	76	76	76	76	76
EXPENSE RATIO	30	30	30	30	30	30	30	30	30	30
PREMIUMS EARNED	150000	150000	150000	150000	150000	150000	150000	150000	150000	150000
PREMIUMS COLLECTED	150000	150000	150000	150000	150000	150000	150000	150000	150000	150000
EXPENSE INCURRED	45000	45000	45000	45000	45000	45000	45000	45000	45000	45000
EXPENSE PAID	45000	45000	45000	45000	45000	45000	45000	45000	45000	45000
LOSS INCURRED	114000	114000	114000	114000	114000	114000	114000	114000	114000	114000
LOSS PAID	114000	114000	114000	114000	114000	114000	114000	114000	114000	114000
U/W PROFIT	-9000	-9000	-9000	-9000	-9000	-9000	-9000	-9000	-9000	-9000
U/W CASH FLOW	-9000	-9000	-9000	-9000	-9000	-9000	-9000	-9000	-9000	-9000

COLLECTION FACTORS:	0.55	0.35	0.10	0.00	0.00									
EXPENSE PAYOUT FACTORS:	0.50	0.40	0.05	0.05	0.00									
LOSS PAYOUT FACTORS:	0.25	0.35	0.20	0.10	0.05	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

CASUALTY LINES

YEAR	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
PREMIUMS WRITTEN	20000	40000	50000	70000	70000	75000	80000	90000	90000	90000
CAL/ACC YR LOSS RATIO	120	105	78	80	85	87	87	92	88	85
EXPENSE RATIO	20	25	25	30	30	30	31	33	31	30
PREMIUMS EARNED	15000	33000	45000	60000	70000	72000	78000	85000	90000	90000
PREMIUMS COLLECTED	11000	29000	43500	60000	68000	72750	77250	85000	89000	90000
EXPENSE INCURRED	4000	10000	12500	21000	21000	22500	24800	29700	27900	27000
EXPENSE PAID	2000	6600	10450	16200	20025	21325	23500	26945	28195	27385
LOSS INCURRED	18000	34650	35100	48000	59500	62640	67860	78200	79200	76500
LOSS PAID	900	4973	10152	14676	21092	28377	35023	41934	49327	55395
U/W PROFIT	-7000	-11650	-2600	-9000	-10500	-13140	-14660	-22900	-17100	-13500
U/W CASH FLOW	8100	17428	22898	29124	26883	23048	18727	16121	11478	7221

YEAR	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
PREMIUMS WRITTEN	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000
CAL/ACC YR LOSS RATIO	85	85	85	85	85	85	85	85	85	85
EXPENSE RATIO	30	30	30	30	30	30	30	30	30	30
PREMIUMS EARNED	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000
PREMIUMS COLLECTED	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000
EXPENSE INCURRED	27000	27000	27000	27000	27000	27000	27000	27000	27000	27000
EXPENSE PAID	27180	27045	27000	27000	27000	27000	27000	27000	27000	27000
LOSS INCURRED	76500	76500	76500	76500	76500	76500	76500	76500	76500	76500
LOSS PAID	60477	65265	68841	71263	73435	74799	75595	76288	76720	76635
U/W PROFIT	-13500	-13500	-13500	-13500	-13500	-13500	-13500	-13500	-13500	-13500
U/W CASH FLOW	2344	-2310	-5841	-8263	-10435	-11799	-12595	-13288	-13720	-13635

YEAR	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
PREMIUMS WRITTEN	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000
CAL/ACC YR LOSS RATIO	85	85	85	85	85	85	85	85	85	85
EXPENSE RATIO	30	30	30	30	30	30	30	30	30	30
PREMIUMS EARNED	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000
PREMIUMS COLLECTED	90000	90000	90000	90000	90000	90000	90000	90000	90000	90000
EXPENSE INCURRED	27000	27000	27000	27000	27000	27000	27000	27000	27000	27000
EXPENSE PAID	27000	27000	27000	27000	27000	27000	27000	27000	27000	27000
LOSS INCURRED	76500	76500	76500	76500	76500	76500	76500	76500	76500	76500
LOSS PAID	76500	76500	76500	76500	76500	76500	76500	76500	76500	76500
U/W PROFIT	-13500	-13500	-13500	-13500	-13500	-13500	-13500	-13500	-13500	-13500
U/W CASH FLOW	-13500	-13500	-13500	-13500	-13500	-13500	-13500	-13500	-13500	-13500

COLLECTION FACTORS:	0.55	0.35	0.10	0.00	0.00										
EXPENSE PAYOUT FACTORS:	0.50	0.40	0.05	0.05	0.00										
LOSS PAYOUT FACTORS:	0.05	0.18	0.12	0.10	0.10	0.10	0.08	0.07	0.05	0.05	0.05	0.05	0.00	0.00	0.00

TOTAL

YEAR	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
PREMIUMS WRITTEN	65000	105000	130000	175000	180000	200000	210000	240000	240000	240000
LOSS RATIO (ACC,YR,)	73	80	66	70	76	80	81	85	82	79
INCURRED EXPENSE RATIO	30	32	28	34	29	31	31	33	30	30
PREMIUMS EARNED	50000	83000	115000	150000	177000	187000	205000	225000	240000	240000
PREMIUMS COLLECTED	35750	80500	114750	152250	173250	190500	203500	225500	237000	240000
EXPENSE INCURRED	15250	26250	32500	50400	51800	57500	63800	74700	72900	72000
EXPENSE PAID	7625	19225	27513	40275	48998	53615	60010	68335	72395	72085
LOSS INCURRED	36550	66150	75700	105600	134400	148890	166920	190200	196200	190500
LOSS PAID	5538	19340	35037	51441	72175	94237	114321	134255	152839	165208
UNDER, PROFIT	-1800	-9400	6800	-6000	-9200	-19390	-25720	-39900	-29100	-22500
UNDER, CASH FLOW	22588	41935	52200	60534	52078	42648	29169	22910	11766	2707
INVESTMENT INCOME	0	0	0	0	0	0	0	0	30388	34371
TOTAL INCOME	0	0	0	0	0	0	0	0	1488	11871
TAXABLE INCOME	0	0	0	0	0	0	0	0	-4629	4997
INCOME AFTER LCF OR PLR	0	0	0	0	0	0	0	0	0	367
TAX PAID	0	0	0	0	0	0	0	0	0	169
DIVIDENDS	0	0	0	0	0	0	0	0	0	0
ENDING INVESTED ASSETS	0	0	0	0	0	0	0	300000	342335	379263
ENDING SURPLUS	0	0	0	0	0	0	0	100000	101488	113190
DISCOUNTED SURPLUS	0	0	0	0	0	0	0	100000	91431	91868
GAAP ADJ SURPLUS	0	0	0	0	0	0	0	116950	118438	130140

YEAR	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
PREMIUMS WRITTEN	240000	240000	240000	240000	240000	240000	240000	240000	240000	240000
LOSS RATIO (ACC,YR,)	79	79	79	79	79	79	79	79	79	79
INCURRED EXPENSE RATIO	30	30	30	30	30	30	30	30	30	30
PREMIUMS EARNED	240000	240000	240000	240000	240000	240000	240000	240000	240000	240000
PREMIUMS COLLECTED	240000	240000	240000	240000	240000	240000	240000	240000	240000	240000
EXPENSE INCURRED	72000	72000	72000	72000	72000	72000	72000	72000	72000	72000
EXPENSE PAID	72180	72045	72000	72000	72000	72000	72000	72000	72000	72000
LOSS INCURRED	190500	190500	190500	190500	190500	190500	190500	190500	190500	190500
LOSS PAID	172742	178718	182891	185413	187435	188799	189595	190288	190720	190635
UNDER, PROFIT	-22500	-22500	-22500	-22500	-22500	-22500	-22500	-22500	-22500	-22500
UNDER, CASH FLOW	-4922	-10763	-14891	-17413	-19435	-20799	-21595	-22388	-22720	-22635
INVESTMENT INCOME	37680	40312	42612	44725	46745	48722	50717	52763	54882	57118
TOTAL INCOME	15180	17812	20112	22225	24245	26222	28217	30263	32382	34618
TAXABLE INCOME	7644	9750	11590	13280	14896	16478	18073	19710	21406	23194
INCOME AFTER LCF OR PLR	7644	9750	11590	13280	14896	16478	18073	19710	21406	23194
TAX PAID	3516	4485	5331	6109	6852	7580	8314	9067	9847	10669
DIVIDENDS	0	0	0	0	0	0	0	0	0	0
ENDING INVESTED ASSETS	408503	433570	455960	477163	497621	517964	538772	560180	582496	606309
ENDING SURPLUS	124854	138182	152963	169079	186472	205114	225017	246213	268748	292697
DISCOUNTED SURPLUS	91292	91024	90776	90397	89816	89004	87965	86712	85269	83665
GAAP ADJ SURPLUS	141804	155132	169913	186029	203422	222064	241967	263163	285698	309647

YEAR	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
PREMIUMS WRITTEN	240000	240000	240000	240000	240000	240000	240000	240000	240000	240000
LOSS RATIO (ACC,YR,)	79	79	79	79	79	79	79	79	79	79
INCURRED EXPENSE RATIO	30	30	30	30	30	30	30	30	30	30
PREMIUMS EARNED	240000	240000	240000	240000	240000	240000	240000	240000	240000	240000
PREMIUMS COLLECTED	240000	240000	240000	240000	240000	240000	240000	240000	240000	240000
EXPENSE INCURRED	72000	72000	72000	72000	72000	72000	72000	72000	72000	72000
EXPENSE PAID	72000	72000	72000	72000	72000	72000	72000	72000	72000	72000
LOSS INCURRED	190500	190500	190500	190500	190500	190500	190500	190500	190500	190500
LOSS PAID	190500	190500	190500	190500	190500	190500	190500	190500	190500	190500
UNDER, PROFIT	-22500	-22500	-22500	-22500	-22500	-22500	-22500	-22500	-22500	-22500
UNDER, CASH FLOW	-22500	-22500	-22500	-22500	-22500	-22500	-22500	-22500	-22500	-22500
INVESTMENT INCOME	59506	62052	64758	67636	70696	73949	77407	81084	84994	89151
TOTAL INCOME	37006	39552	42258	45136	48196	51449	54907	58584	62494	66651
TAXABLE INCOME	25105	27141	29307	31609	34057	36659	39426	42367	45495	48820
INCOME AFTER LCF OR PLR	25105	27141	29307	31609	34057	36659	39426	42367	45495	48820
TAX PAID	11548	12485	13481	14540	15666	16863	18136	19489	20928	22457
DIVIDENDS	0	0	0	0	0	0	0	0	0	0
ENDING INVESTED ASSETS	631767	658834	687611	718207	750737	785322	822094	861189	902755	946948
ENDING SURPLUS	318155	345221	373999	404595	437124	471710	508481	547577	589143	633336
DISCOUNTED SURPLUS	81929	80090	78167	76182	74151	72088	70006	67918	65832	63757
GAAP ADJ SURPLUS	335105	362171	390949	421545	454074	488660	525431	564527	606093	650286