

INSTITUTE AND FACULTY OF ACTUARIES

AUDIT TRAIL

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CA2: Model Documentation, Analysis and Reporting

Paper 1

Regulatory capital model

Objective

The regulatory solvency regime has recently changed for General Insurance Limited (“GIL”). The Chief Risk Officer has requested the calculation regulatory solvency ratio of GIL for year end 2017 and a number of additional calculations.

The purpose of this spreadsheet is to complete the following calculations:

- For year end 2017:
 - Required Capital
 - Own Funds
 - Solvency Ratio
- Recalculate the solvency figures, assuming a reinsurance agreement were in place and calculate what terms would allow a target solvency ratio of 140% to be met.
- Project the solvency ratio of the company for four additional years and estimate what dividend payout ratio would result in a solvency ratio of 140% by year end 2021.

Data

The following data has been provided by the Finance and Actuarial departments of GIL for each line of business, and can be found on the “Parameters” worksheet:

- Forecast premium volumes for 2018
- Reserves and Excess Assets as at year end 2017
- Expected margins for business written in 2018
- Estimate growth rates for premiums and reserves
- Current dividend payout ratio

Also the Solvency capital percentage parameters from the Regulator are given.

Where named ranges have been defined, these are detailed in red italics alongside the relevant cells.

The data provided is assumed to be correct but should be independently verified.

Assumptions

- There are no reasons to doubt the accuracy of the data. We assume therefore that the data provided is correct.
- The Regulator does not update the factors given.
- The Expected Profit is calculated before any tax would be payable on future profits.

- The Reinsurer will accept any proportion of motor business and 50% of property business.
- There is no restriction on the size of the dividend that GIL can declare.
- All premiums are earned in the year that they are written.
- Taxes can be ignored for the purpose of our projections.
- Margins are stable for future periods and are not reduced due to increased competition.

Method

“Reinsurance” worksheet

In this worksheet Regulatory Solvency Ratio under the base scenario and under the two reinsurance scenarios are calculated.

Under the base scenario, with no reinsurance, first the Required Capital is calculated in column C. The premium and reserve figures by line of business are taken from the parameter sheet, as given by the Finance and Actuarial departments. The Premium Capital is calculated by multiplying the relevant solvency percentage factor by the premium estimate for 2018 for each line of business and summed together. And the Reserve Capital is similarly calculated by multiplying the relevant reserve figures by the solvency percentage factors for each line of business and also summed together. The Required Capital is then the sum of the Premium Capital and the Reserve Capital.

Next the Own Funds is calculated, also in column C, as the sum of the Excess Assets (as given by the Finance department) and the Expected Profit. The Expected Profit is calculated by multiplying the premiums for 2018 by the relevant expected margins for each line of business, and summed together.

Finally the Solvency Ratio is the Own Funds divided by the Required Capital.

The individual components of the Required Capital calculation are set out in order to allow the calculation of their percentage contribution to the total Required Capital and these percentages are shown in a pie chart.

Reasonableness check

- The capital held for Reserve risk for motor business is the largest contributor to the total Required Capital, which is reasonable as the reserves are high relative to the property business and the solvency factors are also high by comparison.

The two reinsurance scenarios are calculated in columns E and G. To reflect the reduction in the net premium after the quota share agreement, the premiums for 2018 are reduced by the percentage share of the quota share. For the first reinsurance scenario in column E this is by 50% for both lines of business. The reserves as at year end 2017 are unchanged. The Required Capital calculations remain the same for Premium and Reserve Risks as under the

base scenario but the lower premium volume. The Counterparty Risk Capital is added to the total Required Capital. It is calculated as 2% of the volume of premium ceded to the reinsurer, which is calculated as the difference between the GIL premium with no reinsurance and with reinsurance.

For the Own Funds under the reinsurance scenarios the Excess Assets remains the same but the Expected Profit is updated for the reduced premium volumes calculated above. The Solvency Ratio calculation remains the same as under the base scenario.

Reasonableness checks

- The use of reinsurance reduces the net premium forecast for 2018 so it is reasonable that the Required Capital and the Own Funds both reduce.
- The Solvency Ratio increases with the reinsurance because the expected margin percentages are less than the solvency factors so the Required Capital reduces by more than the Expected Profit.

In the second reinsurance scenario in column G, the proportion of Property business included in the quota share is set to zero. The proportion of the Motor business is then varied until the Solvency Ratio is equal to 140%. This is done by using Goal Seek on the proportion of Motor business. As the answer of 90% is between 0% and 100% this shows that it is possible to just reinsure a portion of the Motor business and still meet the target Solvency Ratio.

Reasonableness check

- Compared to the first reinsurance scenario is it reasonable that the required percentage to be included in the quota share is great than 50% as the portion for Motor is zero but the required solvency result is similar to the first scenario.

“Projection” worksheet

In this worksheet the capital ratio is projected to 2021.

This worksheet starts with the base capital calculation for 2017, which is the same as on the Reinsurance sheet, in column C.

For the years 2018 to 2021, in columns D to G, the premiums and reserves are projected using the growth rates provided. For example, the premium for motor business is multiplied by $(1 + 3\%)$ each year to 2021.

The Required Capital calculations in rows 12 to 14 are the same for each projected year as the base year 2017. So the relevant solvency factors are multiplied by the projected premiums and reserves and the total Required Capital calculated as the sum of the premium capital and the reserve capital.

The Excess Assets (in row 16) is projected as the Excess Assets from the previous period plus the Expected Profit earned in the period minus the proportion that has been paid out as a dividend.

For example:

$$\text{Excess Assets for 2018} = \text{Excess Assets for 2017} + (1 - \text{payout ratio}) \times \text{Expected Profit 2018}$$

The projected Expected Profit is based on the same calculation as in the base case with the margins applied to the projected premiums. And the projected Own Funds is then the sum of the Excess Assets and the Expected Profit for each year.

A chart of the projection of the Required Capital and Own Funds is included, with their values on the left hand axis and the projected Solvency Ratio is included with its percentage values on the right hand axis.

Reasonableness checks

- The Required Capital increases each year in the projection, which is reasonable because the volume of premiums and reserves are increasing.
- The annual increase is approx. 5.5%, which is reasonable considering the average growth rate used in approx. 5%.
- The Excess Assets increases each year because the dividend payout is less than 100% so some profits are retained.
- The Expected Profit increases each year because the projected volume of premiums increases.
- Finally the Solvency Ratio increases in the projection, which is reasonable as it is expected that GIL expects to write profitable business.

“Projection Dividend” worksheet

In this worksheet the dividend payout ratio is varied to give the target Solvency Ratio in year 2021 of 140%

This worksheet is a copy of the “Projection” worksheet above. The dividend payout ratio in the Excess Assets projection formula is changed to refer to cell C21 instead of the payout ratio in the “Parameters” tab.

A Goal Seek is then used to vary the payout ratio in cell C21, until the Solvency Ratio in year 2021 is the target solvency percentage of 140%.

Reasonableness checks

- Under the base projection the Solvency Ratio was less than 140% in 2021 so it is expected that the dividend payout ratio should be less than in the base scenario in order to retain more capital and achieve a higher Solvency Ratio. This is the case with a calculated payout ratio of 36% to get the higher Solvency Ratio.

END OF AUDIT TRAIL