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Gross Premium Valuation Reserves: What Are They and How Are They Calculated?

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Since four states now require an actuarial opinion based on an asset adequacy analysis, and since a gross premium valuation is one of the methodologies listed in ASB 22 to accomplish this in certain situations, now is an appropriate time to delve into what a gross premium valuation is. Since I am the chiefactuary for a small insurance company that previously was not subject to this requirement, this topic was of great interest to me. Although I was first thinking along the lines of cash flow analysis rather than gross premium valuations, the approach I came up with is applicable to both types of analysis.

What Are They?

A gross premium valuation reserve is just that, a reserve. It is calculated on a closed block basis using your existing reserves as of the valuation date as a starting value. Statutory reserves are calculated on either a prospective or a retrospective basis using present value of benefits and/or expenses and persistency and interest assumptions. Gross premium reserves are calculated on a prospective basis using Natural Reserve Assumptions (expected assumptions). They are the present value of future benefits and expenses less the present value of future gross premiums. If you sum to the end of the benefit period, no further adjustments are required. If however, you do not project to the end of the benefit period, you must discount the ending statutory reserve to add to your gross premium reserve.

If you start dissecting the gross premium valuation reserve formulas, some things become immediately apparent. The gross premium itself can be split into three component parts: the net benefit reserve premium, the net expense reserve premium and the profit portion of the premium. The present value of the benefits, less the present value of the net-benefit premium to the end of the benefit period, is the Natural Benefit Reserve.

The present value of the expenses less the present value of the net expense reserve premium is the Natural Expense Reserve; this number will generally be negative. The negative of the present value of the profit portion of the premium is also calculated; let's call this the Natural Profit Reserve. The sum of the Natural Benefit Reserve plus the Natural Expense Reserve plus the Natural Profit Reserve equals the gross premium valuation reserve.

Referring to the above paragraph, the gross premium valuation reserve can be seen to be the required future benefit reserve less the present value of future excess premiums that won't be used for expenses.

Another way to look at the gross premium valuation is that it is the negative of the present value of future cash flows not including interest or taxes.

As stated before, if the cash flows are not evaluated to the end of the benefit period, the present value of the statutory benefit reserve for that period should be discounted to the reserve valuation date and added to the present value of the negative cash flows; this is a good approximation to the gross premium valuation reserve.

Calculate your gross premium valuation reserve using various adverse loadings on your claim costs, your expenses and lapses, and using different interest rates.

The final step is to compare the gross premium valuation reserve to the starting reserve as of the valuation date in question. If the starting reserve is greater than the gross premium valuation reserve, the starting reserve is sufficient. If the starting reserve is less than the gross premium valuation reserve, you may be required to set up the deficiency as additional reserves.

The above analysis was done from a statutory viewpoint. To change to a GAAP viewpoint, do the following. Use GAAP assumptions. Discount the net GAAP reserve at the end of the benefit period rather than the statutory reserve at the end of the benefit period. The net GAAP reserve is the benefit reserve less the DAC asset. Compare the negative of the discounted cash flows excluding interest to the beginning net GAAP reserve. If the beginning net GAAP reserve is greater, your reserve and DAC are sufficient and recoverable respectively.

How to Do One

Run asset shares for your major lines of business and aggregate the various asset shares within a line of business down to one asset share run, using the distributions of business by number of units as weights for combining the runs.

Take ratios of the various cash-flow items by duration quarter to the corresponding premium by duration. Do this for all cash-flow items, except interest and federal income taxes. The cash-flow items should include claims, surrenders, fixed expenses, variable expenses, various statutory reserve amounts and other items management may wish to break out for analysis.

For each line of business, project premium income for each issue quarter as far forward as needed. I projected 120 quarters from the valuation date. Assume no future sales.

Multiply the projected premium for a given durational quarter times the cash flow item ratio for the corresponding quarter from the asset share runs. Sum these cash flows by calendar quarter to produce the cash flows for the cash-flow item in question. ▶▶

► Perform a similar projection for the total reserves. Validate the cash-flow items and the reserve amounts against some recent history of corresponding values from management reports. Try to get your “past projected values” as close as you can to the actual historical values. Then apply an adjustment factor and perhaps a trend to your projected values to get them to exactly match your historical values.

Sum each of the premiums, cash-flow items and statutory reserves by calendar quarter.

Up until this point, the process is equally applicable to gross premium valuation analysis and cash-flow analysis. We will proceed down the gross premium valuation path.

Discount the negative of the cash flows, and add to that the present value of the ending statutory reserve, if any. This is your gross premium valuation reserve.

Calculate your gross premium valuation reserve using various adverse loadings on your claim costs, your expenses and lapses and using various interest rates.

The final step is to compare the gross premium valuation reserve to the starting statutory reserve as of the valuation date in question. If the starting statutory reserve is greater than the gross premium valuation reserve, the starting

statutory reserve is sufficient and you can signoff on the reserves. If the starting statutory reserve is less than the gross premium valuation reserve, you may be required to setup the deficiency as additional reserves. It’s time to talk to your friendly auditor or regulator, or both if applicable.

Although at this point the gross premium valuation was completed, I did some cash-flow testing to assure myself that no further portfolio analysis was needed.

Please note that this paper is written from the standpoint of a small company that sells no products with liabilities varying with investment yields. ●



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7702 Announcement

The Society of Actuaries is pleased to announce that its newest publication, *Life Insurance and Modified Endowments Under Internal Revenue Code Sections 7702 and 7702A*, the first textbook ever written on the subject, is going to be available October 25, 2004. This innovative work provides a practical look at the issues surrounding federal income tax treatment of life insurance products, including in-depth information on the statutory definition of life insurance found in sections 101 (f) and 7702, and the modified endowment rules in 7702A. An essential resource for product designers and those dealing with compliance issues on a daily basis, the book also delivers background and historical information to help readers appreciate the context in which these sections were developed.

Leading experts in the field, actuaries Chris DesRochers, Doug Hertz and Brian King team up with attorney John Adney to write a well-balanced book, combining their extensive knowledge. The result is a text that reflects the actuarial theory, tax policy and political compromises underlying the statutory limitations. Formulas and calculations are provided, along with extensive legal analysis and citations.