GH FVA Model Solutions
Spring 2020

1. Learning Objectives:

1. The candidate will understand and apply valuation principles for insurance contracts.

Learning Outcomes:

(1c) Calculate appropriate claim reserves given data.

(1f) Describe, calculate and evaluate non-claim reserves and explain when each is required

Sources:

AAA Premium Deficiency Reserves Discussion Reports

GHA-103-16 Health Reserves

Individual Health Insurance 2nd Edition CH 6 Reserves and Liabilities

Commentary on Question:

Commentary listed underneath question component.

Solution:

(a) Compare and contrast premium deficiency reserves (PDRs) and contract reserves.

Commentary on Question:

Generally, candidates did better with the compare rather than the contrast.

Compare: PDRs and contract reserves are similar in that they are established to cover expected losses in the future from expected claims exceeding expected premiums

Contrast: The distinction between PDRs and contract reserves is the initial intent. Contract reserves are established for situations in which the policy is knowingly priced with claims costs exceeding premiums in later durations. Premium Deficiency Reserves cover liabilities created by claims experience outcomes which may not have been intended at the time the policy was issued.

1. Continued

(b) List the four lines of business that the Health Reserves Guidance Manual (HRGM) uses to categorize health coverage.

Commentary on Question:
Most candidates got the first three but had trouble with the forth.

- Comprehensive major medical (medical-type coverage, Medicare Supplement, dental, vision, etc.)
- Long-term care insurance
- Income protection (disability income) insurance
- Limited benefit plans (hospital indemnity, critical illness, etc.)

(c) Calculate the following. Show your work.

(i) The testing PDR for each block of business as of year-end 2019.

(ii) The total PDR based on the grouping guidelines of the HRGM as of year-end 2019.

Commentary on Question:
For part (i), candidates were awarded full points if they listed the PDR for Vision and LTD as being $0 but the example in the text has the test PDR as being a negative PDR when projections are all gains. For part (ii) most candidates knew to group major medical, dental and vision all together.

(i) The testing PDR is calculated for each individual line of business:

The Group Major Medical, Group Dental and Group LTC lines of business are projecting a loss in the future. The PDR is the sum of each year's loss (up to where there are projected gains thereafter) where a loss is projected:

Group Major Medical = $20 - $5 + $3 = $18M
Group Dental = $3 + $2 - $3 + $1 = $3M
Group LTC = $15 + $8 = $23

The Group Vision and Group LTD lines of business are not projecting a loss in the future so the PDR is equal to the negative positive amount from the first projected year:

Group Vision = -$2M
Group LTD = -$12M

1. Continued

(ii) Group Major Medical, Group Dental and Group Vision can be grouped together based on the guidelines of the HRGM as falling under the comprehensive major medical category. The total projected losses are as follows with the grouping:

Projected Underwriting Cash Flows ($M)	**2020**	**2021**	**2022**	**2023**	**2024**
Group major medical, dental, vision	-$21	$1	$9	$5	$15

The PDR needed for this grouping is $21 M.

Group LTD and Group LTC cannot be grouped with other lines of business. The PDR needed for LTD is $0 as there are no future losses expected. The PDR needed for LTC is $23M as determined in Part (c)(i)

The total PDR for the business = $21 + $23 = $44M

(d) Calculate the following. Show your work.

(i) The net level premium

(ii) The contract reserve at the end of year 2 per original policy, using the prospective method

(iii) The contract reserve at the end of year 2 per original policy, using the retrospective method

Commentary on Question:
For part (i), candidates had a hard time recognizing that persistency did not change the first 2 years of premium or the first year of claims as the question stated that the persistency assumption was for years 2 through 5. Some candidates failed to apply persistency to the expected claims.

(i)

$Persistency_t = (85\%)^t$
$Discount_t = (1.03)^{-t}$
$Claims_t = \$1{,}000 * (1.05)^{t-1}$
PV(Expected Claims) = Persistency * Discount * Claims

1. Continued

t	Persistency	Discount	Claims	PV(Expected Claims)
0	100%	1.0000	$0.00	
1	100%	0.9709	$1,000.00	$970.87
2	85.0%	0.9426	$1,050.00	$841.27
3	72.3%	0.9151	$1,102.50	$728.96
4	61.4%	0.8885	$1,157.63	$631.65
5	52.2%	0.8626	$1,215.51	$547.33

Total PV(Expected Claims) = $970.87 + $841.27 + $728.96 + $631.65 + $547.33 = $3,720.08

SumProduct of Persistency and Discount = 3.9789

Net Level Premium = PV (Expected Claims) / SumProduct of Persistency and Discount
=$3,720.08 / 3.9789
= $934.95 or $934,949

(ii) Reserve = PV(Future Claims) – PV(Future Net Premiums)

PV(Future Claims at Year 2) = $1,102.50 * $(85\%)^2$ * $(1.03)^{-1}$ + $1,157.63 * $(85\%)^3$ * $(1.03)^{-2}$ + $1,215.51 * $(85\%)^4$ * $(1.03)^{-3}$ = $2,024.13

PV(Future Net Premiums at Year 2) = $934.95 * $(85\%)^1$ * $(1.03)^0$ + $934.95 * $(85\%)^2$ * $(1.03)^{-1}$ + $934.95 * $(85\%)^3$ * $(1.03)^{-2}$ = $1,991.75

Reserve = $2,024.13 - $1,991.75 = $32.38 or $32,384

(iii) Reserve = AV(Past Net Premiums) – AV(Past Claims)

AV(Past Net Premiums at Year 2) = $934.95 * $(85\%)^0$ * $(1.03)^2$ + $934.95 * $(85\%)^0$ * $(1.03)^1$ = $1,954.88

AV(Past Claims at Year 2) = $1,000 * $(85\%)^0$ * $(1.03)^1$ + $1,050 * $(85\%)^1$ * $(1.03)^0$ = $1,922.50

Reserve = $1,954.88 - $1,922.50 = $32.38 or $32,384

2. Learning Objectives:

1. The candidate will understand and apply valuation principles for insurance contracts.

Learning Outcomes:

(1a) Describe the types of claim reserves (e.g., due and unpaid, ICOS, IBNR, LAE, PVANYD).

Sources:

Group Insurance, Skwire, Daniel D., 7th edition, 2016
Ch. 37: Claim Reserves for Short-Term Benefits

Commentary on Question:

This question tested the candidates' knowledge of how to calculate age-to-age and age-to-ultimate factors to derive reserves, given the typical initial data source an actuary starts with. Part a) tested whether the candidate was able to recall what various types of reserves are for. Most people did well on this question.

Solution:

(a) Define the following types of claim liabilities and reserves.

(i) Due and unpaid (D&U) liabilities

(ii) In course of settlement (ICOS) claims

(iii) Incurred but not reported (IBNR)

(iv) Loss adjustment expenses (LAE)

Commentary on Question:

Most people did well on (i)-(iii). A few people confused (i) D&U with unpaid premium reserves. Some people lost points on (iii) IBNR by simply reciting back the name of the reserve as the description of the reserve. The most common error was for LAE, which is a reserve for future administrative costs/staff time to process claims that occurred prior to the valuation date (often a %/function of the claims reserves/IBNR).

(i) Due and unpaid (D&U) liabilities: A reserve for claims that have been reported, processed, approved and adjudicated, but no payment has been made yet by the insurer.

(ii) In course of settlement (ICOS) claims: a reserve for claims that have been reported but are still under investigation/in review/not yet approved/not yet adjudicated. For example, the $ amount has not been determined yet/eligibility is still under review.

2. Continued

(iii) Incurred but not reported (IBNR): A reserve for claims that are expected to have already been incurred as of the valuation date, but are still not sent in to the insurer so need to be actuarially estimated using historic data.

(iv) Loss adjustment expenses (LAE): A reserve for administrative expenses incurred for the adjudication of yet unpaid but incurred claims as of the valuation date, often a % of IBNR/claims reserves.

(b) Calculate age-to-ultimate development factors for lag months 1 to 3 using claims incurred in December 2018. Show your work.

Commentary on Question:
Most candidates did very well on part (b). Case Study Exhibit 1 had two tables, one for ACA and one for Legacy. We allowed for full credit, regardless of whether ACA only, Legacy only, combined or both separately calculated was performed. Because the text never really defined the term but rather showed the process, and in light of the question root for part (d), we provided full credit whether the age-to-ultimate was a fraction or the inverse of that fraction (for example, 0.0264 or 37.915 for lag 1 were equivalent answers). A few candidates did not calculate age-to-ultimate factors but rather calculated age-to-age factors.

Using top table from Exhibit 1:
Ultimate claims: 1,782,000
Lag 1 = 47000/1782000 = 0.0264
Lag 2 = (47000+725000)/1782000 = 0.4332
Lag 3 = (47000+725000+668000)/1782000 =0.8081
Or the inverse worked too.

(c) Calculate weighted average age-to-age development factors for lag months 7 to 12, averaging the factors for the 3 most recent paid months using a percentage weight declining by 10% per month. Show your work.

Commentary on Question:
Candidates generally did well on part (c). A number of candidates lost a little credit for the part by using 1.0,0.9,0.8 or 0.4333,0.3333,0.2333 as their weighted average. A small number of candidates lost ¼ credit for using 1.1,0.1,0.1^2 as the weighting.

A small number of candidates put higher weighting on older time periods.

A small number of candidates lost credit for not selecting factors from the table that would enable them to use the most recent available data, which is an important concept in valuation work.

2. Continued

Some candidates set everything up correctly, but miscalculated a factor or two, and lost a little credit.

As above, working with inverse values obtained full credit.

Lag 12 is 1.000, not N/A…this lost a little bit of credit for some candidates.

Weight	7	8	9	10	11	12
0.81	1.005	1.029	1.026	1.056	1.071	1.000
0.90	1.009	1.009	1.024	1.019	1.005	1.000
1.00	1.009	1.008	1.005	1.031	1.048	1.000
2.71	1.0078	1.0146	1.0176	1.034	1.041	1.000

(d) Calculate the total incurred but not paid (IBNP) claim reserve as of 12/31/2019 for incurred months October 2019 to December 2019, using the above data and the weighted average age-to-age development factors you calculated in part (c).

Show your work.

Commentary on Question:
Candidates did well on this part, though a few commented that they ran out of time, even though this was question 2 on the exam. While time management is of course important, some candidates seemed too strictly beholden to their point-to-time rule of thumb, especially those that seemed to correctly write down how they would answer the question (which took a lot of time in itself). Given other candidates face the same time management issue, there was a need to differentiate the points for this part of the question.

Some candidates who knew they made errors on (c) did themselves a favor by making an explicit assumed answer for (c) and going with it to demonstrate understanding on how to calculate part (d). We made sure to use candidates' own answers from (c) in grading part (d).

Candidates should take care to not cut decimals too short in valuation work like this…as it builds to very wrong reserves and lost a little bit of credit when extreme.

2. Continued

1	13.073	2.48%
2	1.902	32.4%
3	1.197	61.7%
4	1.134	73.9%
5	1.046	83.8%
6	1.018	87.7%
7	1.0078	89.3%
8	1.0146	90.0%
9	1.0176	91.3%
10	1.0345	92.9%
11	1.0406	96.1%
12	1.0000	100.0%

10/1/2019	1,200,000	61.7%	1,944,895	744,895
11/1/2019	600,000	32.4%	1,851,852	1,251,852
12/1/2019	50,000	2.48%	2,016,129	1,966,129
				3,962,876

due to rounding, many answers at this overall magnitude received full credit.

3. Learning Objectives:

1. The candidate will understand and apply valuation principles for insurance contracts.

Learning Outcomes:

(1b) Explain the limitations and biases of the traditional valuation methods.

(1c) Calculate appropriate claim reserves given data.

(1d) Reflect environmental factors in reserve calculations (trend, seasonality, claims processing changes, etc.).

(1e) Evaluate data resources and appropriateness for calculating reserves.

Sources:

Group Insurance, Skwire, Ch 38

Commentary on Question:

Commentary listed underneath question component.

Solution:

(a) Calculate the change in the total reserve for these open claimants due to the use of the new reserve factors. Show your work.

Commentary on Question:

In general candidates performed this question well. Most candidate mistakes were made by thinking the noted reserves were per $3,000 instead of $1. Additionally, candidates needed to state the total change in reserve to receive full marks.

Age	Duration (Months)	Gender	Elimination Period	Own Occupation Period	Benefit Amount	Lookup age-duration	Lookup gender-EP	Old Factor	New Factor	Change in Reserve
29	48	M	3 Months	24 Months	6,000	29-48	M-3	125.96	101.22	-148,440
34	18	F	3 Months	24 Months	9,000	34-18	F-3	111.08	75.54	-319,860
41	9	M	6 Months	24 Months	6,000	41-9	M-6	83.22	61.74	-128,880
48	60	F	6 Months	24 Months	9,000	48-60	F-6	91.72	84.91	-61,290

Total change in reserves **(658,470)**

3. Continued

(b)

(i) State the general formula for a tabular claim reserve for an open claim at duration n.

(ii) Explain why the Thunderball factors are reasonable, considering the components of the formula in (i).

Commentary on Question:
*In general candidates performed part one of this question well. Candidates only received full marks if they understood the question was asking for the reserve at time N and stated a **complete** formula, a good portion of candidates started the time period at 1 or didn't state the time period in the summation.*

*Part two of this question was poorly answered with very few individuals getting nearly full marks. The question asked for candidate to speak to **each** of the components in part i) of this question, however the majority of candidates did not mention benefit amounts or interest/discount. If candidates did not mention these parts of the formula, then a grading point was deducted for each.*

There was a good understanding of recoveries impacting benefit reserves at lower durations, however most candidates did not understand how the benefit ending at age 65 would impact reserves at longer duration claims. Most candidates mentioned mortality being the driving factor for the long duration, however mortality would be very minimal at long durations due to benefits ending at age 65 (continuance should be very similar at long durations). Additionally, candidates had difficulty describing the full situation - is it early/late duration, what does this mean for each of the individuals and how does this relate to the components of the above formula. Points were given if a candidate effectively communicated that the individuals were early/late duration, how this impacted their recoveries, how this related to continuance and the impact of benefits ending at age 65.

Part 1

$$V_n = \sum_{t=n}^{BP} Benefit_t \cdot Continuance_t \cdot InterestDiscount_t$$

3. Continued

Part 2

- For all entries in the Thunderball Exhibit 1, the "Benefitt" in the table is the same and the factor is for a generic $1 of benefit.
- Also, the "InterestDiscountt" for all factors is based on 5% annual discount rate.
- Therefore the difference between the entries must be due to "Continuancet", the probability of the claim continuing to a duration t.

For convenience, use this notation:
A = factor for age 27, duration 4
B = factor for age 50, duration 4
C = factor for age 27, duration 60
D = factor for age 50, duration 60

- A and B both represent new claimants (duration = 4, so they've only been disabled for 4 months).
- This can include many individuals whose disabilities are not severe, so that the individuals are likely to recover. Therefore the probabilities "Continuance t" may be fairly low.
- The case A individual is only 27 years old, so is likely to be healthier overall than the case B individual who is 50 years old. Therefore the claim continuance probabilities might be lower in case A than in case B, which would lead to the factor A being lower than factor B, as observed.

- C and D represent claimants who have been disabled for a long time, duration = 60 so they've already been disabled for 5 years.
- These are probably severely disabled individuals who are unlikely to recover, and are increasingly likely to receive disability payment for the rest of their lives. The probabilities "Continuance t" are probably very high.
- However, the exhibit indicates that the benefit extends only to age 65. Therefore the D claimant can receive benefits only for at most 15 years, while the C claimant could receive benefits for 38 years. This can lead to the factor C being higher than factor D, as observed.

3. Continued

(c)

(i) Calculate the December 31, 2020 IBNR reserve using each of these methods:

a. Percentage of premium

b. Lag

c. Loss ratio

Show your work.

(ii) Recommend an IBNR reserve as of December 31, 2020. Justify your answer.

Commentary on Question:
Part ia – Percentage of Premium

- Grader commentary: *Some candidates divided the 2019 final incurred amount by the 2019 premium rather than the 2019 retrospective reserve and got an answer of $20,300,000. Others incorrectly calculated a reserve of $22,440,000 by calculating a percentage of premium of (45 – 24.6) / 60, or 34%.*

Part ib – Lag

- Grader commentary: *Unless they made an arithmetic error, candidates generally received full credit or no credit on this part.*

Part ic – Loss Ratio

- Grader commentary: *Candidates did very well on this part.*

Part ii

- Grader commentary: *Any well-justified answer could theoretically be accepted, even if it does not align with the model solution. The 8 grading points available for this question broke down this way:*
  - *4 points for each valid justification given, up to 4. Merely pointing out that a method was "credible" or "similar to last year" was not sufficient to get any points without further discussion of how the method compared to the others.*
  - *1 point for showing a number for the reserve amount, as opposed to just giving what method to use. However, 0 points if no justification was given.*
  - *1 point for explaining how the candidate got to the number. However, 0 points if no justification was given.*
  - *2 points for showing a valid calculation. If the candidate simply chose one of the three methods and had calculated it in part i, the full 2 points were given. However, 0 points if no justification was given and 0 points if a numerical answer was not given.*

3. Continued

- *Few candidates listed 4 justifications, but candidates who did list at least 1 valid justification and explained a numerical answer tended to receive over half of the 8 grading points.*

Part ia – Percentage of Premium

- The 2019 retrospective reserve was $18,900,000, or 31.5% of the 2019 premium amount of $60,000,000.
- Applying this 31.5% ratio to the 2020 premium of $66,000,000, the reserve amount is $20,790,000.

Part ib – Lag

- The completion factors are based on 2019 results, and are calculated as the amount reported as of December 31, 2019, over the incurred claims as of December 31, 2020.
  - July: 6.9 / 6.9 = 100%
  - August: 7.3 / 8.1 = 90%
  - September: 5.2 / 7.4 = 70%
  - October: 3.5 / 7.8 = 45%
  - November: 1.3 / 6.6 = 20%
  - December: 0.4 / 8.2 = 5%
  - *Values shown in millions*
- The reported claims as of December 31, 2020, must be divided by the above factors to get the ultimate incurred amounts.
  - July: 7.9 / 100% = 7.90
  - August: 7.8 / 90% = 8.65
  - September: 6.7 / 70% = 9.53
  - October: 4.1 / 45% = 9.14
  - November: 2.4 / 20% = 12.18
  - December: 0.3 / 5% = 6.15
  - *Values shown in millions*
- Adding the above numbers gives a approximate total incurred amount of $53,560,000. Subtracting the $29,200,000 leaves a reserve of $24,360,000.
- Answers rounded at a different level of precision were also accepted.

Part ic – Loss Ratio

- The loss ratio was given as 75%.
- 75% of the premium amount of $66,000,000 is $49,500,000, which is the total incurred claims for 2020.
- So far, $29,200,000 in claims have been reported, leaving (49,500,000 – 29,200,000) or $20,300,000 as the reserve.

3. Continued

Part ii

- *Possible pros and cons of each method to justify selection.*
  - The percentage of premium method is not affected by actual paid amounts, so is less volatile than the lag method. It is not a good estimate if the current period ratio of incurred claims to premium is very different from that in the prior period.
  - The lag method is good because it reflects actual reported claim development, but it is unreliable in the most recent months with low completion factors.
  - The loss ratio method is not affected by actual paid amounts, so is less volatile than the lag method. However, it's not a good estimate if actual incurred claims are much higher or lower than the pricing.
- *Possible recommendation*
  - I recommend using the lag method for the older 3 months and the loss ratio method for the recent 3 months, for the reasons stated above. This leads to a total reserve of $21,640,000.
  - Calculation to support:

Incurred Month	Earned Premium	Reported Claims as of 12/31/2020	Pricing Loss Ratio	Completion Factor	IBNR Reserve
Jul 20		$ 7,900,000		100%	$ -
Aug 20		$ 7,800,000		90%	$ 854,795
Sep 20		$ 6,700,000		70%	$ 2,834,615
Oct 20	$ 11,000,000	$ 4,100,000	75%		$ 4,150,000
Nov 20	$ 11,000,000	$ 2,400,000	75%		$ 5,850,000
Dec 20	$ 11,000,000	$ 300,000	75%		$ 7,950,000
Total	$ 33,000,000	$ 29,200,000			$ 21,639,410

4. Learning Objectives:

1. The candidate will understand and apply valuation principles for insurance contracts.

Learning Outcomes:

(1d) Reflect environmental factors in reserve calculations (trend, seasonality, claims processing changes, etc.).

(1e) Evaluate data resources and appropriateness for calculating reserves.

Sources:

Claim Reserve Model – How Actuaries Rely Upon the Claim Data They Receive, Long Term Care News, Sep 2008

Commentary on Question:

While few candidates received full credit for this question, the majority of candidates received a significant amount of partial credit. Typical issues included not addressing enough of the listed problems, simply restating the problems listed, or not providing the required level of detail.

Solution:

(a) Explain the problems these practices can cause in setting your claim reserves.

Commentary on Question:

To receive full credit, candidates needed to include an explanation of how the problem would impact the reserves. In cases where reserves would be impacted in a specific fashion (i.e., understated), the impact had to be included in order receive full credit.

In general, the issue with these problems is that while actuarial assumptions, such as continuance tables, are created from completed historical data, they are being applied to incomplete current data, which can result in biased calculations:

- Services may have been provided during the week prior to Friday, however the Actuaries only have data on services provided based on the prior file. This may result in higher termination probabilities than needed being applied, resulting in understated reserves.
- If concluded claims are more up-to-date than surviving claims, individuals with shorter claims may end up removed from the population, which results in continuance probabilities that are biased towards understating the reserves.
- By removing terminated claims from the file before the final expenses are submitted, reserves for those final payments may not be set up. Additionally, since those being removed are claimants who are about to terminate, continuance probabilities will end up biased towards understating the reserve.

4. Continued

- Certain claimant characteristics – region, type of provider, and health status of the spouse – can change during the year. If the Actuary does not receive up-to-date information, then any reserves that rely on these items may be materially impacted due to incorrect data.
- Both the closing of the office in August and the upgrading of the claim systems will impact the speed of claims processing and payments. If these impacts are not reflected in the continuance table and the lag development assumptions, the inconsistencies may result in distorted completion factors and IBNR reserves.

(b) Explain possible solutions to address the problems identified in part (a).

Commentary on Question:
For each problem, only one solution was necessary in order to receive full credit. In general, as long as the solution was reasonable and viable, it was accepted.

- The administrator can provide the claim and member information files on a daily basis instead of weekly. Alternatively, the actuaries can adjust the factors to account for the data lag, or add in an explicit margin into their reserves.
- The administrator can change their practice to update both terminated claims and surviving claims on a consistent basis. Alternatively, the actuaries can adjust their assumptions to account for the difference in timing.
- Theoretically, the actuary can keep every claim open that has ever been open, and develop and apply the continuance tables accordingly. Alternatively, the administrators could simply not remove these claimants, or the actuary can adjust their reserves to account for the missing final payments.
- The administrator can update the claimants' characteristics on a more regular basis (i.e., monthly), or the actuary can develop their assumptions using characteristics as of the prior January 1st, to be consistent with the provided data.
- The actuary should adjust their reserving methods and assumptions to account for the faster and/or slower claims processing and payments.

5. Learning Objectives:

2. The candidate will understand an actuarial appraisal.

Learning Outcomes:

(2a) Differentiate the components of an actuarial appraisal versus an embedded value.

(2b) Describe an approach for preparing an actuarial appraisal.

(2c) Describe risks associated with interpreting an actuarial appraisal and an embedded value.

(2d) Differentiate traditional, European, and market-consistent embedded value.

(2e) Describe the actuarial due diligence process.

(2f) Apply applicable Actuarial Standards of Practice.

Sources:
INSURANCE INDUSTRY MERGERS & ACQUISITIONS ch4
GHFV_130_19

Commentary on Question:
Most candidates did a better job in part C and part D, calculate the actuarial appraisal and describe reinsurance mechanisms. Part A is better and Part B.
Part B is challenging because it is a practical question.

Solution:

(a) Describe each of the components of an actuarial appraisal:

- Adjusted book value
- Value of in force business, and
- Value of future business capacity.

Commentary on Question:
Candidates need to explain the concepts, including accounting basis, definition, adjustments

· All amounts are calculated on a statutory basis.
· Projected profits for existing business and future new business are calculated on a best estimate basis (revenues less benefits and expenses)
Adjusted Book Value (ABV)
· Equal to the net worth of the business (statutory assets less statutory liabilities)

5. Continued

· Certain adjustments are typically reflected for the economic values of certain miscellaneous assets or liabilities that are not captured elsewhere in the valuation of the in force business. For example, the asset valuation reserve is typically included in the ABV.

Value of Inforce Business

· Present value of future profits from business that is currently on the books as of the valuation date.

· Typically an adjustment is made to reflect the opportunity cost of maintaining capital in the company to support the in force business in order to meet regulatory and management requirements

Value of Future Business Capacity

· Present value of future profits from business written after the valuation date.

· Reflects the opportunity cost of capital associated with the business

· Typically calculated for a certain number of years of new issues such as 5, 10 or 20.

(b) Describe how an embedded value analysis can be used to support an actuarial appraisal.

Commentary on Question:
To get full credits of this question, candidates need have clear understanding of IBV and VNB and their usage in actuarial appraisal. Examine historical data were missed by most candidates.

· Examine historical data
· Make assumptions on future growth
· modify IBV and VNB based on independent assumptions about future growth
· select a multiple of modified VNB to be added to modified EV

(c) Calculate the actuarial appraisal of the subsidiary. Show your work.

Commentary on Question:
Quite some candidates missed the concept, "actuarial value", so they used discount factor on first year value again,

Actuarial Appraisal Value = Adjusted Book Value (ABV) + Value of Inforce Business + Value of Future Business
Embedded Value = ABV + Value if Inforce Business
So Actuarial Appraisal Value = Embedded Value + Value of future business (2 points for reaching this conclusion)

5. Continued

Value of future business = 10 year Annuity due discounted at a rate of (1+12%)/(1+8%) – 1
Thus, the discount rate for the annuity calculation is 3.7%, and annuity due factor is 4.6554.

Value of future business = $15M (from problem) * 4.6554 (from above) = ~$70M
Actuarial Appraisal = $315M (from problem) + $70M (from last step) = $385M.

(d)

(i) List the primary reinsurance mechanisms available.

(ii) Describe advantages and disadvantages of the reinsurance mechanisms listed in part (i).

Commentary on Question:
Many candidates have clear understanding of reinsurance mechanisms.

Reinsurance Mechanisms:
(1) Assumption Reinsurance
(2) Indemnity Coinsurance
(3) Modified Coinsurance
Assumption Reinsurance:
Advantage: Business is removed from selling company books (cleanest approach for ceding company)
Disadvantage: Policy holder notification is required and many states require policyholder consent
Disadvantage: some tax disadvantages
Indemnity Coinsurance:
Advantage: Can be accomplished quickly with minimal disruption to policyholders
Advantage: Requires more limited regulatory approval
Advantage: Trust accounts may limit the credit exposure to the buyer or seller
Disadvantage: Selling company retains contractual obligation to policyholder – can be an issue if the assuming company goes under
Modified Coinsurance:
Advantage: Assets backing the liability remain with the ceding company
Disadvantage: Relatively uncommon

6. Learning Objectives:

1. The candidate will understand and apply valuation principles for insurance contracts.

Learning Outcomes:

(1a) Describe the types of claim reserves (e.g., due and unpaid, ICOS, IBNR, LAE, PVANYD).

(1d) Reflect environmental factors in reserve calculations (trend, seasonality, claims processing changes, etc.).

Sources:

GHFV-103-16: Health Reserves Lloyd p. 22

Indiv Health Ins Ch 6 p. 183

Group Ins Ch 37 p. 649

Group Ins Ch 38 p. 662

ASOP 5

Commentary on Question:

The key to 6A and 6B was providing rational justification for the selection of the reserving method in 6A and the ASOP 5 consideration in 6B. Many combinations of answers were acceptable so the justification became important.

Solution:

(a) You are provided with the following for which you will be recommending a claims reserve method:

(i) A small group medical block with 5 years of consistent experience on 100,000 members

(ii) A new short-term major medical block with no prior experience

(iii) A medical reinsurance coverage for which claims are infrequent, but very large when they occur

(iv) Statutory reserves on reported claims for a long-term disability (LTD) block

(v) Pending claims for an LTD block

(vi) Incurred but not reported (IBNR) claims for an LTD block

6. Continued

(vii) Liabilities associated with specific litigated claims, which are potentially very large

(viii) IBNR claims in the most recent incurred month, for medical coverage of a very large employer group

Recommend a claim reserve method for each of the above. Justify your answers.

Commentary on Question:
Many reserve methods could apply to each situation. Points were given for reasonable alternative answers.

Minimal points were awarded if there was no reasonable justification connecting it to the situation (e.g. just writing "lag development method" with no justification should get no points.)

In general, the question was answered well with most candidates receiving at least half of the marks. Where they struggled was with the projection method (not well understood). Candidates that did poorly either ran out of time or did not provide justification for their answers.

(i) **Lag development method -** Due to large highly credible size and multiple years of consistent experience, you can derive reliable patterns for projecting IBNP.

(ii) **Loss ratio method** - Without experience, patterns for lag development or factor projection methods do not exist. Apply the loss ratio from pricing estimates to the premium.

(iii) **Case reserves** can be set for known claims that can be large. For IBNR, you can try lag development, but it might be unreliable due to infrequent claims, in which case you can use the loss ratio method.

(iv) **Tabular method** can be used to project out costs for future years on known LTD claims. Particular tables may be required under statutes.

(v) Similar method as for open LTD claims (**Tabular method**), but applying a factor reflecting the probability that the pending claim will become an open claim.

(vi) **Projection method** – Lag method might not work well because claims can last for years. Projection method trending forward historical claims per exposure, and applying that to current exposure, may work best.

6. Continued

(vii) **Case reserves method** – May require legal and claims expertise to estimate the outcome of litigation.

(viii) **Projection method** – the lag method becomes unreliable in the recent months because the low completion factor highly leverages the claims. Therefore, trending forward past claim rates should be more reliable.

(b) Describe a different consideration for each of the above in estimating incurred claims as described in ASOP 5.

Commentary on Question:
Many ASOP 5 considerations apply to each situation. Minimal points were awarded if there was no reasonable explanation connecting it to the specific situation (e.g. just writing "Credibility" with no explanation should get no points.)

This section was the most difficult to grade in the sense that many candidates understood ASOP 5 and used the same 3 or 4 considerations multiple times in the response which meant that only some of the grading points were earned.

Like in Part 6A justification was an issue and lacking more in 6B

(i) **Health benefit plan provisions** - The timing and amount of reserves for small group medical plans are affected by deductibles and provider network restrictions. Pre-existing condition limitations would also reduce costs, but under the Affordable Care Act are not permitted.

(ii) **Credibility -** No experience data is available from this block. The actuary should consider whether other credible data is available from pricing or from other similar blocks and refer to ASOP 25 on credibility procedures.

(iii) **Organizational claims administration -** Large infrequent reinsurance claims take a long time to process, so are significantly affected by changes in administrative practices like staffing levels and processing time.

(iv) **Legislative requirements -** Statutory LTD reserves often must be set using methods and assumptions mandated by governments, which the actuary must consider and abide by.

(v) **Behavior of claimants -** LTD claims are significantly affected by claimant behavior – for example, when unemployment rates are high more people make disability claims and they remain on disability longer.

6. Continued

(vi) **Large claims -** LTD IBNR claims are often set using the lag development method, and large claims may distort the claim patterns. For example, if the processed claims contain extraordinarily large claims, incurred claim estimates may be overstated.

(vii) **COB, subrogation, and government programs -** In very large litigated claims, there often may be other coverages with some portion of the liability, so that subrogation recoveries may apply.

(viii) **Claim seasonality -** When estimating medical IBNP for a single month, the level of incurred claims can vary significantly from month to month. For example, January claim levels may be much lower than December claims levels, as claimants are less likely to exceed deductibles that reset January 1.