GH SPC Model Solutions
Fall 2014

1. Learning Objectives:

1. The candidate will understand pricing, risk management, and reserving for individual long duration health contracts such as Disability Income, Long Term Care, Critical Illness, and Medicare Supplement.

Learning Outcomes:

(1a) Identify difference between short-duration and long-duration pricing and reserving methods.

(1b) Understand and utilize experience studies in setting assumptions for long-duration contracts.

Sources:

GHS-101-14: Pricing Medicare Supplement Benefits, Sections IV & V

Commentary on Question:

Overall candidate performance was very strong on this question. Candidates should continue to focus on providing the appropriate amount of detail requested in questions such as this one. Most candidates seemed to understand the calculation portion well.

Solution:

(a) Describe the key requirements of NAIC model regulations for Medicare Supplement plans.

- For group policies, minimum loss ratio is 75%
- For individual policies, minimum loss ratio is 65%
- To satisfy LR requirements, 3 loss ratios must meet these thresholds: 1 current loss ratio, 2 3rd year loss ratio, 3 future loss ratio
- Plans must have benefit designs that meet Medicare standards
- Guaranteed issue is required
- No preexisting condition exclusions
- Rate increases must be justified
- States vary in how much they review Med Supp rate increases.
- Rates should be sustainable under moderately adverse conditions

(b) Describe the key areas where there may be variations in Medicare Supplement laws among states that have adopted the NAIC model regulation.

1. Continued

(c)

- Whether rating or gender is allowed
- How much each state reviews Med Supp rate increases & filings
- Attained age v. issue age v. community rated – some states only allow one or two types
- Whether smoking status can be used
- Loss ratio basis

(d) Describe different rating methodologies used for Medicare Supplement policies.

- Issue age – plan rated on age at issue. Level premiums used, significant policy reserves needed.
- Attained age – plan rated based on age as of each policy year. Premiums increase over life. Reserves not as significant.
- Community rating – all ages priced equally. Rates increase or decrease each year depending on morbidity and trends

(e) Calculate which Medicare Supplement Plan F, from Carrier 1 or Carrier 2, would be least expensive over the life of the policy for the two Medicare-eligible relatives:

(i) Paul, who just turned 72 and expects to live for 12 years, and

(ii) Jeff, who just turned 58 and expects to live for 20 years.

Show your work.

Paul	Carrier 1	Carrier 2
	3 y @ 205 PMPM 9 y @ 225 PMPM	12 y @ 225
	3*12*205+9*12*225	12*12*225
	$31,680	$32,400
	Pick Carrier 1	

Jeff	Carrier 1	Carrier 2
	12y@175 5y@205 3y@225	20y@195
	12*12*175+12*5*205 +12*3*225	12*20*195
	$45,600	$46,800
	Pick Carrier 1	

1. Continued

(f) Calculate the monthly community rate that would be financially equivalent to the least expensive option determined above for:

(i) Paul and

(ii) Jeff.

Show your work.

(i) Paul: $31,680/144 = $220 PMPM

(ii) Jeff: $45,600 / 240 = $190 PMPM

2. Learning Objectives:

2. The candidate will understand and evaluate the risk associated with health insurance and plan sponsorship and recommend strategies for mitigating the risk.

Learning Outcomes:

(2a) Evaluate an enterprise risk management (ERM) system, including
- Describing the components on an ERM program.
- Discussing ERM risks and risks specific to the health insurance industry.
- Describing and recommending methods used to analyze, evaluate and mitigate the risks.

(2b) Complete a capital needs assessment.
- Calculate capital needs for a given insurer.
- Determine actions needed to address issues identified by assessment.
- Describe components of an Economic Capital model.

Sources:

Ch. 47, Enterprise Risk Management for Group Health Insurers

Chapter 1, An introduction to enterprise risk management
Chapter 7, Definitions of risk
Chapter 8, Risk identification
Chapter 18, Economic capital

GHS-105-14: Mapping of Health Company Risks

GHS-107-14: MCCSR Guideline 2013, Office of the Superintendent of Financial Institutions (OSFI)

Sections: 1 (excluding 1.2.6), 2.1, 3.1, 4.1, 4.2, 4.3, 4.4, 5.1, 5.2, 10.1, 10.2, 10.3, 10.4, 10.6
GHS-108-14: Group MCCSR Calculation Study Note 2010

Commentary on Question:

Performance was varied on this question. Candidates should remember that all sections of the syllabus are testable on the examination, and to provide equal relative focus for all topics, irrespective of nation-specificity of the topic or the nation the candidate works in.

Overall, many candidates performed well on the identification/recall portions of this item, but many performed poorly on the calculation section.

Solution:

(a) Explain the significance and propose a mitigation strategy for two enterprise risks GenLife would be exposed to upon acquisition of RealHealth.

2. Continued

Identification of risks two risks, which could potentially include:

- Market and economic risk
- Credit risk
- Liquidity risk
- Systemic risk (specifically demographic risk)
- Non-life insurance risk (including underwriting risk, volatility risk, catastrophe risk, trend risk)

Operational risks (including regulatory risk, technology risk, crime risk, people risk, legal risk, process risk, model risk, data risk, reputational risk, project risk, strategic risk)
Residual risks

Other risks, not included above, can still be appropriate if accompanied by a coherent and detailed explanation.

For each risk write a coherent and detailed explanation of that risk is relevant to the acquisition of RealHealth. For example:

Liquidity risk is a particular concern due to the trade-off between the liquidity of the assets used to purchase RealHealth, which is a comparatively illiquid asset. Presumably GenLife, at least in the short term, may experience added pressure on its liquidity. Additionally, the reduction in GenLife's overall liquidity may affect the regulatory capital required to be held. GenLife should be prepared for the possibility of liquefying a portion of their assets though sale, use as collateral, or through maturity or periodic payments such as dividends and coupons in order to address this risk.

For each risk write a coherent and well thought-out mitigation strategy for that risk. For example:

GenLife can mitigate its demographic risk, specifically in regards to its catastrophe risk, through risk transfer to a reinsurance company. For example, GenLife can reinsure all individual claims above $25,000. The reduced risk on GenLife would also help alleviate some of the regulatory capital pressures.

(b) Explain the difference between Tier 1 and Tier 2 capital, as defined by Office of the Superintendent of Financial Institutions (OSFI).

This question is not asking for the definition of Tier 1 and Tier 2 capital. It is asking for the difference between the two. Section 2.1 (page 9 of the MCCSR document) sums it up nicely: "If there can be some doubt as to the availability of capital (i.e., retraction privileges, uncertainty as to realizable values), it is classified as tier 2."

2. Continued

We also gave some credit for identification of some tier 1 and tier 2 instruments or details about their use.

(c) Assuming there are no reinsurance treaties in place,

(i) Calculate the morbidity component of the Minimum Continuing Capital and Surplus Requirement (MCCSR) for GenLife's group health block of business when RealHealth is acquired.

(ii) Calculate the morbidity component of the MCCSR assuming $5,000,000 of the premium for RealHealth's insured products has a hold-harmless arrangement in place.

(iii) Calculate the adjusted net Tier 1 capital for RealHealth assuming RealHealth has intangible assets equal to 15% of their gross Tier 1 capital and no other available deductions.

Show your work.

(i) Calculate the component requirement, M, for the post-merger company.

Mtotal = MGenLife (pre-merger) + MRealHealth (pre-merger)

MGenLife (pre-merger) = $10,000,000 (given)
MRealHealth (pre-merger) = 12% of annual premiums, with no adjustment for IBNR (as it is assumed to be settle within 1 month of incurral).
There is no component required for ASO contracts. So:
MRealHealth (pre-merger) = 12% * $6,700,000 = $804,000

Mtotal = $10,000,000 + $804,000 = $10,804,000

Calculate the statistical fluctuation factor, SFF, for the post-merger company.

The exam writer must first identify that M is greater than the threshold for the application of an SFF (which is $9,000,000). Once identified, the calculation of the SFF is:

SFF(M) = 0.7 + 900/sqrt(10,804,000) = 0.9738

Calculate the morbidity component

2. Continued

The exam writer should identify that as there are no reinsurance treaties in place and deficits cannot be re-couped, then no further adjustments apply. So the final morbidity component is:

Morbidity Component = SFF * M = 0.9738 * $10,804,000 = $10,520,935

We also accepted a morbidity component of SFF * M = 0.9738 * $804,000

(ii) The hold-harmless arrangement affects the calculation. Specifically, the hold-harmless arrangement affects the component requirement, M, and because RealHealth's clients are government entities, further adjustment applies.

Mrevised = $5,000,000 * 12% * 5% + $1,700,000 * 12% = $234,000
SFFrevised = 0.7 + 900/sqrt(234,000) = 0.9813
Morbidity Component revised = $10,234,000 * 0.9813 = $10,042,624

(iii) Intangible assets in excess of 5% of gross tier 1 capital is an applicable deduction. So the appropriate deduction is 10% of gross tier 1 capital, implying that the answer is 90% of gross tier 1 capital.

We took off points if the exam writer multiplied 90% times the morbidity component since the deduction applies to available capital, not to required capital.

(d) Explain the impact to the morbidity component of the MCCSR from purchasing reinsurance.

- Premium inputs that are components of the morbidity calculation should be determined net of all reinsurance, which is deemed to be registered.
- There's limitations of ceding to an unregistered reinsurer. Specifically, there is a maximum by which the morbidity component may be reduced::
  SFF0 * M0 – SFF1 * M1, where:
  - M0 is the gross morbidity requirement calculated net of registered reinsurance only, before adjustment for statistical fluctuation;
  - M1 is the gross morbidity requirement calculated net of both registered reinsurance and the specific reinsurance agreements backed by the deposit, before adjustment for statistical fluctuation;
  - SFF0 is the statistical fluctuation factor corresponding to a calculated component requirement of M0, and
  - SFF1 is the statistical fluctuation factor corresponding to a calculated component requirement of M1.

3. Learning Objectives:

3. The candidate will understand an actuarial appraisal.

Learning Outcomes:

(3a) Differentiate the components of an actuarial appraisal versus an embedded value.

Sources:

GHS-111-14: Components of Insurance Firm Value and the Present Value of Liabilities

SOA Embedded Value Calculation for a Life Insurance Company

GHS-112-14: Simple Embedded Value Example

Commentary on Question:

More candidates received credit for part B of this question than part A. Partial credit was given for students that included the formula for embedded value in their response.

Solution:

(a) Calculate the Embedded Value of the block of business as of 12/31/13 for 3 years.

Given Data From Financials - Effectively Shows Year 0 Calc, Have to Calc to Years 1, 2, and 3 by rolling forward with interest

Year 1

Year	Post-tax target profit	Post-tax Interest on Capital	Capital Cashflow
0			
1			
2	$58	$16	$72
3	$52	$15	$573

Calculate In - Year Values

Year	PV Post-Tax Profit	PV Capital Cashflow
2	52.94	65.62
3	44.18	482.17
	97.12	547.79

Discounted capital cashflow at the end of year 0	$547.79
Capital at end of year 1	$614
Cost of Capital	($66.12)
Discounted post tax target profits	$97.12
Embedded Value at end of year 1	**$31.00**

3. Continued

Year 2

Year	Post-tax target profit	Post-tax Interest on Capital	Capital Cashflow	Year	PV Post-Tax Profit	PV Capital Cashflow
0						
1						
2						
3	$52	$15	$573		$48.15	$525.57

Discounted capital cashflow at the end of year 0	$525.57
Capital at end of year 1	$558
Cost of Capital	($32.78)
Discounted post tax target profits	$48.15
Embedded Value at end of year 2	**$15.37**

Year 3
Embedded Value = 0 since assumed premium and required capital = $0 at end of year 2

(b) Calculate the embedded value as of December 31, 2014 assuming the sale did not occur. Show your work.

It's one year later and the sale of the dental block of business did not go through because there wasn't a good fit between Urban Insurance and the potential buyers of the block.

Year	Post-tax target profit	Post-tax Interest on Capital	Capital Cashflow
1			
2	$58	$16	$72
3	$52	$15	$573

3. Continued

Discounted capital cashflow at the end of year 1	$547.79
Capital at end of year 1	$614
Cost of Capital	($66.12)
Discounted post tax target profits	$97.12
Embedded Value at end of year 1	**$31.00**

OR

	EV(0)	$47.01
Plus	one year discount on EV(0)	$4.23
Plus	one year of discount on capital	$60.75
Less	one year of interest on capital	-$18
Less	after tax expected profits in 0	-$63
		$31.00

4. Learning Objectives:

4. The candidate will understand and apply risk adjustment in the context of predictive modeling.

Learning Outcomes:

4(a) Develop and evaluate risk adjustments based on commonly used clinical data and grouping methods

4(b) Apply risk adjustment to underwriting, pricing, claims and care management situations

4(c) Describe typical predictive modeling techniques

4(d) Evaluate the appropriateness of each technique

Sources:

Healthcare Risk Adjustment and Predictive Modeling, Duncan

- Chapter 1, Introduction to Health Risk
- Chapter 14, Risk Adjustment in Medicare

Commentary on Question:

The goal was to understand risk adjustment and the CMS-HCC risk model, calculate a CMS-HCC risk score, and use the risk score to determine a total monthly payment.

Solution:

(a) Compare risk adjustment to:

(i) risk prediction, and

(ii) case mix adjustment.

Commentary on Question:

There was a tendency by some students to go into more detail than was necessary but many students still received most of the grading points.

(i) Risk Adjustment

- Normalizes populations
- Applied to historical data

Risk Prediction

- Used to predict future costs
- Allows targeting of high risk members

4. Continued

(ii) Case Mix Adjustment
- Another method to compare populations
- Special case of risk adjustment

(b) Outline the two most prevalent theories for the member selection patterns observed in Medicare MCOs versus traditional Medicare FFS.

Commentary on Question:
To receive full credit, students needed to mention both MCOs and FFS.

1. MCOs restrict access to providers. Healthy enrollees are not as concerned about the restrictions, so MCOs can draw healthier people in their plans.

2. Unhealthy people are more likely to have established relationships with their health care providers, so they prefer FFS.

(c)

(i) Identify the factors the CMS-HCC Risk Model considers in developing a beneficiary-specific risk score.

(ii) Describe factors listed in (c)(i).

Commentary on Question:
The vast majority of the students got full points on this part.

- Demographics – age/gender
- Disabled – use separate factors
- LTC institution – use separate factors
- ESRD – use separate factors
- New enrollees – don't have history so can only use age/gender
- Disease specific status – uses disease groups, hierarchies and interactions

(d) Calculate the CMS-HCC risk score for a female member aged 73 who was originally disabled and has documented HCCs 10, 11, 12, 51, and 70. Show your work.

Commentary on Question:
This part was done well by most students, although some students overlooked the interactions and the hierarchies.

4. Continued

- 0.51 for female aged 73
- 0.32 for originally disabled
- Only count HCC12 due to hierarchies
- 0.41 for HCC12
- 0.07 for HCC51
- 0.32 for HCC70
- 0.07 for HCC12 & HCC70 interaction

Risk score = 1.70 = 0.51 + 0.32 + 0.41 + 0.07 + 0.32 + 0.07

(b) Calculate the total monthly payment to Green Bear for the member described in Part (d) above, assuming that the standardized county MA bid = $725 PMPM, the standardized county MA benchmark = $790 PMPM, and the Supplemental Member Premium = $20 PMPM. Assume the rebate is 75% of savings. Show your work.

Commentary on Question:
Students were given full credit for this part if all of the math was done correctly even if they used an incorrect factor from part (D). A common mistake was to apply the 1.70 factor to the 75% savings factor. Another common mistake was to forget the supplemental premium. Either mistake still resulted in partial credit if the student showed his or her work and got the other parts correct.

Government payment = bid * risk adjustment score + 75% * (benchmark – bid)
= 725 * 1.70 + 75% * (790 – 725)
= 1,281.25

Total payment to MCO = Government payment + Supplemental member premium
= 1,281.25 + 20.00
= 1,301.25