
SOCIETY OF ACTUARIES
Group and Health – Design & Pricing

Exam DP-GH

MORNING SESSION

Date: Thursday, November 1, 2007

Time: 8:30 a.m. – 11:45 a.m.

INSTRUCTIONS TO CANDIDATES

General Instructions

1. This examination has a total of 120 points. It consists of a morning session (worth 60 points) and an afternoon session (worth 60 points).
 - a) The morning session consists of 10 questions numbered 1 through 10.
 - b) The afternoon session consists of 11 questions numbered 11 through 21.

The points for each question are indicated at the beginning of the question.
2. Failure to stop writing after time is called will result in the disqualification of your answers or further disciplinary action.
3. While every attempt is made to avoid defective questions, sometimes they do occur. If you believe a question is defective, the supervisor or proctor cannot give you any guidance beyond the instructions on the exam booklet.

Written-Answer Instructions

1. Write your candidate number at the top of each sheet. Your name must not appear.
2. Write on only one side of a sheet. Start each question on a fresh sheet. On each sheet, write the number of the question that you are answering. Do not answer more than one question on a single sheet.
3. The answer should be confined to the question as set.
4. When you are asked to calculate, show all your work including any applicable formulas.
5. When you finish, insert all your written-answer sheets into the Essay Answer Envelope. Be sure to hand in all your answer sheets since they cannot be accepted later. Seal the envelope and write your candidate number in the space provided on the outside of the envelope. Check the appropriate box to indicate morning or afternoon session for Exam DP-GH.
6. Be sure your written-answer envelope is signed because if it is not, your examination will not be graded.

Tournez le cahier d'examen pour la version française.

****BEGINNING OF EXAMINATION****
DP-GH: GROUP AND HEALTH – DESIGN & PRICING
Morning Session

- 1.** (4 points) You are the actuary in charge of pricing and underwriting for Super Big Insurance Company. Your Chief Medical Officer wants to invest in a predictive model to use in disease management. He told the CEO that your area should share in the cost of the model because you can use it for underwriting and pricing.
- (a) Describe the advantages and disadvantages of using predictive models for underwriting.
 - (b) Describe the technical and practical questions you would ask before agreeing to consider the model proposed by the Chief Medical Officer.

- 2.** (7 points) The Chief Marketing Officer of a managed care organization has come to you to assist in developing a new product. You are preparing for your first meeting with the product development team.
- (a) Describe a process for evaluating the need for a product.
 - (b) Describe network development issues.
 - (c) Discuss provider reimbursement options for managed care products.
 - (d) Describe measures of network performance.
 - (e) Outline strategies employed to maximize network performance.

3. (8 points) You are a consultant with EGO consulting services. You have been given the following information for an established health insurance company:

<u>Year 1 Allowed Changes PMPM</u>	
Hospital & Other Facility Services	\$130.00
Medical Expense (All Professional Services)	\$90.00
<u>Value of Copayments</u>	<u>\$25.00</u>
Net Charges	\$195.00

There is no interest income and no premium taxes are paid. Overhead costs are 10% of total premium and a 6% profit is targeted. Assume 12% trend in Year 2. No plan benefit changes are made.

	Number of Contracts	Number of persons per Contract	Ratio to Single Rate
Single	50%	1	1.0
Couple	20%	2	2.2
Employee-Child	20%	2.3	1.8
Family	10%	4	3.8

- Calculate the HMO Capitation Rate for the third quarter of Year 1, using the costs per member per month given above. Show your work.
- Calculate the 4-tier premium rates using the distribution of employees above for the third quarter. Show your work.
- Calculate the 2-tier premium rates. Show your work.
- Discuss methods that could have been used to develop the 12% trend factor from historical data.
- Describe common challenges and problems in the trend measurement and analysis process.

4. (6 points) Group Health Company is going to expand into Area A in 2008 and projected a 2008 loss ratio of 80%. The following table summarizes the loss ratio and membership experience by area for Group Health:

Area	Actual		Expected		
	2005 Loss Ratio	2006 Loss Ratio	2005 Loss Ratio	2006 Loss Ratio	2008 Projected Members
A	N/A	N/A	N/A	N/A	10,000
B	80%	82%	75%	76%	500
C	90%	93%	92%	94%	700
D	65%	65%	64%	66%	800
E	70%	70%	65%	65%	300
Total					12,300

- (a) (5 points) Using an empirical approach that assumes credibility for the Group Health prior loss ratio experience, calculate the following:
- (i) Credibility factor to apply to Group Health experience.
 - (ii) Projected 2008 loss ratio for Group Health using 2006 experience.
 - (iii) Projected 2008 loss ratio for Group Health including the expansion.

Show your work.

- (b) (1 point) Describe sources of estimation error using this estimate.

5. (8 points) You have decided to use the asset-share method to price a block of individual medical products. One of the rating cells has the following pricing assumptions:

<u>Duration</u>	<u>Lapse</u>	<u>Premium</u>			<u>Investment</u>	
		<u>Trend</u>	<u>Loss Ratio</u>	<u>Expenses</u>	<u>Commissions</u>	<u>Income</u>
1	40%	10%	45%	30%	35%	3%
2	30%	10%	60%	15%	5%	3%
3	15%	10%	65%	15%	5%	3%
4	10%	10%	70%	15%	5%	3%

The above table has lapses expressed as percentage of policies and all other values expressed as percentage of premium.

Assume the following:

- Target profit margin after tax is 6% based on the percentage of premium method.
- All cash flows occur at the beginning of the year
- 10% discount rate for percentage of premium profitability
- 35% federal income tax rate
- 4 year pricing horizon.

Based on the assumptions and a “test” premium of \$3,000 per policy, you calculated the following (in thousands) for the rating cell block:

<u>Duration</u>	<u>Amounts in 1000's</u>				
	<u>Earned Premium</u>	<u>Incurred Claims</u>	<u>Administrative Expenses</u>	<u>Commissions</u>	<u>Investment Income</u>
1	3,000	1,350	900	1,050	90
2	1,980	1,188	297	99	59
3	1,525	991	229	76	46
4	1,426	998	214	71	43

5. Continued

- (a) (4 points) Determine whether the \$3,000 premium per policy is sufficient to meet the profit target. Show your work.
- (b) (2 points) You are setting lapse assumptions for pricing individual medical and disability insurance:
 - (i) List factors to be considered when choosing lapse assumptions.
 - (ii) Describe characteristics for each factor that may have an impact on lapse rates.
- (c) (2 points) Discuss steps and considerations when using the loss ratio method to calculate renewal rates.

6. (6 points) Your company's Chief Medical Office has asked you to evaluate the savings of your company's disease management program. Your company insures 1,000,000 members in your state of which 20,000 members participate in the disease management program.

- (a) (4 points) Describe control, non-control, and statistical methods that may be used when selecting your test population including:
 - (i) uses in practice.
 - (ii) applicability of each to your population.
- (b) (2 points) Discuss program metrics that should be explicitly recognized when evaluating your program.

7. (7 points) You are the pricing actuary assigned to develop rates for an experience rated group. You are given the following information to be used in calculating the group's renewal rate for 2008.

Experience Period:	July 2006-June 2007
Average Monthly Number of Employees:	200
Opening reserve:	\$200,000
Closing Reserve:	\$230,000
Expected Incurred Claims after pooling:	\$1,000,000
Actual Paid Claims:	\$1,200,000
Estimated claims increase (based on year ending in June 2007) due to change in government program to be effective in 2008:	\$60,000
Pooling threshold	\$50,000 per insured individual
Pooling charges for \$50,000	\$70 per employee per month
Claims Trend for Rating on all benefits:	10% per year
Administration Expense Load:	\$40 per employee per month
Target Profit margin:	4% of premium
Premium Tax:	2% of premium
Commission:	3% of premium
Credibility Formula:	$C = \text{Employee months}/6,000$, maximum $C = 1$

Large Claim Report	Total Claims Paid
Claimant 1	125,000
Claimant 2	75,000

- (a) Calculate the renewal rate per employee per month for the period January 2008 – December 2008. Show your work.
- (b) If you were required to calculate retrospective experience financial results:
- Identify the additional information you would require.
 - Describe the application of this additional information in the calculation.

- 8.** (5 points) You are asked to evaluate the results of a pilot disease management program that ABC insurance put in place for 150,000 of its beneficiaries. ABC provides health insurance to 3.2 million members.

You are given the following information:

	2005	2006
Average Membership	125,000	150,000
Identified chronic population (members)	7500	9750
Chronic admissions	22,500	27,000
Cost per admission	\$8,250	\$8,500

- Inpatient admission trend for ABC is 4.1%
 - Program costs are \$2.25 PMPM
- (a) Calculate the expected 2006 return on investment for this program. Show your work.
- (b) Describe issues you should consider when presenting these results.
- (c) Discuss legal implications associated with medical management programs.

9. (6 points) You are an employee of Acme Inc., a U.S. company. You are given the following benefit options:

	<i>Option 1</i>	<i>Option 2</i>	<i>Option 3</i>
Plan	Traditional PPO	PPO with HRA	PPO with HSA
Deductible	\$500	\$2,000	\$3,000
Coinsurance	80%/20%	80%/20%	80%/20%
Out-of-Pocket Maximum (includes deductible)	\$2,000	\$3,000	\$5,000
Employer fund contribution	N/A	\$1,000 HRA	\$500 HSA
Employee monthly contribution	\$100	\$50	\$25

Your anticipated claims:

\$2000	Medical and Rx
\$200	Dental
\$100	Vision

- None of the plans cover dental or vision under their medical benefits
 - You are single
 - Your income tax rate is 30%
 - Current year maximum HSA contribution is \$2600
- (a) Describe different types of account-based plans and issues to consider when using account-based plans.
- (b) Calculate your expected out-of-pocket expense for each of the options including any applicable tax savings:
- (i) Assuming you do not contribute to HSA.
 - (ii) Assuming you make the maximum contribution to the HSA.

Show your work.

10. (3 points) Describe typical goals of an Integrated Delivery System (IDS) and services an actuary could provide to an IDS.

****END OF MORNING SESSION****