

Exam 5



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Exam 5

Basic Techniques for Ratemaking and Estimating Claim Liabilities

4 HOURS

INSTRUCTIONS TO CANDIDATES

1. This 57.25 point examination consists of 25 problem and essay questions.
2. For the problem and essay questions, the number of points for each full question and part of a question is indicated at the beginning of the question or part. Answer these questions on the lined sheets provided in your Examination Envelope. Use dark pencil or ink. Do not use multiple colors or correction fluid/tape.
 - Write your Candidate ID number and the examination number, 5, at the top of each answer sheet. Your name, or any other identifying mark, must not appear.
 - Do not answer more than one question on a single sheet of paper. Write only on the front lined side of the paper – **DO NOT WRITE ON THE BACK OF THE PAPER**. Be careful to give the number of the question you are answering on each sheet. If your response cannot be confined to one page, please use additional sheets of paper as necessary. Clearly mark the question number on each page of the response in addition to using a label such as “Page 1 of 2” on the first sheet of paper and then “Page 2 of 2” on the second sheet of paper.
 - The answer should be concise and confined to the question as posed. When a specific number of items is requested, do not offer more items than the number requested. For example, if three items are requested, only the first three responses will be graded.
 - In order to receive full credit or to maximize partial credit on mathematical and computational questions, you must clearly outline your approach in either verbal or mathematical form, showing calculations where necessary. Also, you must clearly specify any additional assumptions you have made to answer the question.
3. Do all problems until you reach the last page of the examination where "END OF EXAMINATION" is marked.

CONTINUE TO NEXT PAGE OF INSTRUCTIONS

4. Prior to the start of the exam you will have a **fifteen-minute reading period** in which you can silently read the questions and check the exam booklet for missing or defective pages. A chart indicating the point value for each question is attached to the back of the examination. Writing will NOT be permitted during this time and you will not be permitted to hold pens or pencils. You will also not be allowed to use calculators. The supervisor has additional exams for those candidates who have defective exam booklets.
 - Verify that you have received the reference materials:

Insurance Services Office, Inc., Personal Automobile Manual (Effective 6-98),
General Rules 1-6.
5. Your Examination Envelope is pre-labeled with your Candidate ID number, name, exam number and test center. Do not remove this label. Keep a record of your Candidate ID number for future inquiries regarding this exam.
6. Candidates must remain in the examination center until two hours after the start of the examination. The examination starts after the reading period is complete. You may leave the examination room to use the restroom with permission from the supervisor. To avoid excessive noise during the end of the examination, candidates may not leave the exam room during the last fifteen minutes of the examination.
7. At the end of the examination, place all answer sheets in the Examination Envelope. Please insert your answer sheets in your envelope in question number order. Insert a numbered page for each question, even if you have not attempted to answer that question. Nothing written in the examination booklet will be graded. Only the answer sheets will be graded. Also place any included reference materials in the Examination Envelope. BEFORE YOU TURN THE EXAMINATION ENVELOPE IN TO THE SUPERVISOR, BE SURE TO SIGN IT IN THE SPACE PROVIDED ABOVE THE CUT-OUT WINDOW.
8. If you have brought a self-addressed, stamped envelope, you may put the examination booklet and scrap paper inside and submit it separately to the supervisor. It will be mailed to you. Do not put the self-addressed stamped envelope inside the Examination Envelope. Interoffice mail is not acceptable.

If you do not have a self-addressed, stamped envelope, please place the examination booklet in the Examination Envelope and seal the envelope. You may not take it with you. Do not put scrap paper in the Examination Envelope. The supervisor will collect your scrap paper.

Candidates may obtain a copy of the examination from the CAS Web Site.

All extra answer sheets, scrap paper, etc. must be returned to the supervisor for disposal.
9. Candidates must not give or receive assistance of any kind during the examination. Any cheating, any attempt to cheat, assisting others to cheat, or participating therein, or other improper conduct will result in the Casualty Actuarial Society and the Canadian Institute of Actuaries disqualifying the candidate's paper, and such other disciplinary action as may be deemed appropriate within the guidelines of the CAS Policy on Examination Discipline.
10. The exam survey is available on the CAS Web Site in the "Admissions/Exams" section. Please submit your survey by May 15, 2015.

END OF INSTRUCTIONS

1. (1.5 points)

Given the following information for an ISO Personal Automobile Policy:

Primary Classification	Factor
Pleasure use	1.00
Work less than 15 miles	1.07
Work 15 or more miles	1.18
Farm use	0.82
Business use	1.25

Secondary Classification	Factor
0	0.30
1A	0.70
1B	0.75
2	1.20
3	1.80
4	2.50

- The policy has one 30-year-old driver who uses the vehicle to commute 10 miles to work one day per week.
- The driver has been licensed for more than two years and has no driving record points.
- The policy term is one year.
- The total premium is \$1,480.
- The expense fee is \$80 per policy.
- The policy coverages are Bodily Injury Liability and Property Damage Liability only.
- Only auto usage and safe driver insurance plan (SDIP) are used to determine primary and secondary classification.
- The policy is a single-car policy.

At six months into the policy term, a second driver is added as an operator with the following characteristics:

- 17 years old.
- Has been licensed for less than two years.
- Has 2 driving record points.
- Uses the vehicle 3 days per week to commute 10 miles to school.

Calculate the premium change in dollars for adding the new driver to the policy for the remainder of the policy term.

2. (2 points)

An insurer is considering changing the exposure base for a commercial auto line of business to one of the following:

- i. Annual fuel expense
- ii. Number of miles driven

Using three relevant actuarial criteria, evaluate the effectiveness of each of these potential exposure bases and provide a recommendation for the preferred exposure base.

3. (3 points)

Given the following information for an insurance product:

Time Period	Written Car Years
January 1 through June 30, 2013	106.0
July 1 through December 31, 2013	107.5
January 1 through June 30, 2014	210.0
July 1 through December 31, 2014	45.0

- All policies written before January 1, 2014 had a six-month policy term.
- All policies written from January 1, 2014 onwards had an annual policy term.

a. (1.25 points)

Calculate the earned car years for calendar year 2014, assuming that policies were written uniformly throughout each period.

b. (1.25 points)

Assume new policies in 2014 were written uniformly over the year and the retention ratio prior to the policy term change was 77%. Assess the effect of the policy term change on the retention ratio.

c. (0.5 point)

Assess the appropriateness of the assumption of uniform writings in the calculation of calendar year 2014 earned car years.

4. (2.25 points)

Given the following information:

- Policies are written on an annual basis.
- Proposed rates will be in effect from January 1, 2016 to January 1, 2017.
- Calendar year 2014 earned premium = \$100,000.
- Beginning with July 1, 2012 renewals, the minimum deductible was increased from \$500 to \$1,000.
- The premium impact of any law change is applicable to all policies, including those in-force.
- The rate change history is as follows:

Effective Date	Overall Change	Type of Change
April 1, 2014	+5%	Law
July 1, 2014	+3%	Rate
July 1, 2015	-7%	Rate

- The annual premium exponential trend fit based on data for the 12 months ending each quarter evaluated through December 31, 2014 is as follows:

Calendar Year Ending	Average Earned Premium at Current Rate and Law Level
March 2012	\$510.00
June 2012	\$512.50
September 2012	\$499.50
December 2012	\$489.00
March 2013	\$481.00
June 2013	\$473.00
September 2013	\$477.50
December 2013	\$481.50
March 2014	\$487.00
June 2014	\$492.50
September 2014	\$496.00
December 2014	\$502.00

Number of Points	Annual Exponential Trend Fit
12 point	-0.5%
8 point	2.2%
6 point	3.4%
4 point	3.1%

Calculate the trended calendar year 2014 earned premium at current rate level. Include justification of the premium trend selection.

5. (2.5 points)

Given the following information for a boat owners insurer:

- On July 1, 2014, a rate change of +10% went into effect.
- 2014 earned premium = \$1,000.
- Policies are written on an annual basis.

a. (0.75 point)

Assuming uniform writings, calculate the calendar year 2014 on-level earned premium using the parallelogram method.

b. (1.25 points)

Due to the seasonality of boat owners coverage, assume that the policy distribution of the book of business was as follows (with uniform distribution within each quarter):

Quarter 1	10%
Quarter 2	50%
Quarter 3	30%
Quarter 4	10%

Calculate the calendar year 2014 on-level earned premium, accounting for this assumed policy distribution.

c. (0.5 point)

For the scenario in part b. above, describe another approach the insurer could take to calculate the on-level earned premium.

6. (1.5 points)

Discuss the appropriateness of applying each of the following data aggregation methods to the given line of business:

a. (0.5 point)

Calendar Year Aggregation for Auto Physical Damage

b. (0.5 point)

Policy Year Aggregation for Homeowners

c. (0.5 point)

Report Year Aggregation for Medical Professional Liability

7. (2.5 points)

The following information applies to a company's book of annual policies:

- All policies are written on January 1 each year.
- All losses occur on July 1 each year.
- Loss costs increase by 5% each report year.
- All losses are reported within 4 years of the occurrence date.
- Loss notification is always made on December 31 of a given year.
- Exposure levels are constant and each policy has one exposure.
- There are no expense or profit provisions.
- The ultimate loss costs for report year 2014 are as follows:

Report Year Lag	Loss Cost
0	\$250
1	\$350
2	\$300
3	\$100

a. (1 point)

Calculate the premium of a policy issued in 2015 on:

- i. a mature claims-made policy
- ii. an occurrence policy

b. (0.5 point)

Describe a scenario in which a mature claims-made policy would cost more than an occurrence policy.

c. (1 point)

Beginning with losses occurring on or after January 1, 2015, a new law requires all losses to be reported within 2 years of the occurrence date. Explain the necessary adjustments, if any, to the premiums in part a. above without further calculations.

8. (2.25 points)

An insurance company is using the following data to determine an appropriate large loss threshold and excess loss factor for use in its overall ratemaking calculation:

Accident Year	Reported Loss Including Severity Trend (\$000)	Number of Claims Greater than \$500,000	Excess Ratio at \$500,000
1999	56,261	8	5.5%
...
2011	56,793	5	3.6%
2012	57,049	11	6.3%
2013	50,038	7	3.6%
Total	813,339	121	4.8%

- Excess ratio is the ratio of excess loss dollars to non-excess loss dollars.
- Total number of claims in accident years 1999 to 2013 = 12,435.

The following information is given for accident year 2014:

- Total reported losses including severity trend = \$46,902,000.
- Total reported ALAE = \$2,345,000.
- Loss and ALAE development factor = 1.08.
- Unlimited severity trend factor = 1.05.
- Unlimited frequency trend factor = 0.98.
- \$500,000 limit applies to loss only. Individual claims, including severity trend, greater than \$500,000 are:

Claim	Reported Loss Including Severity Trend
1	\$504,000
2	\$644,000
3	\$817,000
4	\$975,000

a. (1 point)

Calculate the 2014 excess ratio at \$500,000 and justify a recommended excess ratio to be used in the company's overall rate indication.

b. (1.25 points)

Calculate the 2014 projected ultimate losses and ALAE using an excess loss procedure.

9. (1.25 points)

Given the following information:

Expense Type	2014 Expense Amount
Other Acquisition	\$4,000
General	\$17,000
Commission and Brokerage	\$23,000
Taxes, License, and Fees	\$5,000

- 2014 written premium = \$200,000.
- 2014 earned premium = \$170,000.
- Statewide average loss cost per exposure = \$250.
- Profit and contingencies provision = 3%.
- General expenses are incurred throughout the policy term.
- All other expenses are incurred at the beginning of the policy.

Calculate the indicated average rate.

10. (1.75 points)

Given the following information for an insurance company:

Territory	Premium	Ultimate Loss Ratio
A	\$45,000,000	80%
B	\$55,000,000	60%

- The company sets its rates to achieve a permissible loss ratio of 65%.
- All expenses are variable.
- Due to market constraints, the company has decided to cap rate increases in any single territory to a maximum of +20%.

a) (1.25 points)

Taking market constraints into account, use the loss ratio method to determine the rate changes for territories A and B.

b) (0.5 point)

If the company decides to use a different permissible loss ratio due to the territorial cap, the fundamental insurance equation will not be in balance. Describe an alternative to pricing changes the company can take to achieve balance in the fundamental insurance equation.

11. (5.75 points)

An insurer filed the following information in support of a rate change to be effective October 1, 2015:

- All policies are semi-annual.
- The new rates will be in effect for one year.
- The indicated rate change from the prior rate review was 7%, with a target effective date of July 1, 2014.
- The implemented rate change from the prior rate review was 2.5%, with an effective date of October 1, 2014.
- The full credibility standard is 60,000 exposures over two years.
- The insurer uses the square root rule for partial credibility.
- The complement of credibility is selected using the trended present rates method.
- There have been no significant changes to paid loss patterns over the past four years.
- Variable expense ratio = 20%.
- Fixed expense ratio = 7%.
- LAE provision = 3% of loss.
- Profit and contingencies provision = 6%.
- Annual premium trend = 3%.
- Annual loss trend = 5%.
- All losses and subrogation/salvage recoveries are fully developed at 48 months.

Calendar/ Accident Year	Earned Exposures	On-Level Earned Premium (\$000)	Gross Reported Loss Evaluated at December 31, 2014 (\$000)	Ratio of Subrogation/Salvage Received to Paid Loss Evaluated at December 31, 2014
2013	20,700	15,900	17,500	0.471
2014	23,200	17,500	18,800	0.314

Accident Year	Gross Reported Loss Development Factors			
	12-24	24-36	36-48	48-Ult
2010	1.055	1.047	1.018	1.000
2011	1.052	1.043	1.020	
2012	1.057	1.048		
2013	1.061			

Accident Year	Ratio of Subrogation/Salvage Received to Paid Loss Development Factors			
	12-24	24-36	36-48	48-Ult
2010	1.012	1.006	1.006	1.000
2011	1.010	1.006	1.004	
2012	1.536	1.004		
2013	1.500			

Calculate the indicated rate change and justify any assumptions made.

12. (1 point)

Describe two primary purposes of risk classification.

13. (2.5 points)

An automobile insurance company uses the following information for ratemaking:

Earned Exposures		
Vehicle Symbol	Driver Age	
	Under 25	25 and Older
A	250	100
B	75	200
C	75	500

Driver Age	Incurred Loss and ALAE
Under 25	\$235,800
25 and Older	\$482,560

Current Rating Factors	
Symbol A	0.80
Symbol B	1.00
Symbol C	1.30
Under 25	1.00
25 and Older	0.75

a. (0.5 point)

Briefly discuss the use of driver age as a rating variable in the insurer's risk classification system with respect to two relevant considerations.

b. (2 points)

Calculate the indicated driver age relativities and the corresponding base rate that would achieve a revenue neutral change. Justify the selection of a methodology.

14. (2.5 points)

Given the following reported claims data:

Size of Loss	Reported Claim Counts	Reported Ground-Up Losses
$X \leq \$1,000$	120	\$75,000
$\$1,000 < X \leq \$4,000$	117	\$209,000
$\$4,000 < X$	3	\$22,000

Individual claims above \$4,000 are: \$5,500, \$6,500, and \$10,000.

a. (0.75 point)

Calculate the increased limits factor for an increased limit of \$6,000 and a basic limit of \$4,000.

b. (0.75 point)

Calculate the combined loss elimination ratio for a policy with a \$1,000 deductible and a policy limit of \$3,000.

c. (1 point)

Briefly discuss two potential issues when using historical data from policies with deductibles or limits to price deductible factors. Propose a solution for each issue.

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15. (1.5 points)

The following table shows all claims transactions for an insurance company through December 31, 2014.

Claim ID	Accident Date	Report Date	Transaction Date	Incremental Payment	Ending Case Reserves
1	January 1, 2011	January 1, 2011	January 31, 2011	100	100
1			March 2, 2011	100	50
1			April 1, 2011	25	0
2	June 30, 2011	March 15, 2012	June 30, 2012	0	10,000
2			May 25, 2013	250	10,000
2			June 30, 2014	15,000	1,000
2			September 12, 2014	200	0
3	February 25, 2012	March 15, 2012	March 15, 2012	0	0
3			January 15, 2013	0	1,000
3			July 15, 2013	2,500	0

- All three claims are closed as of December 31, 2014.

a. (0.75 point)

Construct the cumulative reported claims triangle on an accident year basis.

b. (0.75 point)

Construct the cumulative reported claims triangle on a report year basis.

16. (2 points)

The following data reflects an insurance company's recent claims experience:

<u>Reported Claims (\$000) as of (months)</u>			<u>Paid Claims (\$000) as of (months)</u>		
Accident Year	<u>12</u>	<u>24</u>	Accident Year	<u>12</u>	<u>24</u>
2011	17,000	40,000	2011	2,000	10,000
2012	29,000	47,000	2012	3,000	15,000
2013	27,000	47,000	2013	5,500	18,000
2014	24,000		2014	5,000	

<u>Reported Claim Counts as of (months)</u>			<u>Closed Claim Counts as of (months)</u>		
Accident Year	<u>12</u>	<u>24</u>	Accident Year	<u>12</u>	<u>24</u>
2011	1,930	2,170	2011	270	1,000
2012	2,070	2,300	2012	300	1,300
2013	1,470	1,650	2013	370	1,020
2014	1,190		2014	320	

a. (1 point)

Use two different diagnostics to assess whether any changes have been made to the company's claims department.

b. (1 point)

Recommend two reserving techniques that are appropriate to estimate unpaid claims in this environment and support each recommendation.

17. (2.75 points)

Given the following information for an insurance company:

Calendar/ Accident Year	Earned Car Years	Earned Premium (\$000)	Reported Claims (\$000)	Selected CDF
2011	830	415	315	1.05
2012	1,000	450	392	1.10
2013	1,000	475	358	1.30
2014	700	280	200	2.00

- The company first started writing business in 2011.
- The mix of business has not changed.
- Significant rate changes have occurred over the past four years.
- Policies are annual and are written uniformly throughout the year.

Calculate the IBNR for accident year 2014 using the Cape Cod technique, incorporating adjustments for claims trend and on-leveling of premium. Justify the selection of claims trend.

18. (2.25 points)

A hospital system self-insures its professional liability exposure. The following information is given:

Accident Year	Reported Claims (\$000s) as of (months)		
	12	24	36
2012	2,750	6,200	7,750
2013	2,950	6,600	
2014	3,850		

Calendar Year	Average Occupied Beds and Outpatient Visits
2012	520
2013	530
2014	540

- The expected average occupied beds and outpatient visits for 2015 = 575.
- The pure premium trend = 4.0%.
- The 36 to ultimate reported claims development factor = 1.05.

Estimate ultimate claims for the 2015 accident year using the expected claims technique and justify the expected pure premium selection.

19. (3.25 points)

The following information is provided for an unpaid claims analysis with data evaluated as of June 30, 2014.

Accident Year	Paid Claims	Reported Claims	Paid Development Technique	Reported Development Technique	Paid Bornhuetter- Ferguson Technique	Selected Ultimate Claims
2012	7.0	7.8	14.0	10.9	12.0	13.8
2013	3.1	5.0	8.7	11.0	9.5	10.2
2014	1.5	1.9	12.0	5.7	10.3	7.1

- All figures are in millions of dollars.
- The a priori ultimate claims estimate is the same for all accident years.
- There is no development of claims after 48 months.

a. (1 point)

Estimate ultimate claims for each accident year using the reported Bornhuetter-Ferguson technique.

b. (1.5 points)

Discuss the appropriateness of the selected ultimate claims for each accident year.

c. (0.25 point)

Estimate ultimate claims for accident year 2014 using one iteration of the reported Benktander technique.

d. (0.5 point)

Explain how the unpaid claim estimate for accident year 2014 will change during successive iterations of the reported Benktander technique.

20. (2.5 points)

Given the following data as of December 31, 2014:

Calendar/Accident Year 2014 Information:

Exposure Units	36,000,000
Paid Claims	\$8,700,000
Reported Claims	\$20,300,000
Selected Ultimate Trended Frequency per 100 Exposure Units	0.42
Selected 12-Ultimate Reported Claims Development Factor	1.720
Selected 12-Ultimate Paid Claims Development Factor	2.960
Selected 12-Ultimate Reported Claim Count Development Factor	1.200
Expected Loss Ratio	44.5%
Rate per 1,000 Exposure Units	1.560

Additional Information:

Accident Year 2012 Selected Ultimate Severity	\$160
Severity Trend	5.0%

Accident Year	Reported Claims as of (months) in \$000				
	12	24	36	48	60
2010	14,200	18,839	22,362	24,039	24,424
2011	14,100	18,707	22,205	23,870	
2012	15,300	20,299	24,094		
2013	14,700	19,503			
2014	20,300				

Accident Year	Paid Claims as of (months) in \$000				
	12	24	36	48	60
2010	8,200	14,722	21,081	23,316	24,272
2011	8,300	14,901	21,339	23,600	
2012	8,900	15,978	22,881		
2013	8,400	15,081			
2014	8,700				

a. (1.5 points)

For accident year 2014, calculate the ultimate claims estimate under each of the following techniques:

- i. Frequency-Severity Technique
- ii. Reported Claims Development Technique
- iii. Paid Claims Development Technique
- iv. Reported Bornhuetter-Ferguson Technique

b. (1 point)

For each of the techniques listed in part a. above, briefly discuss whether the technique is appropriate to select the ultimate claims estimate for accident year 2014.

21. (2.5 points)

Given the following data as of December 31, 2014:

Accident Year	<u>Cumulative Closed Claim Counts</u>		
	<u>12 months</u>	<u>24 months</u>	<u>36 months</u>
2012	730	800	820
2013	750	825	
2014	775		

Accident Year	<u>Cumulative Paid Claims (\$000)</u>		
	<u>12 months</u>	<u>24 months</u>	<u>36 months</u>
2012	2,250	2,600	2,700
2013	2,600	3,000	
2014	2,000		

Accident Year	<u>Ultimate Claim Counts</u>
	2012
2013	846
2014	874

- The latest diagonal is representative of current claim adjusting practices.
- There is no development beyond 36 months.
- Annual severity trend is 4%.

a. (2 points)

Using the disposal rate frequency-severity technique, calculate the ultimate claims.

b. (0.5 point)

Assume accident year 2013 experienced a one-time increase in the severity of claim payments with no impact on frequency or disposal rates. Briefly discuss two adjustments to the disposal rate frequency-severity technique that would be appropriate in this scenario.

22. (2.5 points)

Given the following information:

Cumulative Reported Claims (\$000s) as of (months)

Accident	Year	12	24	36
	2012	10,000	15,000	16,500
	2013	11,280	17,900	
	2014	13,500		

Cumulative Reported Claim Counts as of (months)

Accident	Year	12	24	36
	2012	1,500	1,650	1,700
	2013	1,650	1,815	
	2014	1,815		

Cumulative Paid Claims (\$000s) as of (months)

Accident	Year	12	24	36
	2012	5,000	12,000	15,600
	2013	5,775	13,860	
	2014	6,680		

Cumulative Closed Claim Counts as of (months)

Accident	Year	12	24	36
	2012	850	1,445	1,615
	2013	935	1,590	
	2014	1,030		

Case-Outstanding (\$000s) as of (months)

Accident	Year	12	24	36
	2012	5,000	3,000	900
	2013	5,505	4,040	
	2014	6,820		

Open Claim Counts as of (months)

Accident	Year	12	24	36
	2012	650	205	85
	2013	715	225	
	2014	785		

- There are no partial payments.
- Assume no reported development after 36 months.
- Assume an annual severity trend of 5%.

a. (0.75 point)

Assess the appropriateness of using the reported development technique for calculating ultimate claims given the data above.

b. (1.5 points)

Estimate ultimate claims for accident year 2014 using a Berquist-Sherman case outstanding adjustment.

c. (0.25 point)

Briefly explain how the Berquist-Sherman case outstanding adjustment can be considered in the reported Bornhuetter-Ferguson technique.

23. (1.5 points)

An insurance company recently implemented a new initiative to prioritize the settlement of smaller claims. This initiative has resulted in faster settlement of smaller claims.

a. (1 point)

Discuss why it may not be appropriate for this company to use the following techniques to estimate ultimate claims:

- i. Paid Development Technique
- ii. Reported Development Technique

b. (0.5 point)

Discuss how to adjust one of the development techniques above to make it appropriate for this company.

24. (2 points)

The following information is available for an insurance company:

Paid Claims Gross of Salvage and
Subrogation (\$000)

Accident <u>Year</u>	<u>12 Months</u>	<u>24 Months</u>	<u>36 Months</u>
2012	120	132	138
2013	90	99	
2014	100		

Received Salvage and Subrogation (\$000)

Accident <u>Year</u>	<u>12 Months</u>	<u>24 Months</u>	<u>36 Months</u>
2012	16	17	17
2013	14	15	
2014	15		

- No development occurs beyond 36 months for paid claims.
- No development occurs beyond 24 months for received salvage and subrogation.

Calculate ultimate claims net of salvage and subrogation for all accident years using a ratio approach.

25. (2.25 points)

Given the following information:

Year	Calendar Year			Ultimate on Claims Reported in Calendar Year	Accident Year	
	Paid ULAE	Paid Claims	Reported Claims		IBNR as of December 31, 2014	Reported Claims
2011	\$10,558	\$38,390	\$85,521	\$106,900	\$5,095	\$103,305
2012	\$13,039	\$58,297	\$128,672	\$154,300	\$16,140	\$140,560
2013	\$13,143	\$86,074	\$145,070	\$163,100	\$34,477	\$128,923
2014	\$15,286	\$105,466	\$163,626	\$176,400	\$56,141	\$120,959

- Case outstanding at December 31, 2014 is \$205,520.
- Total IBNR at December 31, 2014 is \$111,853.

a. (0.5 point)

Discuss why the classical technique is not appropriate to estimate unpaid ULAE in this scenario.

b. (1.75 points)

Estimate unpaid ULAE as of December 31, 2014 using an alternative technique that corrects for the issue identified in part a. above. Justify both the approach used and the selected ULAE ratio.

Exam 5

Basic Techniques for Ratemaking and Estimating Claim Liabilities

POINT VALUE OF QUESTIONS

QUESTION	VALUE OF QUESTION	SUB-PART OF QUESTION						
		(a)	(b)	(c)	(d)	(e)	(f)	(g)
1	1.50	1.50						
2	2.00	2.00						
3	3.00	1.25	1.25	0.50				
4	2.25	2.25						
5	2.50	0.75	1.25	0.50				
6	1.50	0.50	0.50	0.50				
7	2.50	1.00	0.50	1.00				
8	2.25	1.00	1.25					
9	1.25	1.25						
10	1.75	1.25	0.50					
11	5.75	5.75						
12	1.00	1.00						
13	2.50	0.50	2.00					
14	2.50	0.75	0.75	1.00				
15	1.50	0.75	0.75					
16	2.00	1.00	1.00					
17	2.75	2.75						
18	2.25	2.25						
19	3.25	1.00	1.50	0.25	0.50			
20	2.50	1.50	1.00					
21	2.50	2.00	0.50					
22	2.50	0.75	1.50	0.25				
23	1.50	1.00	0.50					
24	2.00	2.00						
25	2.25	0.50	1.75					
TOTAL	<u>57.25</u>							

EXAM 5 SPRING 2015 SAMPLE ANSWERS AND EXAMINER'S REPORT

GENERAL COMMENTS:

- Candidates should note that the instructions to the exam explicitly say to show all work; graders expect to see enough support on the candidate's answer sheet to follow the calculations performed. While the graders made every attempt to follow calculations that were not well-documented, lack of documentation may result in the deduction of points where the calculations cannot be followed or are not sufficiently supported.
- Incorrect responses in one part of a question did not preclude candidates from receiving credit for correct work on subsequent parts of the question that depended upon that response.
- Candidates should try to be cognizant of the way an exam question is worded. They must look for key words such as "briefly" or "fully" within the problem. We refer candidates to the Future Fellows article from December 2009 entitled "The Importance of Adverbs" for additional information on this topic.
- Some candidates provided lengthy responses to a "briefly describe" question, which does not provide extra credit and only takes up additional time during the exam.
- Candidates should take care to justify their selections when asked to do so, and note that restatement of a numerical selection in words is not a justification.
- Generally, candidates were fairly well prepared for this exam. However, candidates should be cautious of relying solely on study manuals, as some candidates lost credit for failing to provide basic insights that were contained in the syllabus readings.

EXAM STATISTICS:

- Number of Candidates: 784
- Available Points: 57.25
- Passing Score: 40.00
- Number of Passing Candidates: 275
- Raw Pass Ratio: 35.1%
- Effective Pass Ratio: 37.9%

EXAM 5 SPRING 2015 SAMPLE ANSWERS AND EXAMINER'S REPORT

QUESTION: 1

TOTAL POINT VALUE: 1.5

LEARNING OBJECTIVE(S): A1

SAMPLE/ACCEPTED ANSWERS:

Sample 1:

With original driver: Primary + Secondary factor is $1.00 + 0.30 = 1.30$

With new driver: Primary + Secondary factor is $1.07 + 1.20 = 2.27$

(Second driver has the higher primary classification, and so is designated the principal operator)

Annual premium for original driver without expense fee is $\$1480 - \$80 = \$1400$

Annual premium without expenses for second driver added is $\$1400 * (2.27 / 1.30) = \2445

Annual premium with both drivers is then $\$2445 + \$80 = \$2525$

Annual difference is $\$2525 - \$1480 = 1045$

Additional premium required for remaining six months = $\$1045 / 2 = \522.5

Sample 2:

With original driver: Primary + Secondary factor is $1.00 + 0.30 = 1.30$

With new driver: Primary + Secondary factor is $1.07 + 1.20 = 2.27$

(Second driver has the higher primary classification, and so is designated the principal operator)

Annual premium for original driver without expense fee is $\$1480 - \$80 = \$1400$

Annual premium without expenses for second driver added is $\$1400 * (2.27 / 1.30) = \2445

Annual difference is $\$2445 - \$1400 = 1045$

Additional premium required for remaining six months = $\$1045 / 2 = \522.5

Sample 3:

With original driver: Primary + Secondary factor is $1.00 + 0.30 = 1.30$

With new driver: Primary + Secondary factor is $1.07 + 1.20 = 2.27$

(Second driver has the higher primary classification, and so is designated the principal operator)

Annual premium for original driver without expense fee is $\$1480 - \$80 = \$1400$

Annual premium without expenses for second driver added is $\$1400 * (2.27 / 1.30) = \2445

Annual premium with both drivers is then $\$2445 + \$80 = \$2525$

Additional premium required for remaining six months = $1480/2 + 2525/2 - 1480 = \522.5

EXAM 5 SPRING 2015 SAMPLE ANSWERS AND EXAMINER'S REPORT

Sample 4:

Annual premium without expenses for second driver added is $(\$1480 - \$80) * (1.07 + 1.2) / (1.00 + 0.30)$
= $\$2445$

Annual premium with both drivers is then $\$2445 + \$80 = \$2525$

Annual difference is $\$2525 - \$1480 = 1045$

Additional premium required for remaining six months = $\$1045 / 2 = \522.5

Sample 5:

Annual premium for original driver without expense fee is $\$1480 - \$80 = \$1400$

Annual premium without expenses for second driver added is $(\$1480 - \$80) * (1.07 + 1.2) / (1.00 + 0.30)$
= $\$2445$

Annual difference is $\$2445 - \$1400 = 1045$

Additional premium required for remaining six months = $\$1045 / 2 = \522.5

Sample 6:

With original driver: Primary + Secondary factor is $1.00 + 0.30 = 1.30$

With new driver: Primary + Secondary factor is $1.07 + 1.20 = 2.27$

(Second driver has the higher primary classification, and so is designated the principal operator)

Annual premium for original driver without expense fee is $\$1480 - \$80 = \$1400$

Base rate is $\$1400 / 1.30 = \1076.92

Annual premium without expenses for second driver added is $\$1076.92 * 1.30 = \2445

Annual premium with both drivers is then $\$2445 + \$80 = \$2525$

Annual difference is $\$2525 - \$1480 = 1045$

Additional premium required for remaining six months = $\$1045 / 2 = \522.5

EXAMINER'S REPORT:

The candidate was expected to be able to:

- Calculate primary and secondary factors and add them together.
- Calculate base rate and annual premium for second driver added.
- Calculate the annual premium difference and get the additional premium for remainder of term.

Calculating the classification factors was the most difficult part of the problem for most candidates. Most candidates calculated the correct base rate, although some did not handle the expense fee correctly. Most candidates were able to calculate the premium change correctly given the right

EXAM 5 SPRING 2015 SAMPLE ANSWERS AND EXAMINER'S REPORT

components. Many candidates opted not to answer this question, submitting a blank answer sheet, and resulting in many candidates receiving no credit on this question.

Common mistakes included:

- Incorrect classifications for original and new driver
- Multiplying primary and secondary factors rather than adding them together
- Calculating the base rate without removing the expense fee
- Calculating additional premium for 12 months rather than for 6 months

EXAM 5 SPRING 2015 SAMPLE ANSWERS AND EXAMINER'S REPORT

QUESTION: 2

TOTAL POINT VALUE: 2

LEARNING OBJECTIVE(S): A2

SAMPLE/ACCEPTED ANSWERS:

Annual fuel expense

Sample 1:

Annual fuel expense may not be proportional to expected losses since the fuel expense depends on the type of car, the type of gasoline, gas prices at different gas stations, and driving habit.

Sample 2:

Annual fuel expense may be somewhat proportional to expected loss, since it's correlated with miles driven, but it can change due to changing gas prices.

Sample 3:

This would be easily verifiable with receipts, and not subject to manipulation.

Sample 4:

This exposure base fails this criterion. Although it could easily be tracked and documented it would be subject to tampering and is not easily verified.

Sample 5:

This is not practical because it would be difficult to obtain and not easily verifiable. Companies may not keep track of fuel expenses as a separate expense item.

Sample 6:

Changing the exposure base may be difficult because it can cause premium swings for the insureds, it can be costly from the IT standpoint, and it would take considerable amount of adjustments to the data for future ratemaking analysis.

Sample 7:

The industry usually use the numbers of vehicles and annual fuel expense to rate commercial auto, therefore the annual fuel expense is more consistent with the industry practice.

EXAM 5 SPRING 2015 SAMPLE ANSWERS AND EXAMINER'S REPORT

Number of miles driven

Sample 1:

Number of miles driven is more directly proportional to expected loss as more accidents can occur the more you drive.

Sample 2:

It is directly proportional to expected loss (with perhaps the exception of comprehensive coverage).

Sample 3:

This would be easily verifiable with an odometer or telematics, and it cannot be manipulated by insureds.

Sample 4:

It would be difficult and costly to verify and could be easily manipulated by the insured.

Sample 5:

Number of miles driven is also objective but also difficult to verify and again could be manipulated if the insured was self-reporting.

Sample 6:

With the development of technology, it is objective and easy to obtain. Nowadays, cars all have mile meters or GPS. The insurer can track the mile driven accurately.

Sample 7:

The historical exposure is number of car years, so the criteria wouldn't be satisfied. Changing to a new exposure base would cause large premium swings, it would be costly to implement, and would cause extra work for IT and actuarial staff.

Sample 8:

Considering historical exposure base for commercial auto, miles driven is rarely an exposure base. But pilot UBI insurance is starting to use miles driven as an exposure base.

Recommendation

Sample 1:

Overall I recommend implementing the number of miles driven since it is more proportional to expected loss.

EXAM 5 SPRING 2015 SAMPLE ANSWERS AND EXAMINER'S REPORT

Sample 2:

I recommend annual fuel expense because the data is of a higher quality and is sufficiently proportional to losses. I would likely adjust exposure data for state/vehicle due to MPG differentials in vehicles and prices in different states.

Sample 3:

Neither of these exposure bases is practical or considerate of historical precedent, so I would choose neither and recommend continuing to use car years.

EXAMINER'S REPORT:

Candidates needed to identify the 3 criteria of a good exposure base and evaluate how well annual fuel expense and number of miles driven met each of the criteria. Most candidates received full credit.

Common mistakes included:

- Not identifying all 3 criteria
- Identifying the criteria, but not evaluating whether the proposed exposure bases met the criteria
- Identifying and discussing criteria for evaluating rating variables rather than for exposure bases. However, where there are similarities in the criteria for rating variables and exposure bases, candidates received credit

The question also required candidates to provide a recommendation on the preferred exposure base. For full credit, candidates needed to provide an overall recommendation and a clear rationale for their recommendation. Many candidates did not provide a reason for their recommendation or their rationale was not clear. For the rationale, it wasn't enough to say "Based on the above..." or "Because of these reasons..."

EXAM 5 SPRING 2015 SAMPLE ANSWERS AND EXAMINER'S REPORT

QUESTION: 3

TOTAL POINT VALUE: 3

LEARNING OBJECTIVE(S): A2 / A7

SAMPLE/ACCEPTED ANSWERS:

Part a: 1.25 points

(1)	(2)	(3)	(4)	(5)=(2)x(4)
Time Period	Written car years	Avg. Written Date	% earned in 2014	Earned car years in 2014
1/1/13-6/30/13	106	4/1/13	0%	0
7/1/13-12/31/13	107.5	10/1/13	50%	53.75
1/1/14-6/30/14	210	4/1/14	75%	157.5
7/1/14-12/31/14	45	10/1/14	25%	11.25

Total earned car years for CY14 = 53.75 + 157.5 + 11.25 = 222.5

Part b: 1.25 points

107.5 car years expired in the first half of 2014. If they were all renewed, there would be 215 car years written in the first half of 2014. There were 45 new policies in the 2nd half, so assume 45 in the first half as well. New retention ratio is $((210-45)/215) = 76.74\%$. There appears to be no change associated with the change in term.

Part c: 0.5 point

Sample 1:

The assumption looks appropriate as there doesn't appear to be considerable growth/shrinking and we broke the years down into halves. Using a uniform assumption over a whole year would not be appropriate because renewals all occur in the first half.

Sample 2:

The assumption is inappropriate. Since all policies are shifted from six months to annual. The policies up for renewal from prior to PY2014 are 6 month which means the greatest portion will be up for renewal in the 1st half of the year. It is simply not reasonable to expect uniform writings when we know that the renewals will be heavy at the beginning of the year. Since they are now annual the next wave of written car years will not occur until CY 2015 on the annual renewals.

EXAM 5 SPRING 2015 SAMPLE ANSWERS AND EXAMINER'S REPORT

EXAMINER'S REPORT:

General Commentary

Candidates performed moderately well on this question, with strong performance on part a. and lower scores on parts b. and c. Very few candidates scored full credit for the entire question.

Part a

The candidate was expected to know how to calculate earned car years for semi-annual and annual policies. Candidates need to account for changing policy terms.

Candidates performed well on part a. Typical errors included:

- Incorrect earned exposure percentages for the 3 time periods involved
- Multiplying the semi-annual policies by 0.5 to account for the policy term
- Including the first half of 2013
- Excluding all of 2013

Part b

The candidate was expected to know how to calculate a change in the retention ratio. In general, candidates struggled with part b.

Typical errors included not accounting for new business written in 2014 and various mistakes in getting total renewal business in 2014. Candidates needed to:

- Realize that all 45 WCY in 2nd half of the year are new business; due to the term change there are no renewals in 2nd half of the year
- Use the assumption given in question that new business writing in 2014 was uniform over the year to conclude that 45 of the 210 WCY in first half of 2014 are new, thus renewals are $210 - 45 = 165$
- Double the 107.5 WCY from second half of 2013 to know what was eligible to renew in 2014

Many candidates did not successfully calculate all 3 bullet points above. Additionally, many candidates incorrectly defined the denominator of the retention ratio as "written policies" rather than "policies able to be renewed".

Part c

The candidate was expected to have an understanding of the definition of uniform writings.

This part was challenging, and overall candidates struggled with this part.

Typical errors included stating the company is clearly growing or shrinking, or simply stating the assumption is inappropriate (or appropriate) but not supporting that stance.

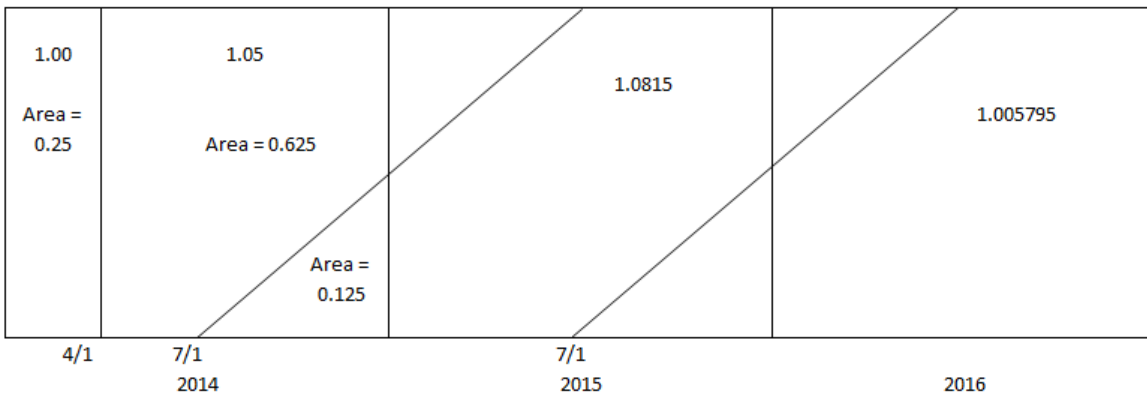
EXAM 5 SPRING 2015 SAMPLE ANSWERS AND EXAMINER'S REPORT

QUESTION: 4

TOTAL POINT VALUE: 2.25

LEARNING OBJECTIVE(S): A3

SAMPLE/ACCEPTED ANSWERS:



Sample 1:

CY 2014 Average Rate Level (assume written uniformly)

$$= 0.25 A + 0.125 C + 0.625 B = 1.0414375$$

$$OLF = 1.005795 / 1.0414375 = 0.96578$$

Select the 6-point pure premium trend of 3.4% to eliminate the effects of the deductible change but to include as much data as possible

Trend period = 7/1/14 to 1/1/17 => 2.5 years

$$\text{Trended EP at current rates} = \$100,000 * .9658 * 1.034^{2.5} = 104,999.82$$

Sample 2:

$$\text{CY 2014 avg rate level} = 0.25(1.0) + 1/8(1.0815) + (1-.25-1/8)(1.05) = 1.0414$$

$$\text{Current rate level} = 1.05 * 1.03 * .93 = 1.0058$$

$$\text{On-level factor} = 1.0058/1.0414 = .9658$$

Trend period 7/1/14 -> 1/1/17 2.5 years

The 12-point fit and the March 2013 & prior avg EP at CRL is useless due to the deductible change.

The 8-point exponential fit even includes a quarter of data at the old deductible level.

Choose trend of 3.4% (6 point) as data stabilizes at this point and is close to 4 point value.

$$\text{Trended 2014 EP@CRL} = 100,000 * 1.034^{2.5} * 0.9658 = \$104,997$$

EXAMINER'S REPORT:

Overall, candidates performed well on this question, with over half of candidates scoring close to full credit or full credit.

EXAM 5 SPRING 2015 SAMPLE ANSWERS AND EXAMINER'S REPORT

On-level factor: The candidate was expected to know the difference between a law change and a normal rate change and how those would be reflected in an on-level calculation. The candidate had to demonstrate how to calculate the different areas associated with a given rate level for the parallelogram method and apply the correct rate factor to each area. Finally, candidates needed to demonstrate the calculation of the on-level factor by dividing the current rate level by the 2014 weighted average rate level.

Many candidates were able to re-create the diagram shown in the sample answers. Candidates generally scored well on this question. The most common errors were not reflecting the law change correctly (treated as a diagonal rather than vertical line) or not calculating the areas associated with a given rate level correctly.

Trended on-level earned premium:

The candidate needed to select a trend factor based on the information provided and justify that selection. Further, the candidate needed to determine the appropriate trend period. Finally, the candidate had to put all of the pieces together to calculate a final answer.

Candidates generally performed well with calculating trended on-level earned premium. The most common shortcoming was not justifying the trend selection properly. While most candidates were able to identify an out-of-pattern trend in the data, it was not always attributed to the deductible level change. Some candidates did recognize the deductible change, but still chose a trend factor based on information that would have been affected by the deductible change (i.e., 8-pt trend). Another common error was choosing an incorrect trend period.

EXAM 5 SPRING 2015 SAMPLE ANSWERS AND EXAMINER'S REPORT

QUESTION: 5

TOTAL POINT VALUE: 2.5

LEARNING OBJECTIVE(S): A3

SAMPLE/ACCEPTED ANSWERS:

Part a: 0.75 point

$$2014 \text{ on-level factor} = (0.875 * 1.0) + (0.125 * 1.1) = 1.0125$$

$$2014 \text{ on-level premium} = \$1000 * 1.1 / 1.0125 = \$1,086.42$$

Part b: 1.25 points

Sample 1:

$$Q1: 1.00$$

$$Q2: 1.00$$

$$Q3: 0.875(1.00) + 0.125(1.10) = 1.0125$$

$$Q4: 0.625(1.00) + 0.375(1.10) = 1.0375$$

$$\text{Total} = 10\% + 50\% + (30\% * 1.0125) + (10\% * 1.0375) = 1.0075$$

$$\text{On-level premium} = \$1000 * (1.1 / 1.0075) = \$1,091.81$$

Sample 2:

$$Q3: 0.3 * (4.5/12) = 0.1125$$

$$Q4: 0.1 * (1.5/12) = 0.0125$$

$$\text{Percent at New Rate Level} = 0.1125 + 0.0125 = 0.125$$

$$\text{Percent at Previous Rate Level} = 1 - .125 = .875$$

$$\text{Average Rate Level} = 1.1 * 0.125 + 1.0 * 0.875 = 1.0125$$

$$\text{On-Level Premium} = \$1000 * (1.1/1.0125) = \$1,086.42$$

Part c: 0.5 point

Sample 1:

The insurer could use the extension of exposures technique to re-rate historical policies using the current rates, and then re-calculate the earned amounts.

Sample 2:

The insurer could use the parallelogram method on smaller time periods, such as daily or monthly, and then aggregate the on-level premium from the smaller time periods to determine the total on-level earned amount.

EXAM 5 SPRING 2015 SAMPLE ANSWERS AND EXAMINER'S REPORT

EXAMINER'S REPORT:

General Commentary

Candidates performed well on this question in total, particularly on parts a. and c.

Part a

Candidates were expected to calculate on-level premium using the parallelogram method. Overall, candidates did very well on this part. The most common errors were incorrectly calculating the area associated with a particular rate level or a calculation error.

Part b

Candidates were expected to calculate on-level premium using the parallelogram method and taking into account an uneven earning pattern. There were two answers accepted, depending on how the candidate interpreted the pattern given, both of which were included in the sample answers above. There was a high variability in the performance of candidates on this part.

A common error was miscalculating the areas associated with each rate level. Making an adjustment for an uneven earning pattern was also difficult for many candidates. In addition, many candidates forgot to take into account earned premium coming from previous policy years and tried to calculate on-level premium using only four policy quarters.

Part c

Candidates were expected to identify another method, other than the standard parallelogram method, to determine the answer to part b. Overall, candidates did well on this part, with the most common answer to this question explaining that the extension of exposures method could be used to answer part b.

One common mistake was not briefly describing the extension of exposures method. Credit for other methods was also given as long as a reasonable explanation was provided.

EXAM 5 SPRING 2015 SAMPLE ANSWERS AND EXAMINER'S REPORT

QUESTION: 6

TOTAL POINT VALUE: 1.5

LEARNING OBJECTIVE(S): A3 / A4

SAMPLE/ACCEPTED ANSWERS:

Part a: 0.5 point

Sample 1:

Not appropriate as calendar year is fixed at year-end (transaction based), but Auto Physical Damage will still develop.

Sample 2:

Appropriate since CY more responsive. Auto PD is short tailed.

Part b: 0.5 point

Sample 1:

Policy year aggregation provides for a good match between premium/exposures and losses. This would be a good choice if we are trying to isolate the effects of underwriting changes such as changes to policy limits or deductibles which could be appropriate for homeowners policies.

Sample 2:

Homeowners is property, which is a short-tailed line. PY takes longer to develop, which is good for long-tailed lines like WC. For short-tailed lines like Homeowners, I would recommend AY/CY instead

Part c: 0.5 point

Sample 1:

Ok if a claims made policy. Otherwise accident year since longer tail line.

Sample 2:

RY aggregation is not appropriate because it cannot be used to estimate IBNR which is very important for a long-tailed line such as this

EXAMINER'S REPORT:

General Commentary

On each part, candidates needed to provide a determination of the appropriateness of the aggregation method stated in the question along with support to justify their determination. The nature of the

EXAM 5 SPRING 2015 SAMPLE ANSWERS AND EXAMINER'S REPORT

question allowed for responses using either a ratemaking or reserving lens, and therefore candidates were given the opportunity to support their response using either discipline. Candidates generally performed well on this question.

Part a

Common mistakes included:

- Discussion of the Calendar Year data method including a pro/con comparison without a discussion of the applicability to Auto Physical Damage
- Discussion of the Calendar Year data method including a pro OR con and corresponding statement of appropriateness without a discussion of the applicability to Auto Physical Damage
- Incorrectly identifying Auto Physical Damage as long-tail and a statement that Calendar Year is not appropriate for a long-tail line
- Simple appropriate/inappropriate statement with no support or discussion
- Statement of appropriateness with an incorrect supporting discussion

Part b

Common mistakes included:

- Discussion of the Policy Year data method including a pro/con comparison without a discussion of the applicability to Homeowners
- Discussion of the Policy Year data method including a pro OR con and corresponding statement of appropriateness without a discussion of the applicability to Homeowners
- Incorrectly identifying Homeowners as long-tailed, unless additional justification is provided, e.g. liability coverages
- Stating that Policy Year is appropriate because HO is short-tailed, as it would be inappropriate to wait an additional year (assuming 12-month policies) for PY data to be finalized for a short-tailed line of business
- Stating that Policy Year is appropriate because individual policies could frequently change underwriting characteristics (limits, deductibles, etc.), rather than a book-level underwriting change
- Simple appropriate/inappropriate statement with no support or discussion
- Statement of appropriateness with an incorrect supporting discussion

Part c

Common mistakes included:

- Stating that Report Year is appropriate for a long-tailed line without mentioning the claims-made policy
- Stating that Report Year reduces pricing and/or reserving risk without mentioning the claims-made policy
- Stating that Report Year eliminates the need to estimate IBNR without mentioning the claims-made policy

EXAM 5 SPRING 2015 SAMPLE ANSWERS AND EXAMINER'S REPORT

QUESTION: 7

TOTAL POINT VALUE: 2.5

LEARNING OBJECTIVE(S): A4

SAMPLE/ACCEPTED ANSWERS:

Part a: 1 point

Claims-Made

$$(250 + 350 + 300 + 100) \times 1.05 = 1050$$

Occurrence

$$250(1.05) + 350(1.05^2) + 300(1.05^3) + 100(1.05^4) = 1117$$

Part b: 0.5 point

Sample 1:

If costs are decreasing (i.e. loss cost trends are negative) then the mature claims-made policy will cost more than an occurrence policy. This is because the claims-made policy will pay claims at today's higher costs while the occurrence policy will not have to pay some of the losses until later, with lower costs, due to the report lag.

Sample 2:

If the loss costs are decreasing each report year then the mature claims made policy would cost more than occurrence policies. Since occurrence policies cover future claims, there is more time for trend to impact those claims as compared to claims made policies.

Part c: 1 point

Claims-Made

Sample 1:

CM would be unaffected by this in 2015 as all claims would be for losses occurring before 1/1/2015 or those occurring and reported in 2015.

Sample 2:

We might see lag 0 loss costs go up for the 2015 policy as losses are reported faster. Will need to adjust lag 0 but other lags should be the same as the law change doesn't apply to older year policy (loss occurring before 1/1/2015).

EXAM 5 SPRING 2015 SAMPLE ANSWERS AND EXAMINER'S REPORT

Occurrence

Sample 1:

This new law would eliminate the loss costs associated with lags 2 & 3. Therefore, if no other impact was assumed, we could subtract the loss costs tied to those 2 lag periods.

Sample 2:

Report lags 2 & 3 no longer covered, assume people would report claims faster so might expect lags 0 & 1 loss costs to increase. If lags 0 & 1 loss costs increase, the occurrence policy price will decrease because the increased reported loss costs at lags 0 & 1 are trended less when compared to lags 2 & 3.

EXAMINER'S REPORT:

General Commentary

Candidate performance on this question was mixed, with candidates scoring well on part a., but struggling on parts b. and c.

Part a

In general, most candidates scored well on this part. Candidates were expected to correctly calculate both claims-made and occurrence loss costs and apply trend under both scenarios. The most common error was a lack of recognition that the loss costs given were for the 2014 report year and thus needed to be trended to 2015.

Part b

Candidates' scores varied on this part. Candidates were expected to demonstrate basic knowledge of the relationship between occurrence and claims-made policies and describe why the selected scenario would result in the mature claims-made policy having higher premiums. The most common error was the lack of an explanation for how or why a decreasing trend would result in a claims-made policy premium more than an occurrence policy premium. Many candidates correctly identified the decreasing trend as the cause but did not give an adequate explanation for why this trend resulted in this premium relationship between the two types of policies.

Part c

In general, most candidates struggled with how the new regulation affected the claims-made calculation in part a. They were more successful explaining the required adjustments to the occurrence premium and understanding that the later reporting lags would be eliminated or reported earlier. Candidates were expected to explain why there would be no change to the claims-made premium, as well as why the occurrence premium would be overstated.

EXAM 5 SPRING 2015 SAMPLE ANSWERS AND EXAMINER'S REPORT

The most common error was a lack of recognition that the timing and terms of the new law would result in no change to the claims-made policy premium, since all of the claims covered under the claims-made policy either occurred prior to the law's implementation or occurred in 2015 and are therefore to be reported within the two-year window.

Except for the specific case where the lag 0 losses might increase in anticipation of the law effect on accident year 2015, many candidates also described loss costs shifting between lags and what that would mean to a claims-made policy but missed the point that for this particular policy term, none of that would happen.

Many candidates did not make any attempt to describe the actual adjustments made to the premium but instead just listed the end result: "no change to the claims-made premium" or "decrease the occurrence premium". This did not illustrate an understanding of the dynamics of the situation.

EXAM 5 SPRING 2015 SAMPLE ANSWERS AND EXAMINER'S REPORT

QUESTION: 8

TOTAL POINT VALUE: 2.25

LEARNING OBJECTIVE(S): A4

SAMPLE/ACCEPTED ANSWERS:

Part a: 1 point

Sample 1:

Claim	Excess
1	4,000
2	144,000
3	317,000
4	475,000
Total	940,000

Actual Excess to Non-Excess Ratio = $940 / (46902 - 940) = 2\%$

Even though the actual excess ratio is only 2%, I would select the 4.8% ratio as derived from the historical averages. This is a much more credible factor given it has enough history to smooth out the peaks and valleys in the volatility from year-to-year.

Sample 2:

Claim	Excess
1	4,000
2	144,000
3	317,000
4	475,000
Total	940,000

Actual Excess to Non-Excess Ratio = $940 / (46902 - 940) = 2.045\%$

Recommend all year average = $[4.8\% \times 15 + 2.045\%] / 16 = 4.65\%$

The all year average provides stability, especially useful since excess losses tend to be volatile.

Sample 3:

Reported losses: 46,902

Excess losses: $504 + 644 + 817 + 975 - 2000 = 940$

Excess ratio: $940 / (46902 - 940) = 2.04\%$

The excess ratio used should be based on 1999 – 2014 experience i.e. balance stability.

This is $[2.04 \times 46,902 + 4.8 \times 813,339] / (46,902 + 813,339)$

EXAM 5 SPRING 2015 SAMPLE ANSWERS AND EXAMINER'S REPORT

Sample 4:

Excess dollars for 2014 = 4,000 + 144,000 + 317,000 + 475,000 = 940,000

Excess ratio = 940,000 / (46,902,000 – 940,000) = 2.05%

Since there is a lot of variation in the excess ratio in the historical data, I would choose an excess ratio based on data from 1999 to 2014 to have a more stable result and not overestimate or underestimate the values.

1999 – 2013 Excess losses: $x / (813,339 - x) = 0.048 \rightarrow x = 37,252.17$

1999 – 2014 Excess losses = 940 + 37,252.17 = 38,192.17

1999 – 2014 Reported losses = 813,339 + 46,902 = 860,241

Excess ratio = 38,192.17 / (860,241 – 38,192.17) = 4.65%

Sample 5:

Claim	Reported	LDF	Ultimate	Excess 500K
1	504,000	1.08	544,320	44,320
2	644,000	1.08	695,520	195,520
3	817,000	1.08	882,360	382,360
4	975,000	1.08	1,053,000	553,000
Total				1,175,200

Excess ratio = 1,175,200 / (46,902,000 x 1.08 – 1,175,200) = .02375

I recommend using the long term ratio of 4.8%, more than 1 year of losses needs to be considered as these events are infrequent and a short-term provision will be large in the years following many large losses and small in years following times with fewer large losses.

Sample 6:

Total excess losses = 2,940,000 – 4 x 500,000 = 940,000

Excess Ratio = 940,000 / (46,902,000 – 940,000) = 2.045%

I recommend using the average of the latest 3 years' excess ratios because there appears to be much annual fluctuation and the 2014 ratio appears relatively low. Hence, will use 4.5%.

Sample 7:

Claim	Reported Loss	Excess Loss
1	504,000	4,000
2	644,000	144,000
3	817,000	317,000
4	975,000	475,000
Total		940,000

Total reported loss = 46,902,000

2014 Excess ratio = 940,000 / (46,902,000 – 940,000) = .020451677

EXAM 5 SPRING 2015 SAMPLE ANSWERS AND EXAMINER'S REPORT

I would recommend using the long term average excess ratio weighted with the recent excess ratio by number of claims. Large losses can be volatile. Important to include long term.

$$\text{Use} = [.02045 \times 4 + .048 \times 121] / 125 = .047$$

Sample 8:

2014 excess reported loss including sev > 500,000 = 940,000

$$\text{2014 Excess loss ratio} = 940,000 / (46,902,000 - 940,000) = .02045$$

As the excess ratios have been volatile, I would use the average of the last four years, including 2014 as an excess ratio = .0388 → 3.9%.

Sample 9:

Claim	Reported	Trend	Untrended	Excess 500K
1	504,000	1.05	480,000	0
2	644,000	1.05	613,333	113,333
3	817,000	1.05	778,095	278,095
4	975,000	1.05	928,571	428,571
Total				820,000

Untrended total reported loss for AY 2014 = 46,902,000 / 1.05 = 44,668,571

Non-excess loss for AY 2014 = 44,668,571 – 820,000 = 43,848,571

$$\text{2014 Excess ratio} = 820,000 / 43,848,571 = 1.87\%$$

As losses above excess are highly uncertain and volatile, I would recommend to use a stable and more credible all year weighted ratio of 4.8% rather than an immature year excess ratio computed.

Therefore, recommend excess ratio = 4.8%.

Part b: 1.25 points

$$(46,902,000 - 940,000) \times 1.08 \times 0.98 \times 1.048 = 50,981,197.48$$

$$2,345,000 \times 1.08 \times 1.05 \times 0.98 = 2,606,045.40$$

$$50,981,197.48 + 2,606,045.40 = 53,587,242.88$$

EXAMINER'S REPORT:

General Commentary

Candidates performed poorly on this question, with few candidates receiving more than 50% of the available points. While candidates appeared to understand the individual components of the excess ratio and how to calculate the projected ultimate, they struggled to combine all components together correctly.

EXAM 5 SPRING 2015 SAMPLE ANSWERS AND EXAMINER'S REPORT

Part a

Limited Loss: The candidate was expected to calculate the excess portion of the claims with reported loss amounts greater than \$500K and the total limited loss. Common errors included:

- Incorrectly calculating the excess portion of the claims with total reported loss greater than \$500K
- Interpreting the total loss of 46,902,000 as exclusive of the claims with total reported loss greater than \$500K

Excess Ratio: The candidate was expected to use the excess losses and limited losses calculated previously to determine the excess ratio. The majority of candidates received credit for this calculation.

Selection: The candidate was expected to make a selection of an appropriate large loss load. Generally, candidates did very well. Candidates needed to consider multiple years in the calculation, such as calculating weighted averages of the 1999 – 2013 with the 2014 ratio using total reported loss, total limited loss, claim counts, or number of years as weight. A common mistake was simply averaging the 1999 – 2013 average with the 2014 ratio.

Justification: The candidate was expected to give appropriate justification for their selected excess ratio. The candidate should discuss at least one of volatility, stability, and/or smoothing. Most common errors included stating “credibility” as a justification, or stating the current accident year is not credible without alluding to the volatility inherent in excess ratios.

Part b

Excess Load: The candidate was expected to correctly include an excess load in the calculation using the limited losses calculated in part a. as well as the excess load selected in part a. The most common errors included:

- Applying the selected excess ratio to total reported losses
- Applying the selected excess ratio to ALAE

Loss Frequency: The candidate was expected to apply the frequency factor to loss. The most common error was stating that frequency trend did not apply because no specific “trend-to” date was given. Since the candidate was supplied a frequency and severity trend factor, as opposed to the pure premium trend factor, the candidate was expected to include a provision for loss frequency.

ALAE Frequency: The candidate was expected to apply the frequency factor to ALAE. The most common error was stating that frequency trend did not apply because no specific “trend-to” date was given. Since the candidate was supplied a frequency and severity trend factor, as opposed to the pure premium trend factor, the candidate was expected to include a provision for ALAE frequency.

ALAE Severity: The candidate was expected to apply the severity trend factor to ALAE. The most common errors included:

EXAM 5 SPRING 2015 SAMPLE ANSWERS AND EXAMINER'S REPORT

- Stating the severity trend did not apply because no specific “trend-to” date was given. Since the candidate was supplied a frequency and severity trend factor, as opposed to the pure premium trend factor, the candidate was expected to include a provision for ALAE severity.
- Applying the severity trend factor to loss and ALAE. The factor should only apply to ALAE since loss had already been adjusted for severity trend.

Loss and ALAE Development: The candidate was expected to apply the development factor to both trended, smoothed loss and to trended ALAE. The most common errors included:

- Applying the development factor to loss, but not to ALAE
- Not applying the development factor to the excess loss provision

EXAM 5 SPRING 2015 SAMPLE ANSWERS AND EXAMINER'S REPORT

QUESTION: 9

TOTAL POINT VALUE: 1.25

LEARNING OBJECTIVE(S): A5 / A6

SAMPLE/ACCEPTED ANSWERS:

Sample 1:

All-Variable Expense Method (assume all expenses are variable)

<u>Expense type</u>	<u>(%) Exp Ratio</u>
Other Acq	$4000/200000 = 2\%$
General	$17000/170000 = 10\%$
Commission	$23000/200000 = 11.5\%$
Taxes, Lic, Fees	$5000/200000 = \underline{2.5\%}$
	26.0%

Indicated Average Rate = $250/(1-0.26-0.03) = 352.11$

Sample 2:

PP = 250

General = 17,000

Indicated Rate = $(\text{Loss} + \text{LAE} + \text{Fixed Expense})/(1-\text{VE}-\pi)$

Variable Expense Ratio = $(\text{OA} + \text{CB} + \text{TLF})/\text{WP} = (4+23+5)/200 = 32/200 = .16$

GE/EP = $17/170$

General Expense = 10% of EP

Indicated Rate = $(250 + \text{FE}/\text{Exp})/(1-.16-.03)$

$P = (250 + .1P)/.81$

$.81P = 250 + .1P$

$.71P = 250$

$P = 352$

EXAM 5 SPRING 2015 SAMPLE ANSWERS AND EXAMINER'S REPORT

EXAMINER'S REPORT:

Candidates were expected to know how to calculate expense provisions, assuming all expenses were variable.

Candidates performed very well on this question, with many receiving full credit. The most common error was multiplying the fixed expense provision by the average loss cost. Another common mistake was to assume some expenses were fixed. The only appropriate way to treat fixed expenses given the information provided is as a percent of premium, which results in the same answer.

EXAM 5 SPRING 2015 SAMPLE ANSWERS AND EXAMINER'S REPORT

QUESTION: 10

TOTAL POINT VALUE: 1.75

LEARNING OBJECTIVE(S): A7 / A9

SAMPLE/ACCEPTED ANSWERS:

Part a: 1.25 points

Sample 1:

$$1 - V - Q = 65\%$$

Indicated Rate Change

$$A = 80\% / 65\% = 1.2308 \rightarrow +23.08\%$$

$$B = 60\% / 65\% = 0.9231 \rightarrow -7.69\%$$

- Cap A increase at 20%
- The premium shortfall will need to be allocated to B

$$\frac{(45\,000\,000) * (23.08\% - 20\%)}{(55\,000\,000)} = 2.52\%$$

- Increase A by 20%
- Increase B by $-7.69\% + 2.52\% = -5.17\%$

Sample 2:

T	Prem 000's	LR		Chg	Allowed
A	45 000	0.8	1.2308	23.08%	20%
B	55 000	0.6	0.9231	-7.69%	

PLR = 0.65

$$45\,000 * (1.2308 - 1.2) = 1386$$

$$[1386 / 55000 * 0.9231] + 1 = 1.0273$$

$$0.9231 * 1.0273 = 0.9483 \quad -1 + 0.9483 = -0.0517$$

- => A = 20% increase
- B = 5.17% decrease

EXAM 5 SPRING 2015 SAMPLE ANSWERS AND EXAMINER'S REPORT

Sample 3:

<u>TER</u>	<u>Prem</u>	<u>Loss</u>	<u>LR</u>	<u>L/R</u> <u>needed</u>	<u>Chg</u>	<u>Cap Chg</u>
A	45,000	36,000	0.8	0.65	1.23	1.2
B	<u>55,000</u>	<u>33,000</u>	<u>0.6</u>	<u>0.65</u>	<u>0.923</u>	<u>0.948</u>
	100,000	69,000	0.69	0.65	1.0611	1.0611

$$\frac{45,000(1.2) + x(55,000)}{100,000} = 1.0611$$

$$x = .948$$

Sample 4:

Taking +20% on Territory A brings A's ULR down to 80%/1.2 = 66.6%. To achieve a permissible ULR of 65% we need to solve

$$.65 = \frac{(.8)(45M) + (.6)(55M)}{1.2(45M) + X(55M)}$$

$$\Rightarrow X = .948$$

Take +20% on Territory A and -5.2% on Territory B

Part b: 0.5 point

Sample 1:

The company can try to reduce losses by implementing a loss control initiative, reducing coverage, or changing the mix of business.

Sample 2:

The company may want to consider asset share pricing to consider long term profitability and reduce the current underwriting profit provision in light of this strategy to get the equation in balance.

Sample 3:

The company could reduce underwriting expenses. Examples of this would include laying off staff or closing office buildings.

EXAMINER'S REPORT:

General Commentary

Candidate performance was mixed on this question, with many candidates receiving full credit on part b., but struggling on part a.

EXAM 5 SPRING 2015 SAMPLE ANSWERS AND EXAMINER'S REPORT

Part a

This question required the candidate to:

- Calculate the indicated rate change for each territory
- Identify the territory cap restriction and apply, as needed
- Recognize if the overall loss ratio would not be achieved due to the territory cap and then determine premium shortfall due to application of territory cap
- Determine an adjustment to bring the total loss ratio across all territories to 65%, i.e. offset Territory B with the premium shortfall from Territory A

Few candidates received full credit.

Although an unnecessary additional step, many candidates took the time to determine territory relativities, overall rate change, and then combined the two to determine territory rate changes.

Many candidates calculated the indicated rate change, applied the territory cap, but then did not take the next step to offset the shortfall from the territory cap. The question states that the company sets its rates to achieve a permissible loss ratio of 65%. Without offsetting the shortfall from the territory cap, the overall loss ratio does not meet this criterion.

Other common mistakes include:

- Mislabeled (i.e., identifying relativities as rate changes and vice versa)
- Calculation of the premium shortfall and offset adjustment by multiplying an additive factor or adding a multiplicative factor.
- Adjusting the expected losses. The losses for each territory have not changed in this scenario, but rather the insurer is attempting to adjust rates/premium to cover the same losses.

Part b

This question required knowledge of the fundamental insurance equation and further required the candidate to identify non-pricing alternatives to bring the equation back into balance. Successful candidates were required to identify what component of the equation he/she was adjusting (expenses, expected loss, profitability load, etc) and give an example of how this could be adjusted without altering price.

Many candidates received full credit.

Common mistakes included:

- Not providing a thorough response, such as simple identification of a component of the equation without an example of how to adjust and vice versa.
- Identifying pricing changes to bring the equation back into balance, when the question specifically asked for an alternative to pricing changes.

EXAM 5 SPRING 2015 SAMPLE ANSWERS AND EXAMINER'S REPORT

QUESTION: 11

TOTAL POINT VALUE: 5.75

LEARNING OBJECTIVE(S): A4 / A6 / A9 / B3 / B6

SAMPLE/ACCEPTED ANSWERS:

Sample 1:

Select LDFS: Assume variations are random and select straight average for each age.

12-24: 1.05625 24-36: 1.046 36-48: 1.019 48-ult: 1.000
 Age to ult: 12 mos: 1.126 24 mos: 1.066 36 mos: 1.019

Trend losses from average accident date of historical period to average accident of future period:

7/1/XX to halfway through 10/1/15-4/1/17 = 7/1/16

Select Salv/Subro LDFS: appears to have been a large change at 12-24 months in 2012. 2013 is consistent so I will select a 2-year average assuming the change will remain going forward. Other years fairly stable – select all year averages

12-24: 1.518 24-36: 1.005 36-48: 1.005 48-ult: 1.000
 Age to ult: 12 mos: 1.534 24 mos: 1.1036 36 mos: 1.005

Get ult trended losses

AY	(1) Rptd (000)	(2) Ult LDF	(3) Trend	(4) = (1)*(2)*(3) Trended losses	(5) = 0.03*(4) LAE
2013	17500	1.066	1.05 ³	21593	648
2014	18800	1.126	1.05 ²	23335	700

AY	(6) S+S Ratio	(7) S+SLDFs	(8) = (6)*(7) Ult S+S Ratio	(9) = (4)*(8) Ult S+S	(10) = (4)+(5)-(9) Net Trended Losses +LAE
2013	.471	1.01036	.476	10276	11965
2014	.314	1.534	.482	11238	12797

Assume S+S ratios apply to loss before LAE

Trend prem: Trend from avg earned historical to avg earned future = 7/1/XX – 7/1/16

AY	OLEP	Trend	Trended OLEP	Trended Loss+LAE	Loss Ratio
2013	15900	1.03 ³	17374	11965	
2014	17500	1.03 ²	18566	12797	
Total			35940	24762	0.689

Credibility: $\sqrt{\frac{(20700+23200)}{60000}} = .855$

EXAM 5 SPRING 2015 SAMPLE ANSWERS AND EXAMINER'S REPORT

Complement of credibility: need to trend from target eff date of last ind to current target date: 7/1/14 – 10/1/15 = 1.25

$$\left(\frac{1.07}{1.025}\right) * \left(\frac{1.05}{1.03}\right)^{1.25} = 1.069$$

Indicated change: $\frac{.689+.07}{1-.2-.06} - 1 = 2.56\%$

Credibility wtd change $0.855 * 1.0256 + (1-0.855) * 1.069 - 1 = 3.2\%$

Sample 2:

Complement: 7/1/14 – 10/1/15 = 1.25 yrs

$$\left(\frac{1.07}{1.025}\right) * \left(\frac{1.05}{1.03}\right)^{1.25} = 1.0693$$

Credibility: $\sqrt{\frac{(20700+23200)}{60000}} = .855$

Trend Period: 7/1/XX – 7/1/16

AY	Prem	trend	Trended OLEP	Loss	CDF	Ult Gr Loss	S/S ratio	CDF	Ult S/S	Ult loss Net S/S
2013	15900	x 1.03 ³	17374	17500	1.065874	18653	.471	1.01033	.4759	9776
2014	17500	x 1.03 ²	18566	18800	1.12556	21161	.314	1.5337	.4816	10969

AY	Ult loss Net S/S	trend	Trended net loss	Loss Ratio
2013	9776	x 1.03 ³	11317	
2014	10969	x 1.03 ²	12094	
				0.6514

Indicated Change

$$\frac{.6514 * (1.03) + .07}{1 - .2 - .06} - 1 = 0.1273\%$$

Credibility wtd indicated rate change
 $0.855 * 0.001273 + (1-0.855) * .0693 = 1.11\%$

Gross LDFs

12-24 => 4yr simple average = 1.056 because no changes in patterns seen

24-36 => 3yr simple average = 1.046 because no changes in pattern

36-48 => avg = 1.019

48-Ult = 1.00

12-Ult = 1.056x1.046x1.019=1.12556

24-Ult = 1.046x1.019=1.065874

EXAM 5 SPRING 2015 SAMPLE ANSWERS AND EXAMINER'S REPORT

Sal&Sub LDF

12-24 => avg of last 2 yrs because earlier age to age doesn't seem to reflect recent developments where age to age is much higher = 1.518

24-36 => simple average because diff in age to age are minimal = 1.0053

36-48 => 1.005 simple average

48-Ult = 1.00

12-Ult = $1.518 \times 1.0053 \times 1.00 = 1.5337$

24-Ult = $1.0053 \times 1.005 = 1.0103$

EXAMINER'S REPORT:

Candidates were expected to know:

- Loss development including justifying selections
- Salvage and subrogation
- Trend period calculations
- Incorporation of ALAE
- Calculation of a loss ratio
- Calculation of indicated rate change
- Complement of credibility
- Credibility weighting

Candidates generally did well on this question, but scored short of full credit. The number of calculations seemed to cause a lot of computational errors in otherwise appropriate answers.

Common mistakes included:

- Math errors
- Not explaining the LDF selection
- Using the ratio of S&S to losses to calculate net losses instead of one minus that ratio
- Not taking the square root on the credibility calculation
- Attempting to credibility weight the loss ratio instead of the indication
- Using written instead of earned dates for premium trending
- Determination of the complement of credibility

EXAM 5 SPRING 2015 SAMPLE ANSWERS AND EXAMINER'S REPORT

QUESTION: 12

TOTAL POINT VALUE: 1

LEARNING OBJECTIVE(S): A8

SAMPLE/ACCEPTED ANSWERS:

Sample 1:

Enhance Fairness – By using risk classification, insureds are priced more closely to their expected losses for the policy. Thus low risk insureds will pay a lower amount than higher risk insureds. This way the low risk insureds will not subsidize the high risks and premium is equitable.

Sample 2:

Enhance Fairness. Differences in prices reflect differences of the future expected loss. Exposures in the same class with similar risks should not be charged significantly differently.

Sample 3:

Financial stability of insurance industry: not identifying risk classes leads to adverse selection whereby insureds (sic) undercharge high-risk insureds and overcharge low-risk insureds. Ultimately insurers attract all high-risk insureds and the total premium is inadequate.

Sample 4:

Protect financial stability of insurance system – if some companies use risk classification and others don't, the ones that do not will be adversely selected against as their better risks will go to company that prices appropriately while poor risks will use to co. w/out risk classification b/c of underpricing. If this company does not charges appropriately they could go insolvent.

Sample 5:

To permit economic incentives to operate and thus promote widespread availability of coverage --> if insurers can charge profitable and fair rates to all classes, they will be more willing to offer coverage to all classes.

Sample 6:

Permit economic incentives to operate and thus enable widespread availability of insurance. If insurers weren't allowed to use risk classification to charge higher premium rates to high risk insureds (in exchange for the higher loss potential of these insureds), very few companies would want to underwrite high risk insureds and the supply of insurance would decrease.

EXAM 5 SPRING 2015 SAMPLE ANSWERS AND EXAMINER'S REPORT

EXAMINER'S REPORT:

Candidates were expected to be able to identify two primary purposes of risk classification and provide some description of how risk classification helped to achieve these purposes. Candidates performed well on this question, with most receiving full credit or close to full credit.

Common errors included:

- Describing something other than a primary purpose of risk classification. For example:
 - Describing what risk classification is
 - Describing considerations when selecting a classification variable
 - Describing a non-primary purpose of risk classification
- Identifying a purpose but not providing any description of it
- Describing only one purpose
- Not adequately describing the purpose by being overly brief or only describing some tangential aspect

EXAM 5 SPRING 2015 SAMPLE ANSWERS AND EXAMINER'S REPORT

QUESTION: 13

TOTAL POINT VALUE: 2.5

LEARNING OBJECTIVE(S): A9

SAMPLE/ACCEPTED ANSWERS:

Part a: 0.5 point

Sample 1:

Driver age is a practical rating variable because it is easy and inexpensive to obtain and verify by DMV records or a copy of driver's license.

Sample 2:

Driver age meets the causality consideration, since young and very old drivers are thought to be less safe, due to inexperience or failing faculties.

Sample 3:

It lacks of controllability. People can't control their age, which mean the rating variable doesn't provide incentive for insurer to improve their rate level.

Sample 4:

Social (private): age is not a very private measure so insureds will not object to providing it based on privacy complaints.

Sample 5:

Measurability – this is an objective not subjective variable that can be measured.

Sample 6:

Age is not easily manipulated since it is on official documents; you are one age and it is not in the control of a person.

Sample 7:

Based on the consideration of public acceptability, driver age may be difficult to use as a rating variable because insureds may feel that providing their age is an invasion of privacy.

Sample 8:

It's allowed by law. Most state allow using age as a rating variable.

EXAM 5 SPRING 2015 SAMPLE ANSWERS AND EXAMINER'S REPORT

Sample 9:

EE<25 = 400

EE>25 = 800

PP<25 = 589.5

pp>25=603.20

Statistical: seems to indicate a differentiation between age since PP is diff but not in direction of current rel. May be correlation with symbol so would need to remove in calculation.

Sample 10:

However, risk classification would most likely support more homogeneous groupings than <25 vs. 25+ For instance, drivers age 70+ may have different indicated factors than ages 25-69.

Part b: 2 points

Sample 1:

Since exposures are not evenly distributed among vehicle symbol for each age classification, I will use the adjusted pure premium approach to correct for distributional bias.

Symbol	Factor	<25	>=25
A	0.8	250	100
B	1	75	200
C	1.3	75	500
Total		400	800
Avg Factor		0.93125	1.1625

Age	Adj. Exposure	Pure Premium	Ind Rel	Re-based
<25	372.5	633.02	1.1478	1
>=25	930	518.88	0.9408	0.8197
Total	1302.5	551.52		

$$[(400*1.00) + (800*0.75)] / 1200 = (BR Adj) * [(400*1.00) + (800*.8197)/1200]$$

$$0.833 = (BR Adj)(0.8798)$$

$$BR Adj=0.9471$$

Age	Relativity
<25	1
>=25	0.8197
Rev. BR=0.9471*Current BR	

EXAM 5 SPRING 2015 SAMPLE ANSWERS AND EXAMINER'S REPORT

Sample 2:

Will use adjusted PP method to deal with exposure correlation

$$\begin{aligned} \text{U25 Adj exposure} &= 0.8(250) + 75 + 1.3(500) \\ &= 372.5 \end{aligned}$$

$$\begin{aligned} \text{25 \& Up Adj Exp} &= 0.8(100) + 200 + 1.3(500) \\ &= 930 \end{aligned}$$

Class	Adj Exp	Adj PP	Curr Rel	Prop Rel	Prop Rel Rebased	% Chg
Und 25	372.5	633.02	1	1.148	1	0
25 & up	930	518.88	0.75	0.941	0.819	9.2
		551.52				6.6

Adj exp wtd avg

$$\text{Off-bal} = (1.066)^{-1}$$

$$\text{New BR} = (1.066)^{-1} * (\text{Prev BR})$$

Sample 3:

$$\begin{aligned} \text{Under 25 Adj Exp: } &250*0.8 + 75*1.0 + 75*1.3 \\ &= 372.5 \end{aligned}$$

$$\begin{aligned} \text{>=25 Adj Exp: } &100*0.8 + 200*1.0 + 800*1.3 \\ &= 930 \end{aligned}$$

I used relativity adjusted exposure to minimize exposure dist. bias.

$$\begin{aligned} \text{Under 25 PP} &= 235800/372.5 \\ &= 633.02 \end{aligned}$$

$$\text{Ind Rel: } 1.00$$

$$\begin{aligned} \text{Over 25 PP} &= 482560/930 \\ &= 518.88 \end{aligned}$$

$$\begin{aligned} \text{ind Rel} &= 518.88/633.02 \\ &= 0.82 \end{aligned}$$

Exp Wtd Rel

$$\text{Current: } [1.0*400+0.75*800]/1200 = 0.833$$

$$\text{Proposed: } [1.0*400+0.82*800]/1200 = 0.888$$

$$\text{Proposed Base Rate: } B * 0.833/0.888$$

$$= 0.934 * B \text{ (current base rate)}$$

EXAM 5 SPRING 2015 SAMPLE ANSWERS AND EXAMINER'S REPORT

Sample 4:

Symbol	Exposures		Relativity
	<25	>=25	
A	250	100	0.8
B	75	200	1
C	75	500	1.3
Adjusted Exposures	372.5	930	

Age	Adjusted Exposures	Loss/ALAE	PP	Ind Rel	Rel Current	% Chg
<25	372.5	235800	633	1	1	0%
>=25	930	482560	519	0.819	0.75	9.30%
						6.20%

wtd by actual exp

Assuming current base rate is 100
 New Base Rate = $100/1.062 = 94.17$

Use the adjusted pure premium approach to take into consideration the correlation btw exposures.

Sample 5:

DA	Adj Exposure	L&ALAE	PP	Ind to Tot	Ind to Base
Under 25	$250*0.8 + 75*1 + 75*1.3 = 372.5$	235.8	0.633	1.1478	1
25 & Older	930	482.56	0.5189	0.9409	0.8197
Total	1302.5	718.3	0.5515	1	

The new differential is 1 and 0.827

$$B_p = (P_p - A_p) / S_p$$

$$\text{Symbol Avg Diff} = (280 + 275 + 747.5) / (350 + 275 + 575) = 1.0854$$

$$\text{Driver Age} = (400 + 800*0.8197) / (400 + 800) = 0.8786$$

$$P_p - A_p = (235,800 + 482,560) / 1200 = 598.63$$

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$$\begin{aligned} B_p &= 598.63 / (0.8786 * 1.0854) \\ &= 627.76 \end{aligned}$$

The adj PP method and avg differential method chose to encounter different distribution of risks.

EXAMINER'S REPORT:

General Commentary

Candidates performed well on this question.

Part a

The candidate was expected to be able to identify criteria for evaluating the appropriateness of rating variables. The candidate was also expected to be able to evaluate driver age with respect to each of the two criteria.

A common mistake was to identify and describe a relevant criterion but to omit any evaluation of driver age.

Part b

The candidate was expected to be able to apply the adjusted pure premium method to develop rating factors and calculate the corresponding base rate offset.

The candidate was expected to identify the distributional bias in the exposures and recognize the adjusted pure premium method was most appropriate given the bias and the data provided. Most candidates used the correct method. A common error was using the adjusted pure premium method correctly but not justifying the selection of a method.

The candidate was also expected to apply the adjusted pure premium method using the data provided to determine the driver age rating factors. Candidates generally did well on this portion of the question. A common error was incorrectly adjusting the exposures for the average symbol relativities by driver age.

Finally, the candidate was expected to calculate the base rate offset that, when implemented with the new driver age factors, would result in a revenue-neutral change. Since no current base rate was provided, the candidate was expected to calculate the base rate offset/off-balance factor, assuming a current base rate and correctly offsetting to develop a proposed base rate, or to calculate the proposed base rate using the symbol and driver age factors with the assumption that total premiums were equal to total losses and ALAE. Common errors included:

- Calculating the off-balance factor using the change in the driver age factor for one age group rather than for the entire book of business
- Applying the average driver age change directly to the base rate rather than inverting it to calculate an off-balance factor

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- Developing the percentage change by driver age group but not doing any additional calculations
- Developing the proposed base rate assuming total premiums equaled total losses and ALAE but did not account for the symbol factors in calculating the base rate

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QUESTION: 14

TOTAL POINT VALUE: 2.5

LEARNING OBJECTIVE(S): A9

SAMPLE/ACCEPTED ANSWERS:

Part a: 0.75 point

Sample 1:

$$\text{LAS (4,000)} = (75,000 + 209,000 + 3 \times 4,000) / (120 + 117 + 3) = 1,233$$

$$\text{LAS (6,000)} = (75,000 + 209,000 + 5,500 + 2 \times 6,000) / (120 + 117 + 3) = 1,256$$

$$\text{ILF (6,000)} = 1,256 / 1,233 = 1.01$$

Sample 2:

$$\text{Losses limited to 4,000} = 296,000$$

$$\text{Losses limited to 6,000} = 301,500$$

$$\text{ILF (6,000)} = 301,500 / 296,000 = 1.019$$

Part b: 0.75 point

Sample 1:

$$\text{Total losses} = 75,000 + 209,000 + 22,000 = 306,000$$

$$\text{Losses eliminated} = 75,000 + 1,000 \times 120 + 1,500 + 2,500 + 6,000 = 205,000$$

$$\text{LER} = 205 / 306 = 0.6699$$

Sample 2:

$$\text{Total losses} = 75,000 + 209,000 + 22,000 = 306,000$$

$$\text{Losses retained} = (209,000 - 1,000 \times 117) + (3 \times 3,000) = 101,000$$

$$\text{LER} = 1 - 101 / 306 = 0.6699$$

Part c: 1 point

Sample 1:

Issue: Policies with deductibles may only have loss amounts in excess of deductible or if deductible decreases may be missing data below current deductible.

Solution: Use loss ratio approach or fit theoretical severity distribution.

Sample 2:

Issue: Policies with policy limits may have loss data censored by policy limits.

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Solution: Use GLM approach or use industry data

Sample 3:

Issue: Higher limits will suffer higher severity trends.

Solution: Trend losses before calculating deductible factors.

Sample 4:

Issue: Higher limits experience greater loss development.

Solution: Develop losses before calculating deductible factors.

Sample 5:

Issue: Insureds may self-select certain deductibles and limits.

Solution: Use GLM.

Sample 6:

Issue: Claim reporting behavior may vary depending on insured's deductible.

Solution: Use GLM.

Sample 7:

Issue: Data thin at higher layers.

Solution: Use smoothing technique or fit data to curve.

Sample 8:

Issue: Distortion in deductibles/limits causes average severity to shift over time.

Solution: Use industry data or GLM.

EXAMINER'S REPORT:

General Commentary

Candidate performance on this question was mixed, with candidates performing well on part a., but struggling more with parts b. and c.

Part a

Candidates were expected to show basic knowledge of ILF calculations, including both the numerator and denominator. Common errors were in calculating LAS (6,000) or using total losses rather than LAS (6,000) in the denominator.

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Part b

Candidates struggled more on part b. than on part a. Many candidates interpreted the 3,000 policy limit as being applied on top of the 1,000 deductible. This misunderstanding made the question impossible to answer with the given information.

Another common mistake was calculating $(1 - \text{loss elimination ratio})$ rather than the loss elimination ratio.

Part c

Candidates struggled with this part of the question.

Some candidates provided responses not related to deductibles or limits, such as mentioning that losses need to be trended or developed.

Another common incorrect response was stating that companies need to collect ground up data or ask customers to report losses under the deductible, after stating truncation/censorship as an issue.

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QUESTION: 15

TOTAL POINT VALUE: 1.5

LEARNING OBJECTIVE(S): B2

SAMPLE/ACCEPTED ANSWERS:

Part a: 0.75 point

Sample 1:

	Cumulative Reported Claims			
AY	12	24	36	48
2011	225	10,225	10,475	15,675
2012	0	2,500	2,500	

Support

Claim 1: AY 2011

@ 12 months: $100 + 100 + 25 = 225$

@ 24 months: 225

@ 36 : 225

@ 48 : 225

Claim 2: AY 2011

@ 12 months: 0

@ 24 months: 10,000

@ 36 months: $250 + 10,000 = 10,250$

@ 48 : $250 + 15,000 + 200 = 15,450$

Claim 3: AY 2012

@ 12: 0

@ 24 : 2,500

@ 36 : 2,500

EXAM 5 SPRING 2015 SAMPLE ANSWERS AND EXAMINER'S REPORT

Sample 2:

Cumulative Paid Claims				
AY	12	24	36	48
2011	225	225	475	15,675
2012	0	2,500	2,500	
2013	0	0		
2014	0			

Case O/S				
AY	12	24	36	48
2011	0	10,000	10,000	0
2012	0	0	0	
2013	0	0		
2014	0			

Cumulative Reported Claims				
AY	12	24	36	48
2011	225	10,225	10,475	15,675
2012	0	2,500	2,500	
2013	0	0		
2014	0			

Sample 3:

Cumulative Reported Claims				
Accident Year	12	24	36	48
2011	225	10,225	10,475	15,675
2012	0	2,500	2,500	
2013	0	0		
2014	0			

$$225 = 100 + 100 + 25 + (0-0)$$

$$10,225 = 225 + (10,000 - 0)$$

$$10,475 = 10,225 + 250 + (10,000 - 10,000)$$

$$15,675 = 10,475 + 15,000 + 200 + (0 - 10,000)$$

$$2500 = 2500$$

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Part b: 0.75 point

Sample 1:

	Cumulative Reported Claims			
RY	12	24	36	48
2011	225	225	225	225
2012	10,000	12,750	17,950	

Support

Claim 1: same as AY transactions

Claim 2: RY 12

@ 12: 10,000

@ 24 : 10,250

@ 36 : 15,450

Claim 3: RY 12

@ 12: 0

@ 24 : 2,500

@ 36 : 2,500

Sample 2:

	Cumulative Paid Claims			
RY	12	24	36	48
2011	225	225	225	225
2012	0	2,750	17,950	
2013	0	0		
2014	0			

Case O/S

RY	12	24	36	48
2011	0	0	0	0
2012	10,000	10,000	0	
2013	0	0		
2014	0			

Cumulative Reported Claims

RY	12	24	36	48
2011	225	225	225	225
2012	10,000	12,750	17,950	
2013	0	0		
2014	0			

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Sample 3:

Cumulative Reported Claims

Report Year	12	24	36	48
2011	225	225	225	225
2012	10,000	12,750	17,950	
2013	0	0		
2014	0			

$$225 = 100 + 100 + 25 + (0-0)$$

$$10,000 = 0 + 0 + 10,000$$

$$12,750 = 10,000 + 2,500 + 250$$

$$17,950 = 12,750 + 15,000 + 200 - 10,000$$

EXAMINER'S REPORT:

General Commentary

Candidates were expected to know the differences between an accident year and report year, how to calculate reported claim amounts given transactional paid and case reserve information, and how to construct a triangle. Candidates generally performed well on this question.

Part a

The candidate was expected to know how claims are assigned to an accident year, how to calculate cumulative reported claim amounts given transactional paid and case reserve information, and how to construct a triangle.

Common mistakes were:

- Ignoring that Accident Year 2012 is 36 months old and not including a loss amount at that age in the triangle or including an amount at age 48 for that accident year
- Calculating age 24 for Accident Year 2012 as 1,000 by using just the case reserves rather than adding the case reserves to the cumulative payments
- Calculating age 24 or 36 for Accident Year 2012 as 3,500 by adding the case reserves to the incremental payment from two separate transactions on claim #3

Part b

The candidate was expected to know how claims are assigned to a report year, how to calculate cumulative reported claim amounts given transactional paid and case reserve information, and how to construct a triangle.

EXAM 5 SPRING 2015 SAMPLE ANSWERS AND EXAMINER'S REPORT

Common mistakes were:

- Calculating age 24 for Report Year 2012 as 13,750 by not accounting for the second transaction in 2013 on claim #3
- Calculating age 24 for Report Year 2012 as 11,250 by not accounting for the second transaction in 2013 on claim #3.
- Calculating Report Year 2011 as 275 by not accounting for the third transaction in 2011 on claim #1

EXAM 5 SPRING 2015 SAMPLE ANSWERS AND EXAMINER'S REPORT

QUESTION: 16

TOTAL POINT VALUE: 2

LEARNING OBJECTIVE(S): B2 / B5

SAMPLE/ACCEPTED ANSWERS:

Part a: 1 point

Paid to Reported Claim Ratio

AY	12	24
2011	0.1176	0.2500
2012	0.1034	0.3191
2013	0.2037	0.3830
2014	0.2083	

Close to Reported Claim Count

AY	12	24
2011	0.1399	0.4608
2012	0.1449	0.5652
2013	0.2517	0.6182
2014	0.2689	

Both of these triangles indicate an increase in the claim closure rate. We can see an increase down the columns for both

Average Case Outstanding

AY	12	24
2011	9.04	25.64
2012	14.69	32.00
2013	19.55	46.03
2014	21.84	

Based on this it appears that Case adequacy is increasing

EXAM 5 SPRING 2015 SAMPLE ANSWERS AND EXAMINER'S REPORT

Paid Severity

AY	12	24
2011	7.41	10.00
2012	10.00	11.54
2013	14.86	17.65
2014	15.63	

Larger claims could be closing quicker

Reported Severity

AY	12	24
2011	8.81	18.43
2012	14.01	20.43
2013	18.37	28.48
2014	20.17	

Case adequacy could be increasing

Part b: 1 point

Sample 1:

The Berquist-Sherman paid method would be appropriate because it would adjust for differing disposal rates and bring paid claims to a common level of settlement.

The reported development technique would be appropriate because it's not affected by speedups in settlement.

Sample 2:

Expected Claims – This method is completely unaffected by changes in development patterns

Berquist Sherman – This method can adjust for both changes in claim settlement rate and case reserve adequacy.

Sample 3:

Because of a change in settlement rate one can apply the B-S technique so that all accident years will be adjusted to same settlement rate.

EXAM 5 SPRING 2015 SAMPLE ANSWERS AND EXAMINER'S REPORT

Since there are many changes being made we can use the expected claims technique, using an a priori estimate of claims will not be distorted by changes and will be stable.

Sample 4:

Settlement rates are increasing. You could use the B-S settlement rate adjustment to restate past paid losses to be at same settlement rate as the latest diagonal.

You could also use the reported claims chain ladder development technique, as this should not be affected by a change in the rate at which claims are paid, assuming reported practices are consistent.

Sample 5:

I would recommend the Berquist Sherman paid technique to adjust historical paid claims to current rate of claims processing, so that the speed up in payments does not cause an overestimate of unpaid claims. I would recommend the Berquist Sherman reported technique to adjusted historical reported claims to the current level of case reserve adequacy. This will avoid overstating unpaid claims due to the recent increase in the average case reserves.

Sample 6:

Use a frequency severity disposal rate technique to adjust for the change in settlement rates and select incremental severities based on the latest diagonal to account for case strengthening.

Expected claims technique – uses an a priori estimate that will not be affected by the changes in the company's claim department

Sample 7:

I would recommend the reported B-F method since this is unaffected by changes in payment patterns and for the most immature year will rely very little on the reported to date.

One appropriate technique would be the expected claims method. This is unaffected by any change in settlement patterns.

EXAMINER'S REPORT:

General Commentary

Candidates were expected to know how to calculate two reserving diagnostics and identify two appropriate reserving techniques in a changing environment. Overall candidates scored very well on this question.

Part a

Candidates were expected to know how to calculate two reserving diagnostics and what they represent. Candidates performed very well on this part.

EXAM 5 SPRING 2015 SAMPLE ANSWERS AND EXAMINER'S REPORT

Candidates needed to show two diagnostic triangles and assess the implications on reserving.

Common errors included:

- No assessment of the diagnostic triangle
- Inadequate assessment of the diagnostic triangle, such as “increasing paid”
- Misinterpreted a smaller increase in average case outstanding compared to the previous year as a decline in case reserve adequacy

Part b

Candidates performed very well on this part. Candidates were expected to identify two appropriate reserving techniques in a changing environment.

Candidates needed to identify two reserving techniques consistent with the diagnostics in part a. and justify the appropriateness of the method.

Common errors included:

- Stating a reserving method but not explaining why it is appropriate
- Only mentioning an adjustment for one of the components on methods with two components, such as frequency/severity

EXAM 5 SPRING 2015 SAMPLE ANSWERS AND EXAMINER'S REPORT

QUESTION: 17

TOTAL POINT VALUE: 2.75

LEARNING OBJECTIVE(S): B3

SAMPLE/ACCEPTED ANSWERS:

Sample 1:

TREND SELECTION

Policy Year	Earned Car Years	Reported Claims (000's)	Selected CDF	Development Ultimate	Pure Premium	Year Over Year Trend
2011	830	315	1.05	331	399	
2012	1000	392	1.1	431	431	1.080
2013	1000	358	1.3	465	465	1.079
2014	700	200	2	400	571	1.228

I recommend a trend of 8%. I'm not including the 22.8% because that year is very immature/ highly leveraged.

ONLEVEL

Policy Year	Earned Premium	Average Rate per Exposure	AY 2014 Rate Per Exposure	Onlevel Premium
2011			400	332
2012			400	400
2013			400	400
2014	280	400	400	280

CAPE COD METHOD

Policy Year	Onlevel EP	CDF	Used Up Premium	Trend to AY 2014	Trended Reported	Adjusted ELR
2011	332	1.05	316	1.260	397	1.260
2012	400	1.1	364	1.170	459	1.260
2013	400	1.3	308	1.080	387	1.260
2014	280	2	140	1	200	1.430
Totals:			1128		1443	

ELR = 1,443 / 1,128
= 1.279

IBNR = 1.279 * 280 * (1 - 1/2)
= 179.06 (000s)

EXAM 5 SPRING 2015 SAMPLE ANSWERS AND EXAMINER'S REPORT

Sample 2:

TREND SELECTION

Policy Year	Earned Car Years	Reported Claims (000's)	Selected CDF	Development Ultimate	Pure Premium	Year Over Year Trend
2011	830	315	1.05	331	399	
2012	1000	392	1.1	431	431	1.080
2013	1000	358	1.3	465	465	1.079
2014	700	200	2	400	571	1.228

Recommend a trend of 8%. Exclude 22.8% because the year is very immature.

CAPE COD METHOD

Policy Year	Earned Car Years	CDF	Used Up Exposure	Trend to AY 2014	Trended Reported	Adjusted ELR
2011	830	1.05	790	1.260	397	0.500
2012	1000	1.1	909	1.170	459	0.500
2013	1000	1.3	769	1.080	387	0.500
2014	700	2	350	1	200	0.570
Totals:			2818		1443	

$ELR = 1,443 / 2,818 = 0.512$

$IBNR = 0.512 * 700 * (1 - \frac{1}{2}) = 179.2 \text{ (000s)}$

EXAM 5 SPRING 2015 SAMPLE ANSWERS AND EXAMINER'S REPORT

EXAMINER'S REPORT:

The question combined topics from different parts of the syllabus. Overall candidates did fairly well on this question, though few scored full credit.

The most common error was to neglect to develop the losses to ultimate when deriving the pure premiums. Many candidates also struggled to provide clear justifications on why the particular trend was selected.

Most candidates were able to bring the premiums to the current level using the Extension of Exposures technique. Candidates also did well in the Cape Cod component, and were able to derive an ELR and the resulting IBNR.

Note that approaching this question by using an exposure-based technique was also acceptable; as premium cancels out in the calculation, using exposure in place of on-level premium achieves the same result.

EXAM 5 SPRING 2015 SAMPLE ANSWERS AND EXAMINER'S REPORT

QUESTION: 18

TOTAL POINT VALUE: 2.25

LEARNING OBJECTIVE(S): B3

SAMPLE/ACCEPTED ANSWERS:

Sample 1:

Weighted Average Reported Claims Link Ratio

12-24	24-36	36-Ult
2.246	1.25	1.05

AY	Trended Pure Premium
12	$7750 \times 1.05 / 520 * 1.04^3 = 17.6$
13	$6600 * 1.05 * 1.25 / 530 * 1.04^2 = 17.68$
14	$3850 * 1.05 * 1.25 * 2.246 / 540 * 1.04 = 21.86$

We can observe 2014 trended pure premium was increased. I prefer to believe 2015 AY will keep this increased pure premium. Select pure premium = 21.86

Ult claims = $21.86 * 575 = 12569.5K$

Sample 2:

AY	12-24	24-36	36-Ult
2012	2.25	1.25	1.05
2013	2.23		
Select Avg	2.2459	1.25	1.05

	(a)	(b)	©	(d)	
AY	Losses	Dev	Trend	Beds	Expected cost / Bed
2012	7750	1.05	1.04^3	520	17.60
2013	6600	$(1.25)(1.05)$	1.04^2	530	17.678
2014	3850	$(2.2459)(1.25)(1.05)$	1.04	540	21.86

I will select a two year average of 2012 & 2013 as these two years have similar pure premiums. Also they aren't subject to a highly leveraged LDFs. (12-24). Selection of \$17.64 PP.

Expected ultimate claims => $17.64 * 575 = \$10,143$

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Sample 3:

AY	12-24	24-36	36-Ult
2012	$6200/2750 = 2.2545$	$7750/6200 = 1.25$	1.05
2013	$6600/2950 = 2.2373$		
Select Straight Avg	2.2459	1.25	1.05
Cum Avg	2.9477	1.3125	1.05

AY	Ult	Beds	Pure Premium*Trend
2012	$7750*1.05=8137.5$	520	$15.649*1.04^2$
2013	$6600*1.3125=8662.5$	530	$16.3443*1.04$
2014	$3850*2.9477=11348$	540	$21.06*1$
		Avg	18.3133

Spike in 2014, should still include in average because it represents valuable information.

Therefore estimate ultimate for 2015 = $575 * 18.3133 * 1.04 = \$10,951$

EXAMINER'S REPORT:

Candidates were expected to know how to calculate estimated ultimate claims using the expected claims technique and to provide justification for the expected pure premium selection. Candidates performed well on this question, with many candidates receiving full credit or close to full credit.

The most common errors included:

- Omitting justification for the pure premium selection
- Incorrect identification of the trend factors
- Incorrectly applying the trend factors
- Calculation errors.

EXAM 5 SPRING 2015 SAMPLE ANSWERS AND EXAMINER'S REPORT

QUESTION 19

TOTAL POINT VALUE: 3.25

LEARNING OBJECTIVE(S): B3 / B8

SAMPLE/ACCEPTED ANSWERS:

Part a: 1 point

AY	Paid CDF to Ult	Rept CDF to Ult	Reported BF Ult
2012	$14/7 = 2.0$	$10.4/7.8 = 1.397$	10.64
2013	$8.7/3.1 = 2.8$	$11/5 = 2.2$	10.4545
2014	$12/1.5 = 8.0$	$5.1/1.9 = 3$	8.5666

Paid BF Ult = paid to date + (Expected Ult x % unpaid)

For AY 2012 = $7 + (\text{expected} \times (1 - 1/2)) = 12$

Expected claims = 10

Reported BF Ult = reported to date + (10 x % unreported)

AY 2012 = $7.8 + (10 \times (1 - 1/1.397)) = 10.64$

AY 2013 = $5.0 + (10 \times (1 - 1/2.2)) = 10.4545$

Ay 2014 = $1.9 + (10 \times (1 - 1/3)) = 8.5666$

Part b: 1.5 points

Sample 1:

AY 2012: Both paid techniques have high ultimate claim, while reported techniques have low ultimate claim. This may be due to case reserving weakening or increase in claim settlement speed. Selected ult claim of 13.8 is appropriate if it is due to case reserve weakening.

AY 2013: Paid techniques give low ultimate. This may be due to slowdown in claim settlement speed. Reported techniques give higher ultimate. This may be due to case reserve strengthening. Selected ult claim of 12.2 is between 2 estimates. Appropriate.

AY 2014: Reported techniques give significantly low ult claim than paid tech. BF rep technique of 8.567 is higher than the selected ult claim. This may be due to severe weakening of case reserving methodology. 7.1 selected ult claim may be too low.

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Sample 2:

2012 seems high. I think they have given too much credit to the paid development technique. Even though there are a couple years of experience, the pd CDF of 2.0 is still rather high and indicates a long tail. I think more weight should still be given to BF methods and reported dev is more reliable than paid.

2013 seems reasonable. It is in the middle of the range of all four estimates.

2014 seems somewhat low. I think the B-F methods are much better for early maturities to help smooth volatility, and 7.1 is below both B-F estimates.

Part c: 0.25 point

Benktander Ultimate = Reported to date + (BF Ult x % unreported)

$$2014 \text{ Ult} = 1.9 + (8.5666 \times (1 - 1/3)) = 7.6$$

Part d: 0.5 point

Sample 1:

The unpaid claim estimate for AY 2014 will continue to decrease during successive iterations of the reported Benktander technique. Eventually, this technique will converge and be equal to the reported development technique estimate.

Sample 2:

Reported BT can be consider as credibility weight average of Reported Development method and BF reported techniques. By doing successive iterations, the method will converge to reported development method, which is AY 2014 ult claims 5.7

EXAMINER'S REPORT

General Commentary

Candidate performance on this question was mixed, with candidates performing well on parts a., c., and d. but struggling more on part b.

Part a

The question dealt with the mechanics of the most common unpaid claim analysis techniques – development and Bornhuetter-Ferguson. The question required the candidate to recognize how these different techniques are interrelated and required a number of simple calculations.

EXAM 5 SPRING 2015 SAMPLE ANSWERS AND EXAMINER'S REPORT

Candidates needed to use the information provided on the paid development technique and the paid Bornhuetter-Ferguson technique to determine the a priori expected claims, then use that figure and information provided on the reported development technique to compute the output of the reported Bornhuetter-Ferguson technique. Candidates performed fairly well on this part.

The most common errors made by candidates included:

- Mistaking the selected ultimate claims for the a priori claim value. Candidates making this error generally neglected the need to compute the a priori from the information given on the two paid methods.
- Using the selected ultimate claims to compute development factors rather than the given information on the paid development and reported development methods.

Some candidates interpreted estimates of ultimate claims as estimates of unpaid claims. Full credit was given to candidates that used this assumption correctly and consistently.

Part b

Candidates were expected to recognize when the results from one or more of the four development methods featured in this question are or are not appropriate to use.

Candidates had to identify whether the selected ultimate claims were appropriate or inappropriate for each accident year individually and support their position on the appropriateness given the specifics of each year.

Most candidates stated a position on whether the ultimate claims for each year were appropriate or inappropriate, but many did not adequately support that position. Simply claiming the selected value was "appropriate," "inappropriate," or "too high/low" without any support did not meet the part's instructions to "discuss" the adequacy. Statements about the selected being "in the range of all estimates" or "higher than 3 out of 4" estimates were considered insufficient support, as it did not show an understanding of when the methods are appropriate vs. inappropriate based on the maturity of the year, the data provided for a given year, and the results of all 4 methods.

Part c

Candidates were expected to know the formula for the Benktander method. Most candidates earned full credit.

Candidates need to appropriately input the results from part a. into the Benktander formula.

Errors occurred with plugging numbers into the formula such as: use of paid development factors rather than reported development factors, use of selected ultimate rather than the result from part a., and use of paid claims to date instead of reported claims.

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Part d

Candidates were expected to have an understanding of the mechanics of the Benktander method. Most candidates performed well on this part.

Candidates needed to identify that repeated iterations of the Benktander formula will eventually converge to the Reported Development method and to explain that the result will decrease with each iteration until it converges, or that more “weight” or “credibility” will be assigned to the Reported Development method until it converges.

Asserting only that the formula eventually converges was not sufficient, as the question asked for how the estimate would change with each successive iteration.

A common error was misidentifying where the formula converges, such as claiming it would converge to the Bornhuetter-Ferguson amount, the reported claims to date, or zero.

EXAM 5 SPRING 2015 SAMPLE ANSWERS AND EXAMINER'S REPORT

QUESTION: 20

TOTAL POINT VALUE: 2.5

LEARNING OBJECTIVE(S): B3 / B8

SAMPLE/ACCEPTED ANSWERS:

Part a: 1.5 points

Frequency-Severity

Ultimate trended severity = $160 * 105^2 = 176.4$

F-S Ultimate = $36M * 0.0042 * 176.4 = 26,672,000$

Reported Claims Development

$20.3M * 1.720 = 34,916,000$

Paid Claims Development

$8.7M * 2.960 = 25,752,000$

Reported Bornhuetter-Ferguson

Sample 1

Earned premium = $36M * 1.560 = 56.160M$

BF Ult = $20.3M + 56.160M * 44.5% * (1 - 1/1.720) = 30,761,000$

Sample 2

Earned premium = $36M$

BF Ult = $20.3M + 36M * 44.5% * (1 - 1/1.720) = 27,006,000$

Sample 3

Earned premium = $(36M * 1.560) / 1000 = 56,160$

BF Ult = $20.3M + 56,160 * 44.5% * (1 - 1/1.720) = 20,310,000$

Part b: 1 point

Frequency-Severity

Sample 1

I wouldn't use this technique since the selected ultimate severity is from 2012 and it's outdated.

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Sample 2

There seems to have been an increase in reserve adequacy in the latest year. Since the Freq-Sev method uses paid data, it is unaffected by this change and is appropriate.

Sample 3

Yes, since you can make adjustments to frequency and severity separately it is less likely to be skewed by operational changes.

Sample 4

Frequency & Severity methods don't sufficiently consider the last reported point, which differs from others. I wouldn't use this estimate.

Reported Claims Development

I would not use this technique since the reported claims as of 12 months is extremely elevated (shock-loss, change in case adequacy?).

Paid Claims Development

Sample 1

The paid method seems appropriate. Although the 12mo LDF is rather highly leveraged, paid amounts and development appear stable so the ultimate should be appropriate.

Sample 2

Not appropriate, steady paid losses shown at 12 months, but doesn't recognize large reported losses, which may be accurate, for example a large unpaid claim.

Sample 3

The paid age to ultimate factor is too highly leveraged and should not be used.

Reported Bornhuetter-Ferguson

Sample 1

I would not use this method due to the elevated reported loss @ 12 months.

Sample 2

The B-F method produces more stable losses at early maturities and gives weight to actual losses and is appropriate.

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Sample 3

The BF would be a better choice since it incorporates the higher reported claims while calculating an IBNR based on expected claims.

Sample 4

It seems like the rate per 1000 exposure is really low. The expected claims part is really low. I think we are underestimating the ultimate even though the reported development part is high.

EXAMINER'S REPORT:

General Commentary

Candidates generally performed well on this question, with many scoring full credit or close to it if they attempted the question. Examination leadership acknowledges a typo on the exposure base for this question, and notes that any reasonable assumption for the B-F a priori expectation was accepted in grading.

Part a

The candidate was expected to know how to compute ultimate loss estimates using the frequency/severity method, the paid loss development method, the incurred loss development method, and the Bornhuetter-Ferguson method.

Most candidates had no trouble computing the estimates using the paid loss development method and the incurred loss development. Some candidates struggled on the frequency/severity method and the B-F method. For the frequency/severity method, the most common mistakes were failing to trend severity correctly and applying the reported claim count development factor to ultimate frequency. For the B-F method, the most common mistakes were using the wrong development factor and not applying the loss ratio to the exposure base.

A few candidates chose to calculate and select their own loss development factors instead of using the ones provided, which was unnecessary, but accepted. In the B-F method, a few candidates used one of the other methods to determine ultimate losses instead of using the expected loss ratio method, which was also accepted.

Part b

The candidate was expected to have an informed opinion on whether or not each of the estimates calculated in part a. were reasonable, and discuss why or why not.

Candidates generally received full credit for the discussion of the paid loss development method, the incurred loss development method, and the B-F method. Many candidates struggled with the discussion around the F-S method, and had difficulty linking the pros and cons of the method itself to the case at hand.

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The reported claim triangle indicated an apparent case reserve strengthening in AY 2014, given a rise in losses that was not seen in the paid triangle. Most candidates were able to recognize this, and thus recognize that the reported development method would lead to an overestimation of the ultimate losses.

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QUESTION: 21

TOTAL POINT VALUE: 2.5

LEARNING OBJECTIVE(S): B4 / B5

SAMPLE/ACCEPTED ANSWERS:

Part a: 2 points

Disposal Rates (cum clsd /ult)

Acc Year	12 months	24 months	36 months
2012	0.890	0.976	1.000
2013	0.887	0.975	
2014	0.887		
Sel	0.887	0.975	1.000

Sel. latest diagonal per note in problem.

Avg. Severity (untrd.) (Pd/clsd ct)

Acc Year	12 months	24 months	36 months
2012	3082	5000	5000
2013	3467	5333	
2014	2581		
Sel	2581	5333	5000

Sel. latest diagonal per note in problem.

AY	Ult Clms
2012	2,700,000 (development complete)
2013	$[846 (1 - 0.975)] * 5000 * 1.04 + 3000000 = 3,109,200$
2014	$[874(.975-.887)] * 5333 * 1.04 + [874(1-.975)] * 5000 * 1.04^2 + 2000000 = 2,546,069$

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Part b: 0.5 point

Sample 1:

Adjust the 24 months expected severity for 2013 to reflect higher severity levels.
Exclude 2013 data from the calculation of average severity to be used for other AYs

Sample 2:

If we assume it was a law change in 2013 that continues for 2014, then the severity for 2012 can be adjusted to reflect the change. This should be done by adjusting the incremental severity triangle.

EXAMINER'S REPORT:

General Commentary

Candidate performance was mixed on this question, with many candidates not providing a sufficient answer for full credit on part b., but performing well on part a.

Part a

The candidate was expected to know how to use the Disposal Rate Frequency Severity technique. Most candidates were able to calculate disposal rates and project incremental claim counts correctly.

The most common mistakes included using cumulative average severity instead of incremental average severity and incorrectly applying the trend.

Part b

The candidate was expected to be able to provide at least one fix to the methodology. Overall candidates scored poorly on this part, as they did not discuss how the adjustment should be made or to which year(s) the adjustment should be applied, but simply stated "adjust the data".

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QUESTION: 22

TOTAL POINT VALUE: 2.5

LEARNING OBJECTIVE(S): B3 / B5

SAMPLE/ACCEPTED ANSWERS:

Part a: 0.75 point

Accident Year	Average Case Outstanding			Change	
	12 Months	24 Months	36 Months	12-24	24-36
2012	\$7,692	\$14,634	\$10,588	0%	23%
2013	\$7,699	\$17,956		13%	
2014	\$8,688				

Accident Year	Average Paid per closed claim			Change	
	12 Months	24 Months	36 Months	12-24	24-36
2012	\$5,882	\$8,304	\$9,659	5%	5%
2013	\$6,176	\$8,717		5%	
2014	\$6,485				

Sample 1:

Since the case outstanding trend is increasing at a greater rate than the 5% severity trend, using a reported development technique would result in estimates being overstated

Sample 2:

From the case outstanding triangle, there has been an increase in case outstanding in recent years. Using the reported development technique would cause an overestimation of ultimates. Reported development method is not appropriate.

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Part b: 1.5 points

Adjusted Average Case Outstanding			
Accident Year	12 Months	24 Months	36 Months
2012	\$7,880	\$17,101	\$10,588
2013	\$8,274	\$17,956	
2014	\$8,688		

Adjusted Reported Claims (\$000s)			
Accident Year	12 Months	24 Months	36 Months
2012	\$10,122	\$15,506	\$16,500
2013	\$11,691	\$17,900	
2014	\$13,500		

Adjusted Reported Development Factors			
Accident Year	12m-24m	24m-36m	
2012	1.532	1.064	
2013	1.531		
Selected	1.531	1.064	
Cumulative	1.629	1.064	

Ultimate claims = 13,500 x 1.629 = \$21,991K

Part c: 0.25 point

Sample 1:

You can use the B-S adjusted LDFs to compute percent unreported in the B-F technique

Sample 2:

It can be considered in the reported development technique of B-F, just using case adequacy adjustment

Sample 3:

The B-F method is a weighted average of the development technique and the expected claims technique. If we use the B-S case outstanding adjustment to calculated adjusted reported claims, the adjusted reported development technique can be used in the B-F method.

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EXAMINER'S REPORT:

General Commentary

Candidates performed well on this question, with many candidates receiving full credit or close to full credit if they attempted the question.

Part a

The candidate was expected to know how to test for case reserve adequacy changes, via checking the change average case outstanding along the last diagonal. Overall, candidates scored well.

The candidate was expected to calculate the unadjusted average case O/S triangle, note the increase along the last diagonal (either absolute or compared to paid severity), and conclude that the reported LDF method was not adequate. The most common errors were using the average reported triangle instead of case O/S and reviewing only AY2014 instead of all years.

Part b

The candidate was expected to know how to perform a Berquist-Sherman incurred loss adjustment. Overall candidates scored well and many candidates received full credit.

Calculation errors were the most common mistakes. Others include:

- Many candidates got detrended average case O/S correct but then failed to apply those correctly.
- Some candidates outlined the steps of the method without any attempt to actually calculate them.

Part c

Candidates were expected to determine how the Berquist-Sherman adjustment would be applied to the Bornhuetter-Ferguson method.

The most common mistakes were suggestions to replace the expected loss ratio or initial expected ultimate, as this does not incorporate the adjusted development pattern from the Berquist-Sherman technique.

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QUESTION: 23

TOTAL POINT VALUE: 1.5

LEARNING OBJECTIVE(S): B4 / B5

SAMPLE/ACCEPTED ANSWERS:

Part a: 1 point

Paid Development Technique

Sample 1:

Since there has been a change in the rate claims are being settled, this would result in an inaccurate estimate. CDFs would change due to the settlement rate changes so the historical factors would not be appropriate.

Sample 2:

Paid development method assumes no change in claim settlement process, therefore it's not appropriate to apply old LDF to recent paid claims.

Sample 3:

If smaller claims settle faster, this may result in lower total paid claims at early maturities as larger claims are settled last. This change in settlement pattern won't be reflected in historic link ratios and the selected ultimate may prove too low.

Sample 4:

If large claims are being settled just as they were before, then using the paid claims technique will overestimate claims as the company now has a higher % of ultimate claims paid earlier.

Sample 5:

We will be seeing changes in the amount of paid claims at each maturity. May increase at early maturities if we are settling a lot of small claims early or may decrease at early maturities if we are taking longer to settle large claims as a result of prioritizing the small ones. Either way, the development pattern for the future isn't the same as the development pattern in the past so old LDFs won't be appropriate and will cause distortions.

Reported Development Technique

Sample 1:

If the claims department is focused on small claims, large claims may develop more than in the past because they are being given less attention. The reported technique would understate claims then.

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Sample 2:

If the smaller claims were settled at the case o/s amount then this would not be affected.

Sample 3:

If the reserves were not perfectly adequate, the closing of small claims early may affect the reported pattern. For example, if case reserves put up on the small claims was historically redundant, closing them earlier reduces the reported at early dates. This would lead to an underestimate as low reported to date multiplied by too low historical LDFs.

Part b: 0.5 point

Sample 1:

Look at triangles by size of loss and use BS paid adjustments to restate historical at current settlement rates.

Sample 2:

Track small claims separately from large claims and perform the Berquist Sherman adjustment on each to reflect new settlement patterns in large vs. small claims.

EXAMINER'S REPORT:

General Commentary

Candidate performance on this question was mixed, with candidates scoring well on part a., but struggling on part b.

Part a

Paid Development: The candidate was expected to recognize that the payment pattern determined from the historical data would no longer be applicable to the data after the change in settlement rates. Candidates generally did a good job in recognizing the change in pattern. A common mistake was simply stating that the method would overstate or understate the estimate with no reason why the method was not appropriate.

Reported Development: The candidate was expected to recognize that the change in settlement pattern could impact the reporting pattern and therefore the reported development technique. Various answers were accepted describing situations where the method would be appropriate or would not be appropriate. Common mistakes included:

- Interpreting larger average case reserves for a change in case adequacy. For example, if average case reserves are higher simply because only large claims remain open, this does not indicate that

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case reserve adequacy has changed or the reported development technique would not be applicable.

- Discussing only the settlement or closure pattern and not discussing the impact on the reporting pattern.

Part b

The candidate was expected to recognize that the Berquist Sherman adjustment would not work in this case. An assumption of the Berquist Sherman adjustment is that paid dollars are proportional to closed claim counts. When there is a shift in settlement by size of claim, this assumption will no longer hold. The paid BS adjustment can exacerbate the misstatement of the technique if paid dollars are not proportional to paid counts. The case outstanding BS adjustment could similarly exacerbate the misstatement if an increase in average case reserves due simply to a different mix of open claims by size was interpreted as a change in case reserving practices. A common mistake was stating that the paid or case outstanding Berquist Sherman adjustment should be applied without recognizing this pitfall.

Another common mistake was to suggest using a different reserving technique, such as the expected loss method. The question did not ask for another technique, but rather asked how to adjust one of the development methods.

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QUESTION: 24

TOTAL POINT VALUE: 2

LEARNING OBJECTIVE(S): B6

SAMPLE/ACCEPTED ANSWERS:

Sample 1:

Ratio of S&S to paid claims:

<u>AY</u>	<u>12 mos</u>	<u>24 mos</u>	<u>36 mos</u>	
2012	.133	.129	.123	
2013	.156	.152		*use simple average development factors
2014	.150			
	.972	.953		

Ultimate claims, paid development

<u>AY</u>	<u>12 mos</u>	<u>24 mos</u>	<u>36 mos</u>	
2012	120	132	138	
2013	90	99		*use simple average development factors
2014	100			
	1.1	1.045		

<u>AY</u>	<u>Ult Claims</u>	<u>Ult Ratio</u>	<u>Ult S&S</u>
2012	138,000	.123	16,974
2013	103,455 = 99(1.045)	.145 = (.152)(.953)	15,001
2014	<u>114,950 = 100(1.1)(1.045)</u> = 356,405	.139 = (.150)(.922)(.953)	<u>15,978</u> 47,953

Ult Net Claims = Ult claims – Ult S&S
 = 356,405 – 47,953 = 308,452

Sample 2:

Paid ldfs			ratio = SS recd / paid loss				
<u>AY</u>	<u>12-24</u>	<u>24-36</u>	12	24	36 => ldfs	12-24	24-36
2012	1.1	1.045	.133	.1288	.123	.968	.955
2013	<u>1.1</u>		.156	.1515		.971	
Selected	1.1	1.045	.15				
Cdf	1.15	1.045	1			selected .9695	.955 1
						Cdf .9259	.955 1

<u>AY</u>	<u>Ult Loss</u>	<u>Ult Ratio</u>	<u>Ult S&S</u>	<u>Net ult claims (000)</u>
2012	138(1) = 138	.123	16.97	121.03
2013	99(1.045) = 103.46	.1515(.955) = .1447	14.97	88.49
2014	100(1.15) = 115	.15(.9259) = .1389	15.97	<u>99.03</u>
			total	308.55

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EXAMINER'S REPORT:

In general, the candidates performed well on this question. The candidate was expected to know how to calculate / estimate recoveries and how to use the development (or chain ladder) technique.

The areas where candidates lost credit most often were:

- Assuming no (S&S / Paid) ratio development beyond 24 months.
 - The problem stated that paid S&S did not develop beyond 24 months, but the ratio can continue to develop due to paid losses developing until 36 months.
- Not calculating net paid (stopping after calculating ultimate S&S).
- Not using the ratio method, even though the problem says to use this method.
 - Some candidates would develop paid losses and S&S separately, then subtract.
- Having calculation errors.

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QUESTION: 25

TOTAL POINT VALUE: 2.25

LEARNING OBJECTIVE(S): B7

SAMPLE/ACCEPTED ANSWERS:

Part a: 0.5 point

The classical technique assumes a steady relationship between paid ULAE and paid claims, but as it is shown in the data, this company is growing and the ratio of paid ULAE to paid claims is significantly different year by year so it is not appropriate.

Part b: 1.75 points

Sample 1:

I would use the Kittel approach using an average of paid and reported losses in the denominator of my paid ULAE / Losses ratio for a more stable estimate.

Year	(1) (Paid + Reported Claims) / 2	(2) Paid ULAE	(3) = (2) / (1) Paid ULAE / Claims Basis
2011	61,956	10,558	0.1704
2012	93,485	13,039	0.1395
2013	115,572	13,143	0.1137
2014	134,546	15,286	0.1136

This ratio has still been decreasing, but much more stable. It seems very stable for 2013 and 2014 so I'll select 0.1137 as my ULAE/Claims ratio.

$$\text{Unpaid ULAE @ 12/31/14} = 0.1137 \times [(0.5)(205,520) + 111,853] = 24,401$$

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Sample 2:

Using reported claims will provide a more stable answer under a growth scenario. I will use a 60/40 assumption.

Year	(1) (Paid + Ult on Claims Reported) / 2	(2) Paid ULAE	(3) = (2) / (1) Paid ULAE / Claims Basis
2011	79,496	10,558	0.133
2012	115,899	13,039	0.113
2013	132,290	13,143	0.099
2014	148,026	15,286	0.103

I am specifically excluding calendar years 2011 and 2012 as the most recent 2 years are lower and relatively stable. I am selecting 10%.

Final Unpaid ULAE calculation can be either of the three following:

1. Expected Claim Method: Unpaid ULAE @ 12/31/14 = $0.10 \times 605,600 - 52,026 = 8,534$
2. Bornhuetter-Ferguson Method: Unpaid ULAE @ 12/31/14 = $0.10 \times (605,600 - 475,711) = 12,989$

Development Method: Unpaid ULAE @ 12/31/14 = $52,026 \times (605,600 / 475,711 - 1) = 14,205$

Sample 3:

I am using the Simplified Generalized approach with a 60/40 assumption because the accident year ultimate claims will help reflect the growth.

Year	(1) (Paid + Acc Year Ult Claims) / 2	(2) Paid ULAE	(3) = (2) / (1) Paid ULAE / Claims Basis
2011	80,396	10,558	0.131
2012	117,339	13,039	0.111
2013	132,470	13,143	0.099
2014	148,446	15,286	0.103

I am selecting a 3 year average because 2011 looks high. I am selecting 10%.

Estimated Pure IBNR based on 4% of latest AY Ult Claims: $4\% \times 177,100 = 7,084$

Unpaid ULAE @ 12/31/14 = $.10 \times [.6 \times 7,084 + .4 \times (605,600 - 7,084)] = 13,120$

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EXAMINER'S REPORT:

General Commentary

Candidates who attempted this question generally performed well. A variety of answers were accepted due to the conflicting information in the source material regarding calculation of unpaid ULAE.

Part a

Candidates were expected to know the assumptions of the classical technique and discuss why they are violated in this scenario. The first key assumption of the classical technique from the text is:

“The insurer’s ULAE-to-claim relationship has achieved a steady-state so that the ratio of paid ULAE-to-paid claims provides a reasonable approximation of the relationship of ultimate ULAE-to-ultimate claims.”

Candidates who scored well on this part discussed the changing paid ULAE-to-paid claims ratio.

A common mistake was simply stating that the insurer was growing and thus the classical technique was not appropriate. This is an incomplete solution; while the text does refer to challenges associated with a growing book, it does so in the context of it distorting the paid ULAE-to-paid claims ratio. Candidates needed to discuss growth in the insurer along with a discussion of the paid ULAE-to-paid claims ratio or mention of different growth rates between paid claims and paid ULAE.

Part b

Note: This portion of the question dealt with a section of the text that has some conflicting information. One alternative approach to the classical technique is the Kittel Refinement which incorporates calendar year incurred claims. It states on page 392 that incurred claims includes reported claims as well as IBNR. However, in Exhibit IV Sheet 2 (page 414) the example uses “Reported Claims” only when deriving the ULAE Ratio. The question was set up similarly to Exhibit IV and thus candidates who utilized reported claims were given full credit. Candidates using any of the approaches shown in Exhibit IV were given full credit if performed correctly. Candidates who attempted to use or derive calendar year incurred claims to align with the footnote on page 392 were not penalized for having a solution different than the exhibits.

Candidates were expected to know an alternative approach to the classical technique for estimating unpaid ULAE. Furthermore, the candidate was expected to justify the approach they used along with the selected ULAE ratio.

Overall, candidates scored well on the calculation portion of this part, but often/sometimes failed to justify their approach and/or ULAE ratio selection. Many candidates simply stated their approach (i.e. “Kittel Method”) or selected ULAE ratio (i.e. “Latest 2 year average”) rather than providing a justification for these selections. The prompt “justify” requires discussion on the reasoning behind the choice, not just re-statement of the choice itself.

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The majority of candidates performed the Kittel Refinement approach using calendar year reported claims. A minority of candidates pursued the Generalized Approach.

Some common mistakes that were encountered were:

- Candidates attempted to derive IBNR and case reserves for the Kittel method rather than using the values given, often times resulting in an error in their calculation.
- Candidates used a straight or weighted average for the ULAE ratio without any consideration for 2011 being exceptionally high relative to the other years.
- Some candidates calculated the claims basis as the sum of the paid and reported claims, instead of the average.
- A few candidates calculated the unpaid ULAE for accident year 2014 only.
- Calculation errors.