19. (3.5 points)

An actuary has performed a reserve analysis on a line of business using four techniques. The data, techniques, and assumptions are as follows:

Accident Year	Reported Claims ($000) as of (months)				
	12	24	36	48	60
2010	5,000	8,500	11,000	11,500	11,500
2011	6,000	10,800	13,000	13,800	
2012	7,000	12,300	15,300		
2013	8,000	14,000			
2014	10,000				

Accident Year	Reported Claim Age to Age Factors				
	12-24	24-36	36-48	48-60	60-Ult
2010	1.70	1.29	1.05	1.00	
2011	1.80	1.20	1.06		
2012	1.76	1.24			
2013	1.75				
Selected	1.75	1.25	1.05	1.00	1.00
CDF to Ultimate	2.29	1.31	1.05	1.00	1.00

Accident Year	Paid Claims ($000) as of (months)				
	12	24	36	48	60
2010	1,100	4,500	8,100	10,000	11,000
2011	1,400	5,500	9,300	11,700	
2012	1,600	6,400	11,200		
2013	1,800	7,200			
2014	1,800				

Accident Year	Paid Claim Age to Age Factors				
	12-24	24-36	36-48	48-60	60-Ult
2010	4.09	1.80	1.23	1.10	
2011	3.93	1.69	1.26		
2012	4.00	1.75			
2013	4.00				
Selected	4.00	1.75	1.25	1.10	1.00
CDF to Ultimate	9.68	2.42	1.38	1.10	1.00

Accident Year	Ratio of Paid Claims to Reported Claims as of (months)				
	12	24	36	48	60
2010	22%	53%	74%	87%	96%
2011	23%	51%	72%	85%	
2012	23%	52%	73%		
2013	23%	51%			
2014	18%				

<QUESTION 19 CONTINUED ON NEXT PAGE>

19. (continued)

Accident Year	Earned Premium ($000)	Projected Ultimate Claims: Development Techniques Reported ($000)	Development Techniques Paid ($000)	Bornhuetter-Ferguson Techniques Reported ($000)	Bornhuetter-Ferguson Techniques Paid ($000)
2010	18,800	11,500	11,000	11,500	11,000
2011	23,200	13,800	12,870	13,800	13,071
2012	25,900	16,065	15,456	16,102	15,836
2013	31,700	18,340	17,424	18,876	19,291
2014	30,000	22,900	17,424	20,985	19,286

- Selected expected claim ratio used in Bornhuetter-Ferguson Techniques is 65%.
- Claims ratio trend is 0%.
- There is no reported development beyond 60 months.

a. (1 point)

Recommend two changes to the actuary's selected assumptions across the techniques and justify the changes.

b. (1.5 points)

For accident year 2014, calculate a revised estimate of ultimate claims for each of the four techniques based on the recommendations made in part a. above.

c. (1 point)

Assume the actuary selected ultimate claims as the average of the four techniques.

Accident Year	Selected Ultimate Claims ($000)
2010	11,250
2011	13,385
2012	15,865
2013	18,483
2014	20,149

Given the revised estimates calculated in part b. above, fully assess the reasonableness of the actuary's accident year 2014 selected ultimate claims estimate of $20,149,000.

CONTINUED ON NEXT PAGE

QUESTION 19	
TOTAL POINT VALUE: 3.50	**LEARNING OBJECTIVE: B3, B8**

SAMPLE ANSWERS

Part a: 1 point

Sample Answer 1

1. I would assume the paid 60 to ult development is not 1.000 as the paid at 60 is 11,000 while reported at 60 is 11,500.
2. The expected claims ratio seems too high based on the historical data. Only AY 2014 has an ECR near 0.65. Lower the ECR.

Sample Answer 2

1. The paid claims to reported claims triangle shows a significant decrease in ratio at 12 months in AY 2014. This suggests possibly a slowdown in settlement rates or increase in case reserve adequacy. It seems more likely to be an increase in case reserve adequacy given that reported claims increased sharply in AY 2014. While paid claims remained at levels similar to prior years. Therefore, I would suggest adjusting for changes in case reserve adequacy.
2. Also the expected claims ratio of 65% for the B-F seems too high. In no year other than Rpt'd for AY '14 does the ultimate loss ratio from any of the methods reach 65%. A 60% ECR seems more reasonable.

Part b: 1.50 points

Sample Answer 1

1. I would select a paid tail factor of 11,500/11,000 = 1.045
2. Based on review of historical data select ECR of 60%

Rptd Dev Ultimate (000) = 22,900 (unchanged)
Paid Dev Ultimate (000) = 17,424 * 1.045 = 18,208
Rptd B-F Ult (000) = 10,000 + 30,000 * 0.60 * (1-1/2.29) = 20,140
Paid B-F Ult (000) = 1,800 + 30,000 * 0.60 * (1-1/(9.68*1.045)) = 18,021

Sample Answer 2

I am assuming that the AY '14 reported claims are increased due to an increase in case reserve adequacy of a factor of 10,000/8,000 = 1.25
Rptd Dev = 10,000 * 2.29 / 1.25 = 18,320
Pd Dev = 17,424 (unchanged)
Rptd BF = 10,000 + 30,000 * .6 * (1–1/(2.29/1.25)) = 18,175
Pd BF =1,800 + 30,000 * .6 * (1-1/9.68) = 17,940

Part c: 1 point

Sample Answer 1

This selection seems too high. It appears as though there is a large reported unpaid claim in AY 14 @ 12 or there is an increase in case res. adequacy. I'll assume this is due to an inc. in case res. adequacy which would mean the reported development method and the reported B-F method overstate ultimate claims. (B-F reported overstates by less than reported development) If this is the case I would rely on the paid development and paid B-F estimates of ultimate which are close to one another and appear stable despite highly leveraged age to ultimate factor @ 12-Ult.

Sample Answer 2

The estimate of 20,149 is too high since it exceeds all of the revised estimates in b of this question that take into account the changes in case reserve adequacy mentioned in a. A better estimate would be the average of the four methods' results in b which would be 17,965.

Sample Answer 3

A lot of reported loss in 2014 but stable paid claims since last several years at 12 age. Maybe a large loss In AY 2014. Therefore I wouldn't give any weight to likely overstated Rep. Dev. Method. Cumulative paid dev factor of 9.68 (or 10.1156) are leveraged. I would select revised BF of 20,140 in b to account for what seems to be a large reported claim in 2014. As a result, actuary's selection of 20,149 is reasonable.

EXAMINER'S REPORT

Overall, very few candidates received full credit. Most candidates who attempted the question received at least some partial credit.

Part a

Candidates were expected to recognize potential weaknesses in assumptions of the methods and to select and justify new assumptions that would improve the validity of the method's results.

Common errors included not providing justification for the newly selected assumptions, stating that claims ratio trend is increasing solely because AY 2014 is high, and stating that the B-F expected claims ratio should increase solely because AY 2014 is high at 12 months.

Part b

Candidates were expected to know how to update the four methods provided in the question given the assumption that the candidate made in part a.

Common errors included incorrect B-F formulas, calculation of IBNR instead of ultimates, and not

updating all methods for the changes in assumptions.

Part c

Candidates were expected to know how to compare the actuary's original estimate to that of the results of the methods in part b. Candidates were also expected to take note of the change in the ratio of paid to reported claims at 12 months and evaluate the validity of the methods.

Common errors included:

- Stating that the actuary's estimate was too high or too low without additional discussion. The question required the candidates to provide a full assessment of the reasonableness of the estimate.
- Not noticing the change in paid/reported claims ratio.
- Assessing the estimate from part b rather than the actuary's estimate.