16. (2.75 points)

Given the following information for a private passenger auto insurer as of December 31, 2016:

Accident Year	Selected Ultimate Claim Counts	Earned Premium ($000)	Premium On-Level Adjustment Factor to 2016
2012	1,025	$132,500	1.405
2013	3,070	$275,250	1.300
2014	2,950	$330,750	1.070
2015	not provided	$360,825	1.050

- Annual claim count trend = -2%.
- Annual severity trend = 5%.
- Accident year 2016 selected ultimate severity = $13,370.
- Accident year 2015 cumulative reported claims as of December 31, 2016 = $30,880,900.

a. (2.25 points)

Estimate the IBNR for accident year 2015 as of December 31, 2016 using a frequency-severity technique.

b. (0.5 point)

Briefly describe one situation where the frequency-severity techniques are useful and one situation where they are not useful.

CONTINUED ON NEXT PAGE

QUESTION 16

TOTAL POINT VALUE: 2.75 | **LEARNING OBJECTIVE: B3**

SAMPLE ANSWERS

Part a: 2.25 points

Sample 1

AY	2016 On-level Premium (000)	Trended Claim counts	Frequency
2012	186,162.5	1,025 x 0.98^4 = 946	0.00508
2013	357,825	3,070 x 0.98^3 = 2890	0.00808
2014	353,902.5	2,950 x 0.98^2 = 2833	0.00801
2015	378,866.25		

Assuming 2012 as outlier, the frequency I chose is 0.008

Adjust frequency to 2015 level = $\frac{0.008 \times 1.05}{0.98} = 0.00857$

Ult AY 2015 = 13,370 x 1.05^-1 x 0.00857 x 360,825 = 39,374,908

IBNR for AY 2015 = 39,374,908 – 30,880,900 = 8,494,008

Sample 2

First adjust severity to 2015 level

AY 15 Ult severity = $\frac{13,370}{1.05} = 12,733.33$

AY	(1) Ult Claim Count	(2) OLEP = EP x OLF / 1.05 (000) (put on 2015 levels)
'12	1025	177,298
'13	3070	340,786
'14	2950	337,050

AY	(3) = (1) / (2) Untrended Freq	(4) Trend to 7/1/15	(5) = (3) x (4) Trended Freq
'12	.0058	.98^3	.0054
'13	.0090	.98^2	.0087
'14	.0088	.98	.0086
Select 2 yr straight avg (AY 12 appears to be anomaly)			.0086

AY 2015 Ult = .0086 x 360,825 x 12,733.33 = 39,512,733

IBNR = AY 15 Ult – AY 15 Rept = 39,512,733 – 30,880,900 = 8,698,948

Part b: 0.5 point

Sample Responses for "useful" situations

- Useful when there is an inflation trend impacting claims since they are simple to include.
- Frequency-severity techniques can incorporate frequency and severity trend in the estimation.
- They are useful when there is a change in case reserve adequacy, the paid F-S method is not impacted by changes in case reserve adequacy.

- Useful for longer tail lines of business where earlier development can be highly leveraged.
- These techniques are useful when frequency & severity are changing at different rates because the two pieces can be broken apart & analyzed separately.

Sample Responses for "not useful" situations

- Not useful when claim count definition is not consistent over the years.
- FS technique is not useful when there are significant partial payments, i.e. claims are not closed when they are paid.
- They are not useful when claims frequently reopen since there isn't a consistent claim count.
- It is not useful if there has been a change to the exposure base or if it is difficult to know what counts as 1 exposure.
- Not useful when attempting to use disposal rate technique when settlement rates are changing
- If the mix of business has recently changed & each segment has different frequency/severity trends.
- Not useful when we don't have enough data to calculate accurate trends since this method is sensitive to trend selections.

EXAMINER'S REPORT

Candidates were expected to estimate IBNR using a frequency-severity method and provide comments regarding the usefulness of frequency-severity methods, in general.

Part a

Candidates were expected to know how to calculate claim frequency, adjust frequency for claim count trend and book of business growth (after using on-level premium factors), adjust severity for severity trend, and finally estimate IBNR using a frequency-severity method.

Common errors included:

- Failing to calculate on-level earned premium or trended claim count.
- Trending on-level earned premium and claim count to different periods, causing a mismatch in the frequency calculation.
- Failing to calculate frequency.
- Selecting a claim count from the untrended historical experience instead of a frequency, not considering the growth in the book of business.
- Failing to or incorrectly detrending the selected frequency at the 2016 level to 2015.
- Failing to detrend the given accident year 2016 severity to accident year 2015.

Part b

Candidates were expected to describe situations that indicate the usefulness of frequency-severity methods (i.e. one useful situation and one not useful situation).

Common errors included stating that frequency-severity methods are:

- Useful when the claim count definition is consistent (or other method assumptions). When method assumptions are found to be true, it means that the actuary can reasonably perform the method. It does not provide any insight into the method's usefulness.

- Useful for long-tailed lines of business. This is not descriptive enough and does not adequately show that the candidate understands the usefulness of the method. Candidates were expected to demonstrate an understanding that the CDFs at early maturities are highly leveraged when using the development method on long tail lines of business, whereas this issue may not occur in frequency-severity methods.
- Generic comments above improving the actuary's insight into the claims process without any details about claim reporting, settlement rates or average claim values.
- Useful when incorporating trend. This is not descriptive enough and does not adequately show that the candidate understands the method. Frequency-severity methods are useful to incorporate inflation trend or separate frequency and severity trends.