

Question 2 from the 2007 Exam

2. (3.5 points)

a. (2 points) The following data were compiled from the ABC automobile insurance portfolio:

Group	Number of Accident-Free Years	Earned Premium at Present Group D Rates	Number of Claims Incurred
A	3 or More	\$ 100,000,000	120,000
B	2	\$ 10,000,000	25,000
C	1	\$ 17,000,000	44,000
D	0	\$ 10,000,000	36,000

Calculate the credibility of a single car for each of the following ranges of accident-free years:

- i. 1 or more
- ii. 2 or more
- iii. 3 or more

b. (1 point) The following table provides the single car credibility for the XYZ automobile insurance portfolio:

Accident-Free Years	Single Car Credibility
1 or More	0.14
2 or More	0.10
3 or More	0.06

Discuss two conclusions that can be drawn from the different credibility results of the ABC and XYZ portfolios.

c. (0.5 point) Explain why analysis of two portfolios with different classification plans could assign different values to the credibility of the experience of a single car.

Supporting materials. Our solution to question 2 from the 2006 Exam.

2. (4 points)

a. (3 points) Given the following information about an automobile insurance portfolio:

Group	Number of Accident-Free Years	Earned Premium at Present Group D Rates	Number of Claims Incurred
A	3	\$25,000,000	40,000
B	2	\$8,000,000	15,000
C	1	\$13,000,000	25,000
D	0	\$8,000,000	30,000

Calculate the credibility of a single car for each of the following:

one-year, two-year, and three-year accident-free periods.

Question 2 – Model Solutions 1 and 2

- a. Initial comment. Candidate model solutions 1 and 2 are nearly identical. Thus, a single solution is shown below. Note that the credibility computed below is based on 3 claim free years, 2 or more claim free years and 1 or more claim free years. A literal interpretation of the question is to compute the credibility of a single car for exactly 1 accident free year, exactly two accident free years and exactly three accident free years. This is shown in model solution 3 below.

Group	Number of Years Claim Free (1)	Earned Premium at Present B Rates (2)	No. of Claims Incurred (3)	Claim Frequency per \$1000 of Premium (4) = (3)/(2)	Relative to Total * (5)=(4)/(4 tot)	Credibilities $Z = 1 - \text{Mod}$ (6) = 1.0 - (5)
A	3	25,000,000	40,000	1.600	0.785	0.215
A + B	2 or more	33,000,000	55,000	1.667	0.818	0.182
A + B + C	1 or more	<u>46,000,000</u>	<u>80,000</u>	1.739	0.854	0.146
Total		54,000,000	110,000	2.037	1.000	

Question 2 – Model Solution 3

- a. Initial comment. In this model solution, credibility for claim-free experience is computed as 1.0 – modification. As stated by Bailey, “Where $R = 0$ as it is for accident-free risks, the credibility equals 1 – Modification”. Modification is set equal to “Relative Claim Frequency” (Claim Frequency per \$1000 of Premium relative to Total Claim Frequency per \$1000 of Premium).

Group	Number of Years Claim Free (1)	Earned Premium at Present B Rates (2)	No. of Claims Incurred (3)	Claim Frequency per \$1000 of Premium (4) = (3)/(2)	Relative to Total * (5)=(4)/(4 tot)	Credibilities $Z = 1 - \text{Mod}$ (6) = 1.0 - (4)
A	3	25,000,000	40,000	1.600	0.785	0.215
B	2	8,000,000	15,000	1.875	0.920	0.080
C	1	13,000,000	25,000	1.923	0.944	0.056
D	0	<u>8,000,000</u>	<u>30,000</u>	3.750		
		54,000,000	110,000	2.037		

For claim-free experience, Credibility = 1 – Modification

Therefore the credibility of a single with exactly 1 yr accident free period = 0.056, exactly 2 yr accident free period = 0.08 and exactly 3 yr accident free period = 0.215.

Supporting materials. An excerpt from our online study guide

Knowing this, the key questions you are likely to see on the exam are as follows. Note: There is overlap in the concepts tested (a. through e. listed below). However, such a breakdown helps the candidate focus on the concepts test in categories a. - e. below.

- Compute credibility for classes with and without claim free experience.
Work problems: '91,27; '93,6; '94,8; '94,31; '95,30; '00, 32; '02,47; '03,22; '04,2; '06,2
- Explain why credibility is expected to vary approximately in proportion to the average claim frequency.
Work problems: '92,43; '96, 50; '97,19; '98, 26; '01,2; '03,2;
- Explain why credibility for experience periods of 1, 2 and 3 years would be expected to vary approximately in proportion to the number of years. Read page 160 and reference Tables 3 and 4 and Appendix 1.
Work problems: '94,9; '95,32; '99,1;

Supporting materials. An excerpt from our online notecards

2 criteria for which credibility for experience rating depends on

- the volume of data in the experience period, and also the
- amount of variation of individual hazards within the class.

If an insured's chance for an accident remained constant from one year to the next, and if there were no risks leaving or entering the class, the credibilities for experience periods of 1, 2 and 3 years would be expected to vary in proportion to the number of years. (see Appendix 1).