Reading: Fisher.ExperienceRating

Fisher_QuintilesTest (Problem 4)

Model: 2018.Q9

Problem Type: Apply the quintiles test

Given

Risk #	Manual Premium	Loss	Mod	Standard Premium
1	890	525	1.09	970
2	598	479	1.17	700
3	902	383	0.97	875
4	1,009	1,368	1.15	1160
5	1,632	872	0.84	1371
6	1,071	938	0.92	985
7	998	1,392	1.27	1,267
8	812	1,224	1.13	918
9	1,390	1,566	1.21	1,682
10	755	1,011	1.03	778

Find Apply the quintiles test and interpret the result.

Solution

First rank the risks from smallest to largest experience modification

Rank	Risk #	Manual Premium	Loss	Mod	Standard Premium
1	5	1632	872	0.84	1371
2	6	1071	938	0.92	985
3	3	902	383	0.97	875
4	10	755	1011	1.03	778
5	1	890	525	1.09	970
6	8	812	1224	1.13	918
7	4	1009	1368	1.15	1160
8	2	598	479	1.17	700
9	9	1390	1566	1.21	1682
10	7	998	1392	1.27	1267

Next, collapse into five groups. Here it is natural to group into consecutive pairs - on the exam make sure to state your logic when grouping.

Risk #s	Quintile	Manual Premium (1)	Loss (2)	Manual LR (3)	Average Mod (4)	Standard Premium (5)	Standard LR (6)
5, 6	1	2703	1810	67.0%	0.87	2356	76.8%
3, 10	2	1657	1394	84.1%	1.00	1653	84.4%
1, 8	3	1702	1749	102.8%	1.11	1888	92.7%
4, 2	4	1607	1847	114.9%	1.16	1860	99.3%
9, 7	5	2388	2958	123.9%	1.24	2949	100.3%

(1), (2), (5) Sum over risks in quintile
(3) = (2) / (1)
(4) = Sumproduct of the experience mod and manual premium within quintile, divided by the sum of the manual premium in the quintile.
(6) = (2) / [(4) * (1)]

Notes:
1.) Since Standard Premium = Experience * Manual Premium for any given risk, it wasn't necessary to calculate the average experience modification factor for each quintile.
2.) We get the same result if we calculate (6) = (2) / (5).

Results:
Manual Loss Ratio Dispersion = 56.9%
Standard Loss Ratio Dispersion = 23.5%

There is an **upward trend** in the manual loss ratio so the experience rating plan does a good job at identifying differences between risks.
There is an **upward trend** in the standard loss ratio so the experience rating plan **doesn't assign enough credibility** to the experience.
The standard loss ratio dispersion is **less than** the manual loss ratio dispersion – the experience rating plan **adjusts for differences** between risks.

Reading: Fisher.ExperienceRating

Fisher_QuintilesTest (Problem 5)

Model: 2018.Q9

Problem Type: Apply the quintiles test

Given

Risk #	Manual Premium	Loss	Mod	Standard Premium
1	1,083	1,429	1.26	1365
2	1,477	657	1.16	1713
3	876	1,338	0.93	815
4	905	1,322	1.14	1032
5	1,863	1,566	1.08	2012
6	1,097	1,336	1.00	1,097
7	1,802	1,781	1.04	1,874
8	1,117	599	1.28	1,430
9	1,659	1,031	0.83	1,377
10	1,072	1,857	1.18	1,265

Find Apply the quintiles test and interpret the result.

Solution

First rank the risks from smallest to largest experience modification

Rank	Risk #	Manual Premium	Loss	Mod	Standard Premium
1	9	1659	1031	0.83	612
2	3	876	1338	0.93	936
3	6	1097	1336	1.00	1140
4	7	1802	1781	1.04	761
5	5	1863	1566	1.08	946
6	4	905	1322	1.14	1305
7	2	1477	657	1.16	1056
8	10	1072	1857	1.18	786
9	1	1083	1429	1.26	1299
10	8	1117	599	1.28	1074

Next, collapse into five groups. Here it is natural to group into consecutive pairs - on the exam make sure to state your logic when grouping.

Risk #s	Quintile	Manual Premium (1)	Loss (2)	Manual LR (3)	Average Mod (4)	Standard Premium (5)	Standard LR (6)
9, 3	1	2535	2369	93.5%	0.86	1548	108.1%
6, 7	2	2899	3117	107.5%	1.02	1901	104.9%
5, 4	3	2768	2888	104.3%	1.10	2251	94.9%
2, 10	4	2549	2514	98.6%	1.17	1842	84.4%
1, 8	5	2200	2028	92.2%	1.27	2373	72.6%

(1), (2), (5) Sum over risks in quintile
(3) = (2) / (1)
(4) = Sumproduct of the experience mod and manual premium within quintile, divided by the sum of the manual premium in the quintile.
(6) = (2) / [(4) * (1)]

Notes:
1.) Since Standard Premium = Experience * Manual Premium for any given risk, it wasn't necessary to calculate the average experience modification factor for each quintile.
2.) We get the same result if we calculate (6) = (2) / (5).

Results:
Manual Loss Ratio Dispersion = 15.3%
Standard Loss Ratio Dispersion = 35.5%

There is a **downward trend** in the standard loss ratio. This means the experience rating plan **assigns too much credibility** to the experience.
There is no clear trend in the manual loss ratio so the plan does a poor job at identifying differences between risks.
The standard loss ratio dispersion is greater than the manual loss ratio dispersion so experience rating does not improve the situation.