Reading: Bahnemann.Chapter6 Bahnemann_FranchDed (Problem 1)
Model: Source Text
Problem Type: Calculate modified severity and pure premium for a franchise deductible

Given

Deductible, d	E[X;d]	$F_X(d)$	C(d)	Frequency	Severity	Pure Premium
0	0	0	?	?	?	?
1,000	659	0.4847	?	?	?	?
2,000	1,111	0.5989	?	?	?	?
3,000	1,478	0.6625	?	?	?	?
5,000	2,071	0.7364	?	?	?	?
10,000	3,144	0.8215	?	?	?	?

0.0005	Ground-up claim frequency, ϕ
$8,896	Basic limit expected loss, E[X;b]
0	Fixed ALAE per claim, ε
20%	Variable ALAE, u

Find Complete the table.

Solution

For a franchise deductible we have: $C(d) = \frac{E[X;d] - d\big(1 - F_X(d)\big) + F_X(d)\epsilon}{E[X;b] + \epsilon}$

Changing the deductible type (but not the deductible amount) doesn't impact claim frequency, so the modifed claim frequency is still: $\phi(1 - F_X(d))$

However, the modified severity becomes: $\left(\frac{E[X;b] - E[X;d]}{1 - F_X(d)} + (d + \epsilon)\right)(1 + u)$ *Alice: "Note the + d in the large ( )"*

Using these equations we can complete the table as follows

Deductible, d	E[X;d]	F_X(d)	C(d)	Frequency	Severity	Pure Premium
0	0	0	0.00000	0.000500	$10,675	$5.34
1,000	659	0.4847	0.01615	0.000258	$20,382	$5.25
2,000	1,111	0.5989	0.03471	0.000201	$25,691	$5.15
3,000	1,478	0.6625	0.05233	0.000169	$29,975	$5.06
5,000	2,071	0.7364	0.08464	0.000132	$37,070	$4.89
10,000	3,144	0.8215	0.15277	0.000089	$50,669	$4.52

Reading: Bahnemann.Chapter6 Bahnemann_FranchDed (Problem 2)
Model: Source Text
Problem Type: Calculate modified severity and pure premium for a franchise deductible

Given

Deductible, d	E[X;d]	FX(d)	C(d)	Frequency	Severity	Pure Premium
0	0	0	?	?	?	?
500	489	0.5402	?	?	?	?
1,000	790	0.5592	?	?	?	?
1,500	1,170	0.7818	?	?	?	?
2,250	2,040	0.8031	?	?	?	?
10,000	2,643	0.8964	?	?	?	?

0.0003	Ground-up claim frequency, ϕ
$12,861	Basic limit expected loss, E[X;b]
50	Fixed ALAE per claim, ε
7%	Variable ALAE, u

Find Complete the table.

Solution

For a franchise deductible we have: $C(d) = \frac{E[X;d] - d\big(1 - F_X(d)\big) + F_X(d)\epsilon}{E[X;b] + \epsilon}$

Changing the deductible type (but not the deductible amount) doesn't impact claim frequency, so the modifed claim frequency is still: $\phi(1 - F_X(d))$

However, the modified severity becomes: $\left(\frac{E[X;b] - E[X;d]}{1 - F_X(d)} + (d + \epsilon)\right)(1 + u)$ *Alice: "Note the + d in the large ( )"*

Using these equations we can complete the table as follows

Deductible, d	E[X;d]	F_X(d)	C(d)	Frequency	Severity	Pure Premium
0	0	0	0.00000	0.000300	$13,815	$4.14
500	489	0.5402	0.02216	0.000138	$29,379	$4.05
1,000	790	0.5592	0.02921	0.000132	$30,425	$4.02
1,500	1,170	0.7818	0.06830	0.000065	$58,988	$3.86
2,250	2,040	0.8031	0.12680	0.000059	$61,265	$3.62
10,000	2,643	0.8964	0.12794	0.000031	$116,287	$3.61