***Additional Topics***

***Additional Mathematics Topics in General insurance (property and liabiloity)***

1. ***Net or Pure Premium***

If the loss distribution follows *the normal distribution*, the pure premium P will be calculated as follow:

 **P =  +** $σ×$ **z %9.99**

If the number of insured = 1 then:

P1 = x1 + $σ1 ×$ **z** %9.99 where **z% 9.99** is the standard value for the confidence degree 99.9% & z = 3.09 (we will approximate it to 3 to facilitate the calculation).

P2 = 2 + $σ2 ×$ **z** %9.99

P3 = 3 + $σ3 ×$ **z** %9.99

P100 = 100 + $σ100 ×$ **z** %9.99

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P1000 = 1000 + $σ1000 ×$ **z** %9.99

P10000 = 10000 + $σ1000 ×$ **z** %9.99

P1000000 = 1000000 + $σ1000000 ×$ **z** %9.99

***Example***

 Based on the previous value of  =1000 & $σ$ =1500 then

 **If n = 1 (**i.e. if there is only one insured), then the premium for one insured would be:

P1 = 1 + $σ1 ×$ **z** %9.99

P1 = 1000 + $1500 ×$ **3** = 1000 + 4500 =5500

 If n = 2 (i.e. if there are only two insureds), then the premium for two insureds would be:

P2 = 2 + $σ2 ×$ **z** %9.99

 P2 = 1000×2 + $((1500$ × $\sqrt{2}$ ) × 3)

 = 2000 + ((1500× 1.4142) ×3)

 =2000 + 6363.96 =8363.96

Then the premium for each insured =$ \frac{p2}{2}$ = $\frac{8363.96}{2}$ = 4141.98

If n = 3 (i.e. if there are only three insureds) then the premium for three insureds would be:

P3 = 3 + $σ3 ×$ **z** %9.99

P3 = 1000× 3 + $((1500$ × $\sqrt{3}$ ) × 3)

 =3000 + ((1500× 1.732051) ×3)

 = 3000 + 7794.23 = 10794.23

Then the premium for each insured = =$ \frac{p3}{3}$ = $\frac{10794.23}{3}$ = 3598.08

**If n = 100** (i.e. if there are100 insureds) then the premium for 100 insureds would be:

P100 = 100 + $σ100 ×$ **z** %9.99

P100 = 1000× 100 + $((1500$ × $\sqrt{100}$ ) × 3)

 = 100000 + ((1500× 10) ×3)

 = 1000000 +45000 = 145000

Then the premium for each insured = $\frac{p100}{100}$ = $\frac{145000}{100}$ = 1450

**If n = 10000** (i.e. if there is 10000 insureds), then the premium for 10000 insureds would be:

 P10000 = 10000 + $σ1000 ×$ **z** %9.99

P10000 = 1000× 10000+ $((1500$ × $\sqrt{100}00$ ) × 3)

 = 10000000+ ((1500× 100) ×3)

 = 10000000 +450000 = 145000 = 10450000

Then the premium for each insured = $\frac{p10000}{10000}$ = $\frac{10450000}{10000}$ = 1045

**If n = 1.000.000** (i.e. if there are 1000000 insureds), then the premium for 1000000 insureds would be:

P1000000 = 1000000 + $σ1000000 ×$ **z** %9.99

P1000000  = (1000× 1000000) + $((1500$ × $\sqrt{10000}00$ ) × 3)

 = 1000000000+ ((1500× 1000) ×3)

 = 1000000000 +4500000 = 145000 = 1004500000

***Then* the net premium for each insured** = $\frac{p 1000000}{1000000}$ = $\frac{1004500000}{1000000}$ = 1004.5

And,

**The gross premium =** $\frac{ the pure premium }{1- loadings}$

Given $loadings$ = 30 %

So, **the gross premium** = $\frac{ 1004.5 }{1- 0.3}$ =1435 (1004.2 pure premium and 430.5 loadings).