

**Reading:** Werner 13: Other Considerations  
**Model:** 2013.Spring #10  
**Problem Type:** Lifetime Value Analysis

LVA (60) - (Problem 1)

**Find** Calculate the lifetime value of the expected profit as a percentage of premium

**Given**

premium: year 1	2,000
premium: year 2	2,160
premium: year 3	2,080
new business expected LR	60%
annual decrease in losses	40
expenses - new business	720
expenses - renewal business	600
prob(1st renewal)	92%
prob(2nd renewal)	78%
prob(3rd renewal)	0%
annual discount rate	4%

Step 1 complete the following table

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
year	premium	loss	expense	persistence	cumulative persistence	discount factor	PV profit	PV premium
1	2,000	1,200	720	100.0%	100.0%	1.0000	80.00	2,000.00
2	2,000	1,160	600	92.0%	92.0%	0.9615	212.31	1,769.23
3	2,000	1,120	600	78.0%	71.8%	0.9246	185.77	1,326.92
<i>totals ==&gt;</i>							478.08	5,096.15

- (1) = given  
 (2) = start at (premium: year 1) x 60% then decrease by 40 per year  
 (3) = use 'new business' expenses for year 1, then 'renewal expenses' for years 2 & 3  
 (4) = given  
 (5) = product of current & prior values of (Col 4)  
 (6) =  $1 / (1 + \text{discount rate})^{\text{year} - 1}$   
 (7) =  $[(1) - (2) - (3)] \times (5) \times (6)$   
 (8) =  $(1) \times (5) \times (6)$

Step 2 calculate the % profit

$$\begin{aligned}
 \% \text{ profit} &= \frac{\text{total PV(profit)}}{\text{total PV(premium)}} \\
 &= \frac{478.08}{5,096.15} \\
 &= 9.38\% \quad \text{<==== final answer}
 \end{aligned}$$

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LVA (60) - (Problem 2)

**Find** Calculate the lifetime value of the expected profit as a percentage of premium

**Given**

premium: year 1	1,300
premium: year 2	1,340
premium: year 3	1,400
new business expected LR	70%
annual decrease in losses	50
expenses - new business	572
expenses - renewal business	286
prob(1st renewal)	90%
prob(2nd renewal)	78%
prob(3rd renewal)	0%
annual discount rate	4%

Step 1 complete the following table

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
year	premium	loss	expense	persistence	cumulative persistence	discount factor	PV profit	PV premium
1	1,300	910	572	100.0%	100.0%	1.0000	-182.00	1,300.00
2	1,300	860	286	90.0%	90.0%	0.9615	133.27	1,125.00
3	1,300	810	286	78.0%	70.2%	0.9246	132.40	843.75
<i>totals =====&gt;</i>							83.67	3,268.75

- (1) = given  
 (2) = start at (premium: year 1) x 70% then decrease by 50 per year  
 (3) = use 'new business' expenses for year 1, then 'renewal expenses' for years 2 & 3  
 (4) = given  
 (5) = product of current & prior values of (Col 4)  
 (6) =  $1 / (1 + \text{discount rate})^{\text{year} - 1}$   
 (7) =  $[(1) - (2) - (3)] \times (5) \times (6)$   
 (8) =  $(1) \times (5) \times (6)$

Step 2 calculate the % profit

$$\begin{aligned}
 \% \text{ profit} &= \frac{\text{total PV(profit)}}{\text{total PV(premium)}} \\
 &= \frac{83.67}{3,268.75} \\
 &= 2.56\% \quad \text{<==== final answer}
 \end{aligned}$$