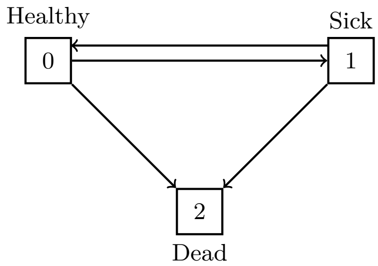
Chapter 1

Guo's Solution to Fall 2018 LTAM WA

WA1 This seems to be the first time SOA tested profit testing under a multiple state model, making this problem likely the most difficult WA.

In addition, some parts of this problem are calculation intensive. For these parts, you can gain more credits by outlining how to solve the problem and skip the numerical calculations.



(a) ★★★☆☆ Difficulty

$$_2p_{60}^{01} = P(0 \to 0 \to 1) + P(0 \to 1 \to 1) = (0.9 - 0.01 \times 0)0.05 + 0.05(0.2) = 0.055$$

$(b)(i)$ ★★★★☆ Difficulty

If the insured is at state 0 at $t = 2$, what are the insurer's future incomes and obligations?

- incomes: 5,000 while the insured in state 0
- expenses: 150 while in state 0 or 1
- benefit: 50000 if get to state 2

$$_2V^{(0)} = 50000A_{62:\overline{8}|}^{02} + 150\left(\ddot{a}_{62:\overline{8}|}^{00} + \ddot{a}_{62:\overline{8}|}^{01}\right) - 5000\ddot{a}_{62:\overline{8}|}^{00}$$

$$= 50000 \times 0.46667 + 150(4.7328 + 0.2533) - 5000 \times 4.7328 = 417.415$$

The waived premiums in state 1 should not be treated as a negative benefit. Waiving premiums in state 1 is the same as saying that the premiums are paid only while the insured is in state 0.

$(b)(ii)$ ★★★★☆ Difficulty

If the insured is in state 1 at $t = 2$, what are the insurer's future incomes and obligations?

- incomes: 5000 while in state 0
- expenses: 150 while in state 1 or 0
- benefit: 50000 if get to state 2

$$_2V^{(1)} = 50000A_{62:\overline{8}|}^{12} + 150\left(\ddot{a}_{62:\overline{8}|}^{11} + \ddot{a}_{62:\overline{8}|}^{10}\right) - 5000\ddot{a}_{62:\overline{8}|}^{10}$$

$$= 50000 \times 0.49680 + 150(1.4060 + 3.3340) - 5000 \times 3.3340 = 8881.0$$

$(b)(iii)$ ★★★★★ Difficulty

We'll apply the recursive formulas:

$$\begin{cases} \left({}_2V^{(0)} + 5000 - 150\right)1.06 = 50000p_{62}^{02} + p_{62}^{00}\,{}_3V^{(0)} + p_{62}^{01}\,{}_3V^{(1)} \\ \left({}_2V^{(1)} - 150\right)1.06 = 50000p_{62}^{12} + p_{62}^{10}\,{}_3V^{(0)} + p_{62}^{11}\,{}_3V^{(1)} \end{cases}$$

$$\begin{cases} (417.415 + 5000 - 150)1.06 = 50000(0.05 + 0.01 \times 2) + (0.9 - 0.01 \times 2)1788 + 0.05\,{}_3V^{(1)} \\ (8881.0 - 150)1.06 = 50000(0.10 + 0.01 \times 2) + (0.7 - 0.01 \times 2)1788 + 0.2\,{}_3V^{(1)} \end{cases}$$

$$\begin{cases} {}_3V^{(1)} = 10200 \\ {}_3V^{(1)} = 10195 \end{cases}$$

The difference is because the provided value ${}_3V^{(0)} = 1788$ is a rounded value. You don't need to find ${}_3V^{(1)}$ twice. Solve any equation and you'll find ${}_3V^{(1)}$.

By the way, SOA is kind enough to give you ${}_3V^{(0)}$. Otherwise, you'll need to solve systems of equations to find ${}_3V^{(0)}$ and ${}_3V^{(1)}$.

$(c)(i)$ ★★★★★ Difficulty

At $t = 2$, the insured can be in state 0, 1, 2. If in state 2, the profit emerging at $t = 3$ is zero.
If in state 0 at $t = 2$, the profit emerging at $t = 3$ per policy inforce at $t = 2$ is:

$$X = \left({}_2V^{(0)} + 5000 - 60\right) 1.057 - \left(50000p_{62}^{02} + p_{62}^{00}\, {}_3V^{(0)} + p_{62}^{01}\, {}_3V^{(1)}\right)$$
$$= \left({}_2V^{(0)} + 5000 - 60\right) 1.057 - \left({}_2V^{(0)} + 5000 - 150\right) 1.06$$
$$= (417.415 + 5000 - 60)1.057 - (417.415 + 5000 - 150)1.06 = 79.33$$

If in state 1 at $t = 2$, the profit emerging at $t = 3$ per policy inforce at $t = 2$ is:

$$Y = \left({}_2V^{(1)} - 60\right) 1.057 - \left(50000p_{62}^{12} + p_{62}^{10}\, {}_3V^{(0)} + p_{62}^{11}\, {}_3V^{(1)}\right)$$
$$= \left({}_2V^{(1)} - 60\right) 1.057 - \left({}_2V^{(1)} - 150\right) 1.06$$
$$= (8881.0 - 60)1.057 - (8881.0 - 150)1.06 = 68.94$$

$$\Pi_3 = {}_2p_{60}^{00} X + {}_2p_{60}^{01} Y + {}_2p_{60}^{02} \times 0$$

$${}_2p_{60}^{00} = P(0 \to 0)P(0 \to 0) + P(0 \to 1)P(1 \to 0) = (0.9 - 0.01 \times 0)(0.9 - 0.01 \times 1) + 0.05(0.7 - 0.01 \times 1) = 0.8355$$

$${}_2p_{60}^{01} = 0.055$$

$$\Pi_3 = 0.8355 \times 79.33 + 0.055 \times 68.94 = 70.07$$

$(c)(ii)$

$$NPV(2) = -200 + \frac{84.74}{1.08} + \frac{80.35}{1.08^2} = -52.65$$
$$NPV(3) = -200 + \frac{84.74}{1.08} + \frac{80.35}{1.08^2} + \frac{70.07}{1.08^3} = 2.97 > 0$$

The discounted payback period is 3 years.

WA2 This is a mainstream problem and you should get most of the credits.

(a) ★★★☆☆ Difficulty

A 5-year deferred continuous whole life annuity that pays at the rate of 1000 per year.

(b) ★★★☆☆ Difficulty

$$1000\,{}_{5|}\bar{a}_x = 1000\,{}_5E_x\,\bar{a}_{x+5}$$

(c) ★★★★★ Difficulty

$$Y|T_x > 5 = 1000v^5\bar{a}_{\overline{T_{x+5}}|} = 1000v^5\frac{1 - v^{T_{x+5}}}{\delta}$$

$$E(Y|T_x > 5) = 1000v^5\bar{a}_{x+5}$$

$$Var(Y|T_x > 5) = 1000^2v^{10}Var\left(\frac{v^{T_{x+5}}}{\delta}\right) = 1000^2v^{10}\frac{{}^2\bar{A}_{x+5} - \bar{A}^2_{x+5}}{\delta^2}$$

$$E(Y^2|T_x > 5) = E^2(Y|T_x > 5) + Var(Y|T_x > 5) = 1000^2v^{10}\left(\bar{a}_{x+5}\right)^2 + 1000^2v^{10}\frac{{}^2\bar{A}_{x+5} - \bar{A}^2_{x+5}}{\delta^2}$$

$$\Rightarrow E(Y) = {}_5q_xE(Y|T_x \le 5) + {}_5p_xE(Y|T_x > 5) = 0 + {}_5p_x\,1000v^5\bar{a}_{x+5}$$

$$\Rightarrow E(Y^2) = {}_5q_xE(Y^2|T_x \le 5) + {}_5p_xE(Y^2|T_x > 5) = 0^2 + {}_5p_xE(Y^2|T_x > 5)$$

$$= 0^2 + {}_5p_x\left(1000^2v^{10}\left(\bar{a}_{x+5}\right)^2 + 1000^2v^{10}\frac{{}^2\bar{A}_{x+5} - \bar{A}^2_{x+5}}{\delta^2}\right)$$

$$Var(Y) = E(Y^2) - E^2(Y) = 1000^2v^{10}\left({}_5p_x\frac{{}^2\bar{A}_{x+5} - \bar{A}^2_{x+5}}{\delta^2} + \left(\bar{a}_{x+5}\right)^2\left({}_5p_x - \left({}_5p_x\right)^2\right)\right)$$

$$= 1000^2v^{10}\left({}_5p_x\frac{{}^2\bar{A}_{x+5} - \bar{A}^2_{x+5}}{\delta^2} + \left(\bar{a}_{x+5}\right)^2{}_5p_x\,{}_5q_x\right)$$

(d) ★★★☆☆ Difficulty

$$E(Y) = 1000\,{}_5E_{65}\,\bar{a}_{70} = 1000 \times 0.75455 \times 11.502472 = 8679.1902$$

$$\text{where} \quad \bar{a}_{70} = \alpha(\infty)\ddot{a}_{70} - \beta(\infty) = 1.00020 \times 12.0083 - 0.50823 = 11.502472$$

Alternatively, you can first find $\bar{A}_{70} = \dfrac{0.05}{\ln 1.05}A_{70}$ and then $\bar{a}_{70} = \dfrac{1 - \bar{A}_{70}}{\ln 1.05}$.

(d) ★★★★☆ Difficulty

Y is an increasing function of T_{65} and $Y > E(Y)$ maps to $T_{65} > t^*$ where $T_{65} = t^*$ is such that $Y = E(Y)$.

$$8679.1902 = 1000\int_5^{t^*} e^{-\delta t}dt = 1000 \times \frac{1.05^{-5} - 1.05^{-t*}}{\ln 1.05}$$

$$1.05^{-t^*} = 0.36006705, \quad t^* = -\frac{\ln 0.36006705}{\ln 1.05} = 20.93588$$

$$P(T_{65} > 20.93588) = {}_{20.93588}p_{65} = \frac{\ell_{85.93588}}{\ell_{65}} = \frac{(1 - 0.93588)\ell_{85} + 0.93588\ell_{86}}{\ell_{65}}$$

$$= \frac{(1 - 0.93588)61184.9 + 0.93588 \times 57656.7}{94579.7} = 0.6120016$$

(d) ★★★★☆ Difficulty

If Y is normal, then Y would be symmetrically distributed in a bell curve centering around its mean 8679.19, which would require that T_{65} to be symmetrically distributed around 20.93588 (because Y is an increasing function of T_{65}), that is requiring:

$$P\left(T_{65} \le 20.93588 - k\right) \approx P\left(T_{65} > 20.93588 + k\right)$$

The above cannot hold. Human death time isn't symmetrically distributed over any constant.

However, the total actuarial value of a large block of identical contracts with the same issue age is approximately normal due to the law of large numbers.

WA 3

This is modeled after Mary Hardy study note. If you read the study note and worked through its examples, you can get perfect credits for Parts (a), (b), and (c). Part (d), however, is difficult because Mardy Hardy's explanation of the major shortcomings of the Lee-Carter model is terse.

(a) ★★★☆☆ Difficulty

m_x is the weighted average force of mortality between age x and $x+1$.

$$m_x = \frac{q_x}{\int_0^1 {}_tp_x dt} = \frac{\int_0^1 {}_tp_x \, \mu_{x+t} dt}{\int_0^1 {}_tp_x dt}$$

(b) ★★★☆☆ Difficulty

$$\ln m(80, 2018) = \alpha_{80} + \beta_{80} K_{2018} = \alpha_{80} + \beta_{80} \left(K_{2017} + c + \sigma_k \, Z_t\right)$$

$$= -2.4 + 0.05 \left(-4 - 0.2 + 1.5 Z_t\right) = 0.075 Z_t - 2.61 \sim N(-2.61, 0.075^2)$$

$$\ln Y \sim N(\mu, \sigma^2) \quad \Rightarrow \quad E(Y) = e^{n\mu + 0.5n^2\sigma^2}$$

$$E\left[m(80, 2018)\right] = e^{-2.61 + 0.5 \times 0.075^2} = 0.073741651$$

$$E\left[m^2(80, 2018)\right] = e^{-2 \times 2.61 + 0.5 \times 2^2 \times 0.075^2} = 5.468505 \times 10^{-3}$$

$$Var\left[m(80, 2018)\right] = 5.468505 \times 10^{-3} - 0.073741651^2 = 3.0673908 \times 10^{-5} = 0.005538^2$$

$m(80, 2018)$ is an increasing function of Z_t and 10-th percentile of $m(80, 2018)$, $Q_{10\%}\left(m(80, 2018)\right)$, maps to 10-th percentile of Z_t, $Q_{10\%}\left(Z_t\right)$.

$$Q_{10\%}\left(Z_t\right) = -1.28155$$

$$Q_{10\%}\left(m(80, 2018)\right) = e^{0.075(-1.28155) - 2.61} = 0.066795721$$

$(c)(i)$ ★★★☆☆ Difficulty

From Mary Hardy study note Example 4.5 (c).

$$\text{UDD: } {}_tq_x = t\, q_x \quad \text{for } 0 \le t \le 1$$

$$m_x = \frac{q_x}{\int_0^1 {}_tp_x dt} = \frac{q_x}{\int_0^1 \left(1 - t\, q_x\right) dt} = \frac{q_x}{1 - 0.5 q_x}$$

$$q_x = \frac{m_x}{1 + 0.5 m_x}, \quad p_x = \frac{1 - 0.5 m_x}{1 + 0.5 m_x}$$

$(c)(ii)$ ★★★★☆ Difficulty

Under UDD, $Q_p\left(p(80, 2018)\right)$ maps to $Q_{1-p}\left(m(80, 2018)\right)$. See Mary Hard study note Example 4.5(b).

$$Q_{50\%}\left(m(80, 2018)\right) = e^{0.075(0) - 2.61} = e^{-2.61}$$

$$Q_{50\%}\left(p(80, 2018)\right) = \frac{1 - 0.5e^{-2.61}}{1 + 0.5e^{-2.61}} = 0.92907324$$

(d) ★★★★★ Difficulty

Lee-Carter model doesn't capture the cohort effect (the impact of the birth-year on mortality). Studies have found that people born in certain "better" years can have lower mortality than the general population. In the Lee-Carter model, α_x and β_x are the attained age factors and K_t captures the general mortality trend at t. The model doesn't have a factor to capture the birth year impact on mortality.

In addition, in the Lee-Carer model, the correlation efficient ρ between the mortality improvement in two different years, that is ρ for $R(x,t) = \ln m(x,t) - \ln m(x, t-1)$ and $R(y,t) = \ln m(y,t) - \ln m(y, t-1)$ where $x \neq y$ is always 1, suggesting that when $R(x,t)$ moves up or down $R(y,t)$ moves in the same direction with the same magnitude. This perfect correlation assumption does not fit reality.

WA 4

Parts (b) and $(d)(i)$ are mainstream life contingency content everyone should know. The other parts are more difficult.

(a) ★★★★☆ Difficulty

Making a whole life insurance policy fully paid before an advanced age can be attractive to both the insured and the insurer. The insured doesn't have to worry about paying premiums at old ages when he may not able to afford the policy. To the insurer, a fully paid up policy eliminates lapses and reduces surrenders, possibly enhancing profitability.

(b) ★★★☆☆ Difficulty

$$G\ddot{a}_{60:\overline{20}|} = 100000A_{60} + 0.3G + 0.1G\ddot{a}_{60:\overline{20}|} + 450 + 50\ddot{a}_{60}$$

$$12.38165G = 100000 \times 0.290282 + 0.3G + 0.1G \times 12.38165 + 450 + 50 \times 14.90407$$

$$G = 2787.24$$

$$_2V = 100000A_{62} + 0.1G\ddot{a}_{62:\overline{18}|} + 50\ddot{a}_{62} - G\ddot{a}_{62:\overline{18}|}$$

$$= 100000 \times 0.31495 + 0.1 \times 2787.24 \times 11.58498 + 50 \times 14.38606 - 2787.24 \times 11.58498 = 3153.20$$

(c) ★★★★☆ Difficulty

Let β represent the modified renewal net annual premium.

$$-0.5\beta + \beta\ddot{a}_{60:\overline{20}|} = 100000A_{60}$$

$$-0.5\beta + 12.38165\beta = 100000 \times 0.290282$$

$$\beta = 2443.11$$

$$0.5 \times 2443.11 = 1221.56$$

$$_2V = 100000A_{62} - \beta\ddot{a}_{62:\overline{18}|} = 100000 \times 0.31495 - 2443.11 \times 11.58498 = 3191.62$$

(d) ★★★☆☆ Difficulty

$$\alpha = 100000vq_{60} = 100000 \times 1.05^{-1} \times 0.003398 = 323.62$$

- Actuarial value at $t = 2$ of future benefits is the same for FPT and for the modified reserve.
- Year 1 net premium for FPT is lower than that for the modified reserve.
- Hence annual renewal net premium for FPT is higher than that for the modified reserve.
- Hence at $t = 2$ FPT reserve is lower.

WA 5
This problem is a surprise to everyone. If you can calm down, however, the concept is simple.

$(a)(i)$ ★★☆☆☆ Difficulty

$$250000 = Xa_{\overline{20|}} = X \times \frac{1-1.05^{-20}}{0.05} = 12.46221X \quad X = 20,060.65$$

$(a)(ii)$ ★★☆☆☆ Difficulty

$$X\ddot{a}_{\overline{16|}} = 20060.65 \times \frac{1-1.05^{-16}}{1-1.05^{-1}} = 228,283.34$$

$(a)(iii)$ ★★★☆☆ Difficulty

- If die in Year 1, the outstanding balance is $X\ddot{a}_{\overline{20|}}$.
- If die in Year 2, the outstanding balance is $X\ddot{a}_{\overline{19|}}$.
- ...
- If die in Year 20, the outstanding balance is $X\ddot{a}_{\overline{1|}} = X$.

$$\text{Balance at } K_{35}+1 = \begin{cases} X\ddot{a}_{\overline{20-K_{35}|}} & \text{if } K_{35} = 0,1,2,\dots,19 \\ 0 & \text{if } K_{35} = 20,21,23,\dots \end{cases}$$

$(b)(i)$ ★★★☆☆ Difficulty

$$Z = \begin{cases} X\ddot{a}_{\overline{20-K_{35}|}} v^{K_{35}+1} & \text{if } K_{35} = 0,1,2,\dots,19 \\ 0 & \text{if } K_{35} = 20,21,23,\dots \end{cases}$$

$(b)(ii)$ ★★★★☆ Difficulty
Year 1:

$$\begin{cases} DB = X\ddot{a}_{\overline{20|}} = X\dfrac{1-v^{20}}{d} \\ Z = DB \times v = \dfrac{X}{d}v - \dfrac{X}{d}v^{21} \end{cases}$$

Year 2:

$$\begin{cases} DB = X\ddot{a}_{\overline{19|}} = X\dfrac{1-v^{19}}{d} \\ Z = DB \times v^2 = \dfrac{X}{d}v^2 - \dfrac{X}{d}v^{21} \end{cases}$$

So on.
Year 20:

$$\begin{cases} DB = X\ddot{a}_{\overline{1|}} = X\dfrac{1-v}{d} \\ Z = DB \times v^{20} = \dfrac{X}{d}v^{20} - \dfrac{X}{d}v^{21} \end{cases}$$

The mortgage policy is the sum of two 20-year term policies:

- Policy One has a level death benefit of $\dfrac{X}{d}$ payable at the end of the year of death. APV: $\dfrac{X}{d}A_{\overset{1}{35}:\overline{20|}}$.
- Policy Two has a negative level death benefit $\dfrac{X}{d}$ payable always at $t = 21$ regardless of the year of death. APV: $-v^{21}{}_{20}q_{35}$.

$$\Rightarrow E(Z) = \frac{X}{d}\left(A_{\overset{1}{35}:\overline{20|}} - v^{21}{}_{20}q_{35}\right)$$

(c) ★★★☆☆ Difficulty

$$E(Z) = \frac{20060.65}{1-1.05^{-1}}\left(0.009397 - 1.05^{-21} \times \left(1 - \frac{97846.2}{99556.7}\right)\right) = 1360.6938$$

$$P = \frac{E(Z)}{\ddot{a}_{35:\overline{20|}}} = \frac{1360.6938}{13.02398} = 104.46$$

(c) ★★★★☆ Difficulty
Level premiums are funding decreasing death benefits. Some years down the road, the annual premium will exceed the outstanding loan balance and there's no incentive for the insured to keep paying premiums.
At your leisure, you should verify the following net premium reserves:

t	$35+t$	${}_tV$
0	35	0.00
1	36	6.99
2	37	12.02
3	38	14.88
4	39	15.32
5	40	13.16
6	41	8.24
7	42	0.47
8	43	−10.15
9	44	−23.50
10	45	−39.30
11	46	−57.05
12	47	−75.95
13	48	−94.89
14	49	−112.25
15	50	−125.86
16	51	−132.84
17	52	−129.39
18	53	−110.58
19	54	−70.12
20	55	0.00

At $t=8$, the net premium reserve first becomes negative. The policyholder has no reason to keep the policy inforce after $t=7$.

SOA is nice to give you the annual loan repayment X and the outstanding loan balance at $t=5^-$. This information helps you confirm your understanding of the 20-year mortgage insurance policy. In addition, if you can't solve (b), you can still calculate (c).

WA 6

(*a*) ★★★★★ Difficulty

This question turns out to be the most frustrating question for me. I was not sure about the followings:

- Is the 3.6% the actual rate or the nominal rate?
- Is the final salary the sum of 12 monthly salaries from age 64 to $64+\frac{11}{12}$? Or is it the annual salary at age $64+\frac{11}{12}$?

By trial and error, I matched the magic 8050. The total salary in the last year is the sum of the 12 monthly geometrically increasing salaries starting from age 64 and ending with age $64+\frac{11}{12}$. The effective monthly salary growth factor is $1+\dfrac{0.036}{12}=1.003$.

$$\frac{40000}{12}\times\left(1.003^{12(64-30)}+1.003^{12(64-30+\frac{1}{12})}+\ldots+1.003^{12(64-30+\frac{11}{12})}\right)$$

$$=\frac{40000}{12}\times\frac{1.003^{12(64-30)}-1.003^{12(65-30)}}{1-1.003}=138044.47$$

The monthly pension benefit is:

$$0.02\times 138044.47\times(65-30)\times\frac{1}{12}=8052.59$$

(*b*) ★★★★☆ Difficulty

$$12\times 8052.59\left(\ddot{a}^{(12)}_{\overline{10|}}+{}_{10}E_{65}\,\ddot{a}^{(12)}_{75}\right)$$

$$=12\times 8052.59\left(\frac{1}{12}\times\frac{1-1.05^{-10}}{1-1.05^{-1/12}}+0.55305\left(10.3178-\frac{11}{24}\right)\right)=1,293,125.3$$

(*c*) ★★★★★ Difficulty

The part is prone to errors. To avoid errors, note the following pattern:

- At $t=\dfrac{1}{12}$, 6% of the 1st monthly salary $\dfrac{40000}{12}$ is deposited into an account that earns an interest rate $\dfrac{0.096}{12}=0.008$ per month. Its accumulated value at age 65 is $0.06\times\dfrac{40000}{12}\times 1.008^{12(65-30)-1}$.
- At $t=\dfrac{2}{12}$, 6% of the 2nd monthly salary $0.06\times\dfrac{40000}{12}\times 1.003$ is deposited. Its accumulated value at age 65 is $0.06\times\dfrac{40000}{12}\times 1.003\times 1.008^{12(65-30)-2}$.
- ...
- At $t=65-30=35$, 6% of the monthly salary at age $64+\dfrac{11}{12}$ is deposited. The accumulated value at age 65 is $0.06\times\dfrac{40000}{12}\times 1.003^{12(64-30)+11}\times 1.008^{0}$.

The accumulated value is the sum of the geometric series:

$$\frac{\text{1st term}-\text{term after the last}}{1-\text{common ratio}}$$

$$=0.06\times\frac{40000}{12}\times\frac{1.008^{12(65-30)-1}-1.003^{12(65-30)}\times 1.008^{-1}}{1-1.008^{-1}\times 1.003}=995,523.95$$

(*d*) ★★★☆☆ Difficulty

The lump sum 1,293,125.3 is greater than the accumulated value 995,523.95. The IRR is greater than 9.6%.

(*e*) ★★★☆☆ Difficulty

$$12X\ddot{a}^{(12)}_{65}=1293125.3$$

$$12X\left(13.5498-\frac{11}{24}\right)=1293125.3$$

$$X=8,231.35$$

(*f*) ★★★☆☆ Difficulty

(*i*) A policyholder has more information than the insurer and will typically choose an option to maximize his interest at the expense of the insurer's.

(*ii*)

- The unhealthy will most likely choose the lump sum option
- The healthy will mostly likely choose the non-guaranteed life annuity
- If actual population mix is different from the assumed, the employer can have a gain or loss.

Please report any errors to yufeng.guo.actuary@gmail.com.

I'm an ASA and associate actuary at Milliman Chicago Office. My office email is yufeng.guo@milliman.com.

My spring 2019 LTAM manual is to be released in early January. For sample chapters of my fall 2018 LTAM edition, see http://deeperunderstandingfastercalc.com/mlc-solver.

By the way, does your company use SAS? If YES, you might want to learn it. I published a SAS book at amazon https://www.amazon.com/Beginning-SAS-Programming-beginners-learning/dp/1514218992/ref=sr_1_2?ie=UTF8&qid=1510711296&sr=8-2&keywords=learn+sas.