EXAM MLC QUESTION OF THE WEEK

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Week of April 28/08

A fully discrete whole life insurance policy with level premiums issued at age x has a death benefit of 100,000. The policy expenses are as follows

	1st Year	Renewal Years
Percent of Premium	50%	20%
Per Policy	5000	1000

The policy is based on a two-decrement model, with decrement 1 being death and decrement 2 being policy cancellation. Cancellation can only occur at the end of a first year.

Interest is at a rate of $i = .20$ and mortality probabilities are $q_x^{(1)} = .05$, $q_{x+1}^{(1)} = .05$ and the policy cancellation probability is .25 every year. The insurer wishes to have an expected asset share of 3000 per surviving policy at the end of two years.

If the insurer charges a contract premium of 14,000 per year, and if the insurer pays a cash value of CV for withdrawals at the end of the first year, and $CV + 1000$ for withdrawals as the end of the second year, find the value of CV.

The solution can be found below.

Week of April 28/08 - Solution

We use the relationship

$$(_kAS + G - E_k)(1+i) - b \cdot q^{(1)}_{x+k} - {}_{k+1}CV \cdot q^{(2)}_{x+k} = p^{(\tau)}_{x+k} \cdot {}_{k+1}AS$$

$$[14,000(.5) - 5000](1.2) - 100,000(.05) - .25CV = .7 \cdot {}_1AS$$

and

$$[{}_1AS + 14,000(.8) - 1000](1.2) - 100,000(.05) - .25(CV + 1000) = (.7)(3000)$$

so that

$$[\frac{[14,000(.5)-5000](1.2)-100,000(.05)-.25CV}{.7} + 14,000(.8) - 1000](1.2)$$
$$- 100,000(.05) - .25(CV + 1000) = (.7)(3000)$$

Solving for CV results in $CV = 638$.