

## FA Module 20: Insurance contracts: GAAP (practice problems)

(The attached PDF file has better formatting.)

### Exercise 20.1: Insurance contracts: GAAP

On October 1, 20X1, an insurer writes a motor insurance contract with a one year term and collects a premium of 800. The cash received is held in a non-interest bearing checking account. The estimated claims for the policy year are 600. To compute the percentage of the policy term that have been earned, assume all months have 30 days and the year has 360 days.

Expenses paid at policy inception are

- Agents' commission = 10% of premium
- Underwriting costs = 60
- Modifications to a web site = 30

On November 15, 20X1, a claim of 110 is paid. At December 31, 20X1, the estimated costs for other incurred claims is 150 (nominal value) and 120 (present value). The estimated claims for the unexpired portion of the policy year remain  $75\% \times 600 = 450$ . For this insurance contract:

- A. What are the assets at policy inception?
- B. What are the liabilities at policy inception?
- C. What is the revenue at policy inception?
- D. What are the expenses at policy inception?
- E. What are the assets at December 31, 20X1?
- F. What are the liabilities at December 31, 20X1?
- G. What is the revenue for 20X1?
- H. What are the expenses for 20X1?
- I. What is pre-tax income for 20X1?

*Part A:* The insurer collects 800 in cash and pays

- $10\% \times 800 = 80$  in agents' commission
- 60 in underwriting expenses
- 30 for web-site expenses

The cash asset is  $800 - 80 - 60 - 30 = 630$ .

The costs that vary with acquisition of new and renewal policies are deferred over the contract term, so the insurer sets up a deferred policy acquisition cost of  $80 + 60 = 140$  at policy inception.

*Part B:* No revenue is recognized until the insurance protection is provided, so the insurer sets up a deferred revenue (called the unearned premium reserve) of 800 at policy inception. Deferred revenue is a liability account, not an asset account or an income statement item.

*Part C:* The revenue at policy inception is zero. No insurance protection has been provided, so no revenue is earned.

*Question:* Isn't revenue recognized when premium is due?

*Answer:* For long duration contracts, revenue is recognized when the premium is due. For short duration contracts, revenue is recognition as insurance protection is provided.

*Part D:* The expenses that vary with acquisition of new and renewal policies are matched with the earning of premium revenue; they are not entered on the financial statements at policy inception. Other expenses, such as web-site modifications, are expensed when incurred. The expenses at policy inception = 30.

*Part E:* Cash decreases 110 to pay the claim on November 15, 20X1. The cash asset at December 31, 20X1, is  $630 - 110 = 520$ .

One quarter (3 months) of the policy term has expired and three quarters (9 months) remain. The DPAC (deferred policy acquisition cost) asset is reduced 25% to  $140 \times (1 - 25\%) = 105$ .

*Part F:* One quarter (3 months) of the policy term has expired and three quarters (9 months) remain. The UEPR (unearned premium reserve) liability is reduced 25% to  $800 \times (1 - 25\%) = 600$ .

The loss reserve liability is the nominal value of incurred claims not yet paid = 150.

*Part G:* The revenue for 20X1 is the earned premium. One quarter (3 months) of the policy term has expired and three quarters (9 months) remain, so 25% of the premium is earned:  $25\% \times 800 = 200$ .

*Part H:* The expenses for 20X1 are three:

- Expenses recognized at policy inception = 30.
- One quarter (3 months) of the policy term has expired and three quarters (9 months) remain, so 25% of the deferred acquisition costs are expensed:  $25\% \times 140 = 35$ .
- Incurred claims in 20X1 =  $110 + 150 = 260$ . Both paid claims and incurred but unpaid claims are expenses when they occur.

Total expenses for 20X1 =  $30 + 35 + 260 = 325$ .

*Part I:* Pre-tax income for 20X1 is revenue – expenses =  $200 - 325 = -125$ .

## Exercise 20.2: Insurance contracts with premium deficiency: GAAP

On October 1, 20X1, an insurer writes a motor insurance contract with a one year term and collects a premium of 800. The cash received is held in a non-interest bearing checking account. The estimated claims for the policy year are 600. To compute the percentage of the policy term that have been earned, assume all months have 30 days and the year has 360 days.

Expenses paid at policy inception are

- Agents' commission = 10% of premium
- Underwriting costs = 60
- Modifications to a web site = 30

On November 15, 20X1, a claim of 110 is paid. At December 31, 20X1, the estimated costs for other incurred claims is 150 (nominal value) and 135 (present value). The estimated claims for the unexpired portion of the policy year are re-estimated as

- Scenario #1: 550 (nominal value) and 500 (present value)
- Scenario #2: 750 (nominal value) and 680 (present value)

For this insurance contract:

- A. What are the assets at policy inception?
- B. What are the liabilities at policy inception?
- C. What is the revenue at policy inception?
- D. What are the expenses at policy inception?
- E. What are the assets at December 31, 20X1?
- F. What are the liabilities at December 31, 20X1?
- G. What is the revenue for 20X1?
- H. What are the expenses for 20X1?
- I. What is pre-tax income for 20X1?

*Parts A, B, C, and D* are the same as for the previous exercise.

*Part A:* The insurer collects 800 in cash and pays

- $10\% \times 800 = 80$  in agents' commission
- 60 in underwriting expenses
- 30 for web-site expenses

The cash asset is  $800 - 80 - 60 - 30 = 630$ .

The costs that vary with acquisition of new and renewal policies are deferred over the contract term, so the insurer sets up a deferred policy acquisition cost of  $80 + 60 = 140$  at policy inception.

*Part B:* No revenue is recognized until the insurance protection is provided, so the insurer sets up a deferred revenue (liability) account (called the unearned premium reserve) of 800 at policy inception.

*Part C:* The revenue at policy inception is zero.

*Part D:* The expenses that vary with acquisition of new and renewal policies are matched with the earning of premium revenue; they are not entered on the financial statements at policy inception. Other expenses, such as web-site modifications, are expensed when incurred. The expenses at policy inception = 30.

*Part E:* The re-estimate of the future incurred claims causes a premium deficiency.

- Cash is credited (decreased) 110 to pay the claim on November 15, 20X1. The cash asset at December 31, 20X1, is  $630 - 110 = 520$ .
- One quarter (3 months) of the policy term has expired and three quarters (9 months) remain. The DPAC (deferred policy acquisition cost) asset is reduced 25% to  $140 \times (1 - 25\%) = 105$ .

The unearned premium reserve of 600 is not enough to cover the DPAC plus the remaining claims. The accounting entries differ for the two scenarios. Even though nominal values are used for the loss reserves, the insurer may choose nominal values or present values for the premium deficiency.

- Scenario #1:
  - Nominal values: the loss reserve of 550 + the DPAC of 105 is more than the unearned premium reserve of 600, so the DPAC is reduced to 50.
  - Present values: the loss reserve of 500 + the DPAC of 105 is more than the unearned premium reserve of 600, so the DPAC is reduced to 100.
- Scenario #2:
  - Nominal values: the loss reserve of 750 + the DPAC of 105 is more than the unearned premium reserve of 600, so the DPAC is reduced to 0
    - A premium deficiency reserve of  $750 - 600 = 150$  is set up.
  - Present values: the loss reserve of 680 + the DPAC of 105 is more than the unearned premium reserve of 600, so the DPAC is reduced to 0.
    - A premium deficiency reserve of  $680 - 600 = 80$  is set up.

*Question:* Does a premium deficiency arise only if the insurer re-estimates unpaid claim costs?

*Answer:* A new policy may have a premium deficiency if the estimated claim costs + the expenses that vary with the acquisition of new and renewal policies exceeds the premium. Estimating claim costs for a single policy is rarely possible, but premium deficiencies are estimated for groups of policies.

Insurers rarely write blocks of business that are unprofitable at initial estimates, but exceptions occur:

- An insurer may continue writing business during a severe underwriting cycle downturn (when it loses money) in anticipation of earning money when the underwriting turns up.
- State rate regulation may prevent needed rate increases. The insurer may write the policies in anticipation of higher rates in subsequent years.

*Part F:* One quarter (3 months) of the policy term has expired and three quarters (9 months) remain. The UEPR (unearned premium reserve) liability is reduced 25% to  $800 \times (1 - 25\%) = 600$ .

The loss reserve liability is the nominal value of incurred claims not yet paid:

- Scenario #1: 550
- Scenario #2: 750

*Question:* Why use nominal values for loss reserves and present values for premium deficiency reserves?

*Answer:* Loss reserves and premium deficiency reserves have different purposes:

- Loss reserves are held at nominal values to ensure sufficient funds to pay claimants.
- Insurers hold premium deficiency reserves to avoid deferring accounting losses once they are anticipated. The true loss depends on the present values of the cash flows.

*Part G:* The revenue for 20X1 is the earned premium. One quarter (3 months) of the policy term has expired and three quarters (9 months) remain, so 25% of the premium is earned:  $25\% \times 800 = 200$ .

*Part H:* The expenses for 20X1 are:

- Expenses recognized at policy inception = 30.
- One quarter (3 months) of the policy term has expired and three quarters (9 months) remain, so 25% of the deferred acquisition costs are expensed:  $25\% \times 140 = 35$ .
- Incurred claims in 20X1 =  $110 + 150 = 260$ .
- The reduction in the DPAC because of the premium deficiency is an expense (50, 5, or 105, depending on the scenario and the use of nominal values or present values).
- The increase in the premium deficiency reserve in scenario #2 is an expense (150 or 80, depending on nominal values or present values).

*Part I:* Pre-tax income for 20X1 is revenue minus expenses. Pre-tax income depends on the scenario and the use of nominal values or present values for the premium deficiency.