12. (3.5 points)

The following information is available for a property and casualty insurance company as at December 31, 2016. All amounts are in thousands of dollars ($000s).

	Held-to-Maturity Bond Portfolio	Available-for-Sale Bond Portfolio	Fair Value Option Bond Portfolio
Cash flow from 2017	1,000.0	500.0	2,000.0
Cash flow from 2018	1,000.0	750.0	1,500.0
Cash flow from 2019	500.0	1,000.0	1,500.0
Market Value	2,291.3	2,020.3	4,561.1

Calendar year claims payout pattern

2017	40%
2018	35%
2019	25%

Other information:

- Effective market yield: 5%
- Undiscounted losses and adjustment expenses: 5,000
- Assume all asset and liability cash flows are made at the end of the year.
- The market value of each bond corresponds to the present value of cash flows discounted at the effective yield.
- MfAD for claims development: 8%
- MfAD investment return rates: 0.5%
- Assume that there are no income taxes.

A change in interest rates occurs on December 31, 2016 which causes the yield to decrease from 5% to 4%.

Calculate the impact of the rate decrease on the following:

i. Net Income
ii. Other Comprehensive Income
iii. Equity

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QUESTION 12	
TOTAL POINT VALUE: 3.5	**LEARNING OBJECTIVE: C1**

SAMPLE ANSWERS

Sample answer 1

PV reserve @ 5% = 5,000 x 40% x 1.05^-1 + 5,000 x 35% x 1.05^-2 + 5,000 x 25% x 1.05^-3
= 4,571.86
PV reserve @ 4.5% = 5,000 x 40% x 1.045^-1 + 5,000 x 35% x 1.045^-2 + 5,000 x 25% x 1.045^-3
= 4,611.77
PV reserve @ 4% = 5,000 x 40% x 1.04^-1 + 5,000 x 35% x 1.04^-2 + 5,000 x 25% x 1.04^-3
= 4,652.30
PV reserve @ 3.5% = 5,000 x 40% x 1.035^-1 + 5,000 x 35% x 1.035^-2 + 5,000 x 25% x 1.035^-3
= 4,683.44

PV reserve w/PfAD @ 5% = 4,571.86 + (4,611.77 – 4,571.86) + 4,571.86 x 8% = 4,977.52
PV reserve w/PfAD @ 4% = 4,652.30 + (4,683.44 – 4,652.30) + 4,652.30 x 8% = 5,065.62

- ⇨ Change in Liab = 5,065.62 – 4,977.52 = 88.10

For Assets
HTM:
MV @ 5% = 2,291.30
MV @ 4% = 2,291.30 for H-T-M using book yield, not market yield, so no impact

AFS:
MV @ 5% = 2,020.30
MV @ 4% = 500 x 1.04^-1 + 750 x 1.04^-2 + 1,000 x 1.04^-3 = 2,063.18
Change = 2,063.18 – 2,020.30 = 42.88 flow through OCI

FV options:
MV @ 5% = 4,561.10
MV @ 4% = 2,000 x 1.04^-1 + 1,500 x 1.04^-2 + 1,500 x 1.04^-3 = 4,643.41
Change = 4,643.41 – 4,561.10 = 82.31 flow through NI

- ⇨ NI change = 82.31 – 88.10 = -5.79
- ⇨ OCI change = 42.88
- ⇨ EQ = NI change + OCI change = -5.79 + 42.88 = 37.09

Sample answer 2 (using duration)

Modified Duration of Liabilities= (1 x 5,000 x 40% x 1.05^-1 + 2 x 5,000 x 35% x 1.05^-2 + 3 x 5,000 x 25% x 1.05^-3) / 4,571.86
= 1.82
Change in liabilities = -1.82 x -1% x 4,977.52 = 90.57

Modified Duration of FVO = 1.87
Change in FVO = -1.87 x -1% x 4,561.10 = 85.13

Modified Duration of AFS = 2.19
Change in AFS = -2.19 x -1% x 2,020.30 = 44.28

Change in NI = 85.13 – 90.57 = -5.44
Change in OCI = 44.28
Change in Equity = 44.28 – 5.44 = 38.84

EXAMINER'S REPORT

Candidates were expected to determine the impact that a change in interest rates would have on both the claim liabilities and the various bond portfolio classifications (HTM, AFS, FVO) and how a change in any of these elements would impact income, other comprehensive income and equity.

Common errors include:

- Calculating an increase in net income from an increase in liabilities
- Forgetting to include changes in liabilities in the change in net income
- Assuming that payments occurred mid-year rather than end of year (question specifically stated end of year)
- Calculating a change in the value of HTM bonds and including it the change in net income, OCI or equity
- Forgetting to include claims PfAD in calculation of APV of liabilities