18. (4.75 points)

The following information is available for a federally-regulated property and casualty insurance company as at December 31, 2018. All amounts are in thousands of dollars ($000s).

Probable Maximum Loss (PML) 500, East Canada	90,000
PML 500, West Canada	350,000
PML 250, East Canada	25,000
PML 250, West Canada	130,000
Common shares issued and paid	60,000
Retained earnings	155,000
Accumulated other comprehensive income	45,000
Earthquake premium reserve	10,000
Nuclear and contingency reserves	0

The company has the following reinsurance coverage for any earthquake occurrence:

Layer	Ceded to Reinsurers
75,000 xs 25,000	90%
100,000 xs 100,000	100%
50,000 xs 200,000	50%

The insurance company is progressively phasing in from a 420-year return period in 2014 to a 500-year return period in 2022.

a. (2.25 points)

Calculate the insurance company's margin required for catastrophes at target as at December 31, 2018.

b. (1 point)

Fully explain the impact on the MCT components of a decrease in the earthquake reserves.

c. (0.5 point)

Explain how personal property earthquake exposures impact the surplus used in A.M. Best's BCAR score.

d. (1 point)

Briefly describe four qualitative earthquake risk management practices that would improve the A.M. Best rating with respect to the catastrophe analysis.

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QUESTION 18

TOTAL POINT VALUE: 4.75	**LEARNING OBJECTIVE(S): C1, C2**

SAMPLE ANSWERS

Part a: 2.25 points

Sample

Countrywide PML500 = (90,000^1.5 + 350,000^1.5)^(1/1.5) = 379,800

East Canada PML 420 = 0.68*90,000 + 0.32*25,000 = 69,200

West Canada PML 420 = 0.68*350,000 + 0.32*130,000 = 279,600

Reserving PML = (2022-2018)/(2022-2014)*max(279,600, 69,200) + (2018-2014)/(2022-2014)*379,800 = 329,700

Reinsurance coverage =0*25,000 + 0.9*75,000 + 1.0*100,000 + 0.5*50,000 = 192,500

10% Capital and Surplus = 0.10*(60,000 + 155,000 + 45,000) = 26,000

ERC = Reserving PML – Financial Resources = 329,700 – (192,500 + 10,000 + 26,000) = 101,200

Earthquake Reserve = 1.25 * (ERC + EPR) = 1.25 * (101,200 + 10,000) = 139,000

Part b: 1 point

Sample 1

- This will decrease the capital required for insurance risk
- If dealing with unregistered reinsurers, it may decrease credit risk
- Since both insurance risk and credit risk decrease, operational risk will decrease
- Capital available will stay the same unless the decrease is caused by a decrease in EPR

Sample 2

- Equity stays the same & capital available stays the same
- Required capital for catastrophe reduces (insurance risk)
- Operational capital reduces
- Diversification credit reduces, but less than insurance + operational

Sample 3

- Insurance risk down because cat margin down
- Market risk stable
- Credit risk stable (if no cession to unregistered)
- Capital available stable

Part c: 0.5 point

Sample:

- Surplus is reduced by PML (1 in 100 years)

Sample 2

- Surplus is reduced by the net PML after tax, adjusted for any catastrophe after first event.

Sample 3

- Property earthquake exposure increase causes PML and earthquake reserve increase. Surplus will decrease.

Part d: 1 point

Sample answers (maximum one answer from four of the following categories)

- Data quality and governance (one of the following)
    - Accurate property value and insurance to value, accurate property location and coding
    - Implement safeguards to prevent manipulation
    - On-site review to ensure data is up to date
    - Be comfortable and check integrity, validation & limits of data used
    - Improve the quality of data and get data audited
    - Invest in data quality
    - Invest in technology to improve data quality
- Risk management (one of the following)
    - Board should review earthquake policies
    - Oversight of risk management by senior management
    - Experience risk management leadership
    - Have sound Eq risk management program, subject to oversight by the board
    - Establish a clear risk appetite/risk Limit (limit exposures)
- Exposure monitoring (one of the following)

    - Monitor, measure exposure
    - Aggregate exposure monitoring
    - Monitor aggregate loss exposure
    - Monitor & limit geographic concentration
    - Use aggregate loss exposure as a secondary test of the model
- Models/modeling (one of the following)
    - Have in-house or purchase cat model
    - Parameter selection
    - Understand the assumptions used and methodology of EQ model
    - Run/use more than one model
    - Ensure knowledge of assumptions, methods, limitation, of models
- Have qualified staff running the model (internal or external)
- PML (one of the following)
    - Make sure you're comfortable with the PML (data quality, non-modeled exposures, model risk, multi-region)
    - Compare PML with previous estimate
    - Explain PML variations
- Financial resources and contingency plan (one of the following)
    - Ensure financial flexibility
    - Quality financial resources
    - Capital strength of parent company
- "What-if" testing

EXAMINER'S REPORT

Candidates were expected to be able to calculate the reserving PML as an interpolation between the PML 420 (East or West) and the PML 500 Countrywide. Then, using the reserving PML, they were required to calculate any margin required for catastrophes. Candidates were also expected to understand the impact of the earthquake reserve on the MCT and on the BCAR test.

Part a

Candidates were expected to be able to calculate the reserving PML as an interpolation between the PML 420 (East or West) and the PML 500 Countrywide. Then, using the reserving PML, they were required to calculate any margins required for catastrophes.

A common error included:

- Not removing the EPR as part of financial resources when calculating the ERC. This resulted in EPR being added to the Earthquake Reserve when it should not.

Part b

Candidates were expected to understand the impact of the earthquake reserve on the MCT.

A common error included:

- Indicating that the operational risk might or might not change and that the change would depend on whether the risk margin is limited by the 30% cap. This is an inaccurate statement as the cap depends on the sum of insurance risk, credit risk and market risk. If those three values collectively decrease, the cap will decrease. Therefore, if insurance risk decreases, operational risk will decrease, everything else being equal.

Part c

Candidates were expected to understand the impact of the earthquake reserve on the BCAR test.

A common error included:

- Not indicating that the surplus would decrease.

- Not able to quantify how the surplus would decrease.

Part d

Candidates were expected to identify four qualitative risk management practices that would improve the A.M. Best rating with respect to the catastrophe analysis.

Common errors included:

- Repeating the same argument using different wording
- Not providing four qualitative risk management practice