SOCIETY OF ACTUARIES
Advanced Portfolio Management

Exam APMV

AFTERNOON SESSION

Date: Friday, May 1, 2009
Time: 1:30 p.m. – 4:45 p.m.

INSTRUCTIONS TO CANDIDATES

General Instructions

1. This afternoon session consists of 10 questions numbered 11 through 20 for a total of 60 points. The points for each question are indicated at the beginning of the question. There are no questions that pertain to the Case Study in the afternoon session.
2. Failure to stop writing after time is called will result in the disqualification of your answers or further disciplinary action.
3. While every attempt is made to avoid defective questions, sometimes they do occur. If you believe a question is defective, the supervisor or proctor cannot give you any guidance beyond the instructions on the exam booklet.

Written-Answer Instructions

1. Write your candidate number at the top of each sheet. Your name must not appear.
2. Write on only one side of a sheet. Start each question on a fresh sheet. On each sheet, write the number of the question that you are answering. Do not answer more than one question on a single sheet.
3. The answer should be confined to the question as set.
4. When you are asked to calculate, show all your work including any applicable formulas.
5. When you finish, insert all your written-answer sheets into the Essay Answer Envelope. Be sure to hand in all your answer sheets since they cannot be accepted later. Seal the envelope and write your candidate number in the space provided on the outside of the envelope. Check the appropriate box to indicate morning or afternoon session for Exam APMV.
6. Be sure your written-answer envelope is signed because if it is not, your examination will not be graded.

Tournez le cahier d'examen pour la version française.

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Exam APMV-Front Cover

****BEGINNING OF EXAMINATION****
AFTERNOON SESSION

11. (*4 points*) Angel Life's local government is securitizing future parking meter cash flow. The mayor has asked Angel Life to consider purchasing this structured finance product (SFP). However, the CIO of Angel Life is concerned because her company is just recovering from losses in sub-prime securities investment.

(a) Explain the financial motivations for creating SFPs and the reasons behind the prior rapid growth of issuance of these securities.

(b) Critique the role of credit ratings in the valuation of SFPs.

(c) Describe the lessons from Angel Life's sub-prime experience that are relevant for them when considering investing in this SFP.

12. (*8 points*)

(a) Compare and contrast the motivations for Regulatory and Rating Agency Capital and a company's motivations to hold Economic Capital (EC).

(b) List different approaches to calculating EC.

(c) Describe the advantages and disadvantages of the different methods to allocate EC among various business segments and the corporate line.

Your company determines interest rate risk, mortality and lapse are the risks subject to EC. By using a simulation model, your company estimates the risk exposures as follows:

Interest rate risk	99^{th} percentile	80486
Mortality risk	99^{th} percentile	1997
Lapse risk	99^{th} percentile	1049
Interest rate risk	mean	75697
Interest rate risk	Actuarial liability on the balance sheet	78148

Your CRO has suggested using the sum of the 99^{th} percentile quantities of various risks as the estimation of total EC of the company.

(d) Evaluate the appropriateness of your CRO's suggested method of estimating total EC of the company.

The management of your company is interested in some details of the new financial product company (FPC) model of Standard & Poor's.

(e) Describe what risks are covered in FPC and what your company should do with risks that are not specifically included.

13. (*5 points*) Your Corporate Investment Policy gives you the following asset allocation:

Asset Class	Allocation
Corporate Bonds	50%
Mortgages	40%
Equities	10%

A student actuary has developed a rebalancing strategy. Assess the points she makes as shown below and make adjustments as necessary:

(a) The benefits of rebalancing include controlling drift in the overall level of risk and preventing over-exposure to assets that may have become overpriced.

(b) The rebalancing strategy should follow the approach of Percentage-of-Portfolio rebalancing, in which the portfolio is rebalanced when an asset class's weight first passes outside the corridor.

(c) The portfolio should be monitored at the middle of each quarter and rebalanced as necessary.

(d) The transaction costs for rebalancing are immaterial since no illiquid assets are involved.

(e) The tax costs are not important, since this rebalancing strategy involves buying appreciated assets and selling depreciated assets.

(f) The recommended corridors (tolerance bands) are to be set up based on the respective asset class' volatilities:

Asset Class	Corridor (tolerance band)
Corporate Bonds	45% - 55%
Mortgages	36% - 44%
Equities	8% - 12%

(g) Equities are considered more volatile than the other asset classes in the portfolio.

14. (*7 points*) You are exploring investing in a hedge fund, and in particular the fund Hedge-It-All. The information on Hedge-It-All performance is presented below:

Hedge-It-All	Annual Risk-free Rate	Annual Total Return	4-year Annualized Standard Deviation
Year 1	3%	11%	n/a
Year 2	4%	−10%	n/a
Year 3	2%	2%	n/a
Year 4	1%	10%	9.7%

(a) Describe the concerns when reviewing the performance of hedge fund indices.

(b) Describe the considerations and relevant measures when reviewing the performance of a particular hedge fund such as Hedge-It-All.

(c) Calculate

(i) Downside deviation

(ii) Maximum Drawdown

(iii) Sharpe Ratio

based on the most recent 4 years of experience of Hedge-It-All and starting net asset value of $100.

(d) Describe the investors and situations that will be the most appropriate to invest in Hedge-It-All given the results in (c).

(e) Describe the process of developing a hedge fund allocation and explain how the hedge fund allocation process is different from mean-variance analysis on a traditional standard portfolio.

15. (*6 points*) Your company has adopted a risk-adjusted return on capital (RAROC) measurement to analyze transactions. The following provides characteristics of a loan portfolio and details of your company's risk and investment parameters:

Loan Portfolio	1,000,000,000
Market Value of Loan Portfolio	970,000,000
Term of Loan	5 years
Risk Rating of Loan	3
Earned Rate on Loan Portfolio	6.8%
Crediting Rate on Deposits	4.0%
Interest Expense on Loan	0.1%
Operating Cost	1.5%
Expected Loss	1.0%

Earned Rate on Capital	6.0%
Hurdle Rate	15.0%
VAR (99^{th} percentile for 2 day event)	5,000,000
VAR Limit	12,000,000
F1 (VAR adjustment for exceptional shocks)	2.00
F2 (VAR adjustment for unused VAR)	0.15
F3 (VAR adjustment exceeding limits)	3.00
Operational VAR	1,000,000

Capital Factors for Credit Risk by rating and maturity

	Loan Tenor (Years to Maturity)		
Internal Ratings	4 years	5 years	6 years
3	1.74%	1.89%	2.03%
4	2.31%	2.47%	2.60%
5	8.03%	8.32%	8.50%

(a) Discuss the risk components used to develop RAROC capital and how RAROC capital is set.

(b) Calculate the RAROC Capital for this Loan Portfolio.

(c) Calculate the RAROC rate.

(d) Assess whether you would recommend investing in this portfolio.

16. (*6 points*) The ALM analysis of your company's single premium deferred annuity (SPDA) results in scenarios that nearly all meet or exceed the profit target. One ALM committee member concludes that this product line has very little risk.

(a) Assess the above conclusion in the context of total risk management.

(b) Describe and appraise scenario analysis that is based on parallel yield curve shifts.

(c) Describe the reasons why credit spreads may change and a strategy to hedge this risk.

The SPDA has an option that the fund value can be withdrawn before maturity based on certain events.

(d) Describe what can be done to mitigate this liquidity risk.

(e) Define a metric that could be used to show the risk of buying pools of mortgages to back SPDAs.

17. (*7 points*)

(a) Define synthetic Collateral Debt Obligations (CDOs).

(b) Describe the risk measures for CDO tranches.

(c) Describe the effect of correlation of defaults on the equity, mezzanine and senior tranches.

(d) Describe the risk management challenges in the dynamic hedging of single-tranche CDOs that are not present in traditional CDOs.

(e) Calculate the par spread for the mezzanine tranche, given the following data and assumptions:

Tranche	Attachment points (%)	Notional amount ($millions)
Equity	0-5	50
Mezzanine	5-15	100
Senior	15-100	850

Risk-free rate	5% annually
Maturity of reference portfolio	3 years
Payment frequency	Annual at year end
Expected losses on the mezzanine tranche up to the payment date k	
$k = 1$	\$3 million
$k = 2$	\$6.5 million
$k = 3$	\$10.5 million

18. (*6 points*) According to the American Academy of Actuaries report to the NAIC regarding the mapping of insurance risks to Federal Reserve Risk Categories, Asset/Liability Matching (ALM) risk falls into two Federal Reserve Risk Categories.

(a) Describe the elements of ALM risk embedded in each of these two Federal Reserve Risk categories.

(b) Describe the contribution to ALM risk from the following liabilities:

(i) Single premium endowment policies.
(ii) Universal life policies.

(c) Describe a method to mitigate the interest rate risk for an insurance company of the following:

(i) Single premium endowment policies.
(ii) Universal life policies with no surrender charges.
(iii) Mortgage backed securities.

19. (*6 points*)

(a) Compare and contrast growth and value styles of equity investing.

(b) Compare and contrast returns-based with holdings-based analysis of equity portfolios.

(c) Describe the limitations and considerations in returns-based and holdings-based analyses.

(d) Interpret the results of the analyses below to assess the investment style of an equity portfolio:

According to a holdings-based style analysis as of June 6/30/20XX:

	Portfolio	Market Benchmark
Number of stocks	30	750
Dividend yield	2.5%	2.1%
P/E	18	20
P/B	1.8	2
EPS growth (5-year projected)	15%	12%
Sectors		
Finance	15%	10%
Health Care	20%	20%
Information Technology	25%	30%
Materials	15%	10%
Telecommunication	10%	10%
Industrials	5%	5%
Utilities	10%	15%

According to a returns-based style analysis for 36 months ending 6/30/20XX.

Effective style	
large-cap growth style	20%
small-cap growth style	52%
mid-cap value style	15%
mid-cap growth style	13%
style fit (R^2)	97.8%
annualized active return	0.3%
annualized tracking risk	6%

20. (*5 points*)

(a) Analyze the advantages and disadvantages of various investment vehicles available for commodities.

(b) Describe the components of historical returns on commodities and economic drivers of those components.

(c) Describe the decisions that investors have to make to invest in commodities.

(d) Assume a closed block of long term care policies with a CPI rider.

(i) Evaluate the appropriateness of investing in commodities to support this block.

(ii) Recommend a method of investing in commodities to support this block.

****END OF EXAMINATION****
AFTERNOON SESSION