

****BEGINNING OF EXAMINATION****
FINANCE
MORNING SESSION

Questions 1-5 pertain to the Case Study.
Each question should be answered independently.

- 1.** (8 points) Mr. Newman has just given J. Peterman the unaudited line-of-business and consolidated financials of NADA for 2002 along with projections for 2003-2005. In addition, NADA has supplied Peterman with an extensive business plan detailing the growth potential and opportunity for each of its business units.

The business plan contains an emphasis on growing the GIC business. Mr. Newman plans to do this through the addition of Funding Agreements with 12-day put options. The Funding Agreements will be sold to institutional investors other than retirement plans.

Peterman is concerned about NADA's growing reliance on GIC sales. Peterman has questions about the profitability, liquidity, and investment risks of the GICs.

Mr. Newman has asked you to address the rating agency's concerns.

- (a) Explain why Peterman may have concerns about increased Funding Agreement sales and their effects on profitability, liquidity, and investment risk.
- (b) Peterman has recently adopted a view of interest rate risk similar to Moody's Investor Service. Summarize Moody's view of interest rate risk, and describe the impact that such views could have on Peterman's evaluation of NADA's current and planned GIC business.

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- 2.** (10 points) In preparation for the upcoming rating agency meeting with J. Peterman, Chief Actuary Kramer has been asked to look into improving the RBC ratio of the term life block. His preference is to change the asset mix backing the product.

Manzier Reinsurance has offered to coinsure 35% of NADA's term life block.

- (a) (1 point) Calculate the required capital for year-end 2003 for the term life block of business prior to any reinsurance. Show your work.
- (b) (2 points) Propose terms for the reinsurance transaction with Manzier that would optimize NADA's RBC ratio for the term life block of business.
- (c) (3 points) Calculate the required capital for year-end 2003 for the term life block if the reinsurance deal you proposed is consummated. Show your work.
- (d) (2 points) Calculate the impact of your proposed reinsurance arrangement on NADA's year-end 2003 RBC ratio. Assume no change to available surplus. Show your work.
- (e) (2 points) Predict Manzier's response to the terms of the reinsurance arrangement proposed in part (b).

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3. (12 points) NADA's business plan projects increased sales of GICs beginning in 2003. To achieve this plan, the Marketing Department has instituted a commission scale for GIC products sold in 2003, as follows:

- a commission payment of 1% of deposits for GICs with 5-year interest rate guarantees
- a commission payment of 0.2% of deposits for GICs with 1-year interest rate guarantees
- commissions are paid at the time of sale to the broker.

Von Nostrum has recommended that NADA start deferring acquisition costs with respect to its new business. Elaine Benes has put you in charge of creating a methodology to capitalize and amortize acquisition costs in accordance with U.S. GAAP.

You start by focusing on the GIC line. Assume the following:

- NADA's GICs are FAS 97 investment contracts.
 - All GICs are sold at the beginning of the year.
 - There are no withdrawals prior to maturity.
 - Interest earned is paid to the contract holder on December 31 of each year.
 - For assets backing the GIC business sold in 2003, NADA expects to earn an investment return of 4.295%.
 - Expenses are 5 basis points per year.
- (a) Describe the procedure for determining the capitalization of the acquisition expenses and the subsequent amortization of the DAC asset for the GIC line.
- (b) Calculate the DAC asset for new business planned to be written in 2003 for the GIC line. Show your work.
- (c) Calculate the amortization schedule for the DAC asset from part (b). Show your work.

3. Continued

- (d) Assume through 2004 that no assumptions have changed from 2003. Assume that on January 1, 2005, there are defaults within the investment portfolio which reduce future investment income to NADA by 0.20% per annum. Calculate the impact that this event will have on NADA's balance sheet and income statement for the GIC business originally written in 2003. Show your work.
- (e) Following your GIC analysis, you consider the implications of Von Nostrum's recommendation for NADA's other business lines.

Explain the likely reasons why Von Nostrum has recommended deferring acquisition costs, and describe the considerations impacting the capitalization and amortization of acquisition costs associated with each of NADA's business lines.

4. (3 points) Outline a report analyzing the strengths and weaknesses of NADA's corporate governance system.

5. (9 points) NADA is currently under review with negative implications by the J. Peterman rating agency.

- (a) Describe which current operations and corporate attributes of NADA help to maintain or improve its rating and which may hurt the rating.
- (b) Propose changes to its business strategy that NADA can implement to improve its rating. Include justification for your proposed changes.

6. (4 points) XYZ Company uses the expected policyholder deficit as the relevant risk measure for solvency analysis. XYZ's total assets are currently \$10,000 and have been invested to earn a guaranteed return of 5% over the next year. XYZ has two lines of business with perfectly correlated liability exposures. The total loss for the two lines combined at the end of the year is a random variable that is distributed as follows:

| x | $\Pr[X=x]$ |
|---------|------------|
| \$8,000 | 15% |
| 10,000 | 60 |
| 12,000 | 25 |

- Calculate the expected policyholder deficit ratio. Show your work.
- If the regulator requires that capital be held such that the expected policyholder deficit does not exceed 5% of expected losses, determine XYZ's current position relative to this requirement. Show your work.
- Describe how the owners of XYZ hold a position similar to a stock option.

7. (8 points) As the Product Innovator at In the Box Co., you developed an idea for a new product line and pitched it to your boss, Jack, who is the Vice President of Marketing. Thinking this concept is a good strategic fit and recognizing value based on features already traded in the market, Jack requests that you develop the idea further.

You use the traditional discounted cash flow (DCF) approach to analyze the idea. Unfortunately, you discover that this project produces a NPV of -50 using the DCF approach.

- Explain why Jack's initial assessment of the project does not seem to reconcile with the value calculated under the traditional DCF approach.
- Describe how you would enhance the DCF approach to consider the additional value that Jack sees.
- Indicate the complications presented by the approach you proposed in part (b).

- 8.** (6 points) As a financial consultant to Golden Parachute Company, you have been asked to make a recommendation to the Board of Directors regarding the funding of the company's defined benefit pension plan. The board is split between those that feel the plan is too heavily funded (and would like to take a plan reversion) and those that feel the funding status of the plan is not sufficient due to the level of equity exposure. A law has just been passed that will prevent companies from taking a pension plan reversion, but it does not become effective until the next plan year.

You have the following information available:

- Market value of plan assets = \$65,400,000
- Present value of liability by accounting standards = \$60,000,000
- Present value of liability by actuarial standards = \$63,000,000
- Assumed rate of return for plan valuation purposes = 8.5%
- Plan early retirement provision(s) = none
- Plan normal retirement age = 65
- Amount of liability by accounting standards attributed to employees age 60 or older = \$36,000,000
- Minimum required contribution for the plan year in question = \$0
- Maximum tax-deductible contribution for the plan year in question = \$1,000,000
- Asset Allocation:
 - 50% Stocks
 - 25% High yield bonds
 - 20% Municipal bonds
 - 5% Cash

Upon a participant's retirement, the plan liquidates assets to purchase a life annuity to cover the participant's future benefit payments.

- (a) Outline the advantages and disadvantages of overfunding a defined benefit pension plan.
- (b) Recommend the funding related action that Golden Parachute's Board of Directors should take. Support your recommendation.
- (c) Recommend whether any changes should be made to the asset allocation or assumptions utilized in the pension plan's annual valuation. Include support for your recommendation.

****END OF EXAMINATION****
MORNING SESSION

****BEGINNING OF EXAMINATION****
FINANCE
AFTERNOON SESSION
Beginning With Question 9

- 9.** (4 points) Martha, the CEO of a large life insurer, has contacted you, a consulting actuary, with concerns regarding fair value accounting.
- (a) Describe the differences between fair value and entity specific valuations.
 - (b) Explain the impact that a downgrade in the firm's credit standing would have under both valuation methodologies.
 - (c) Martha notes that the market value of many of the company's liabilities is not available. Describe a fair value accounting methodology that can be used for valuation purposes under these circumstances and the principles underlying this methodology.

10. (14 points) **“Hemlock Inc. poisons investors as it files Chapter 11 bankruptcy - \$2 billion of corporate bond defaults – stock is delisted.”**

That was the headline that three business people faced as they scanned the business section of the morning paper.

Dominic is a Portfolio Manager for the Parthenon Investment Grade Bond Fund, a fund that attracts investments from smaller insurance companies. Dominic had relied on private sector watchdogs when he purchased newly issued Hemlock Inc. debt for the fund just six months ago. At that time, and as recently as last week, various NRSROs had rated Hemlock BBB or its equivalent.

Isabel is the head of the Investment Committee for Mt. Olympus Insurance Company (MOIC), Parthenon’s largest investor. MOIC’s liabilities consist of 75% whole life insurance and 25% fixed deferred annuities. In addition to a significant investment in Parthenon, MOIC has additional Hemlock debt and a small stock position in Hemlock. As a result, MOIC had greater exposure to Hemlock than its peers. MOIC is currently rated B++ by A.M. Best. A review meeting with A.M. Best is scheduled for later in the week due to the arrival of a new CEO at MOIC and dwindling life insurance sales.

Nicholas, the Chief Actuary for MOIC, chairs the committee that meets with and responds to requests by the insurance rating agencies. He received a phone call this morning from the MOIC analyst at Standard & Poor’s, who asked for a meeting with the MOIC committee next week to discuss the impact of the Hemlock bankruptcy.

- (a) (6 points) Dominic had a voice mail from Isabel upon arrival at his desk. She demands to know how his fund could be holding such a large position in a company that has gone bankrupt.

Formulate a response to Isabel that includes the following:

- (i) Explain what a rating issued by an NRSRO means.
 - (ii) Explain how an NRSRO collects and uses information to arrive at a rating.
 - (iii) Describe the shortcomings of NRSROs that could explain how Hemlock was rated investment grade at the time of its default.
 - (iv) Describe attempts by NRSROs to mitigate these shortcomings.
- (b) (4 points) Nicholas grills Isabel on her conversation with Dominic before racing upstairs to brief the new CEO on the upcoming meeting with A.M. Best.
- (i) Explain how A.M. Best arrives at a company rating.
 - (ii) Suggest steps that MOIC can take to manage the ratings process with A.M. Best.

10. Continued

- (iii) Predict the action that A.M. Best will take with respect to MOIC's rating and the basis for that action.
 - (iv) Predict possible ramifications of A.M. Best's action.
- (c) (4 points) The new CEO's bonus is partially dependent on maintaining or improving MOIC's ratings and partially dependent on revamping MOIC's dwindling life insurance sales, which are down 30% from three years ago. Focusing on the upcoming Standard & Poor's meeting, he asks Nicholas to determine the impact of recent events.

You are given the following tables of information regarding MOIC, updated to reflect the Hemlock event.

| ASSET | % OF PORTFOLIO |
|--------------------------------------|-----------------------|
| Cash | 5% |
| U.S. government securities | 15% |
| NAIC 1 – public corporate bonds | 25% |
| NAIC 2 non-144(a) private placements | 30% |
| Non-investment grade bonds | 5% |
| Common stock | 20% |

| YEAR | ANNUAL EARNINGS ADEQUACY RATIO |
|-------------|---------------------------------------|
| 2002 | 170% |
| 2001 | 190% |
| 2000 | 185% |
| 1999 | 200% |
| 1998 | 225% |

- (i) Describe the impact of the Hemlock event on MOIC under the Standard & Poor's Capital Adequacy model.
- (ii) Describe how Standard & Poor's would view MOIC's liquidity.
- (iii) Calculate the current weighted average Earnings Adequacy Ratio and comment on the prospects for 2003's Earnings Adequacy Ratio. Show your work.

- 11.** (8 points) You are the pricing actuary for a multi-national reinsurance company, ABC Re. WXY Life has approached you regarding a transaction that would efficiently utilize WXY Life's expiring tax loss carry forwards (TLCF).

Note the following:

- WXY Life is rated BBB- by a well known credit rating agency.
- None of WXY Life's existing business is currently reinsured.
- Local regulations prohibit WXY Life from taking a reserve credit for reinsurance.
- ABC Re does not currently have a relationship with WXY Life.

Below is WXY Life's projected statutory income:

| WXY Life's Projected Statutory Income | | |
|--|---------------------------------|----------------------|
| Year | Pre-tax Statutory Income | Expiring TLCF |
| 2003 | -2 | 10 |
| 2004 | 2 | |
| 2005 | 4 | |
| 2006 | 5 | |
| 2007 | 6 | |
| 2008 | 8 | |
| 2009 | 8 | |
| 2010 | 8 | |
| 2011 | 8 | |
| 2012 | 8 | |

You have decided to propose a modified coinsurance structure effective December 31, 2003 with the following features:

- Retention equals 25% of all existing business.
- The risk charge equals 4% of beginning of year Outstanding Surplus Account (OSA).
- The modified coinsurance interest rate equals LIBOR + 3%.
- WXY Life can recapture the block of business once the OSA balance reaches zero.
- The initial reinsurance allowance will efficiently use the expiring TLCF.

- (a) (5 points) Assume all reinsurance accounts are settled at the end of each calendar year and LIBOR equals 4% throughout the projection period. Based on the above projection, determine when WXY Life can recapture the block of business. Show your work.

11. Continued

- (b) (2 points) Comment on the appropriateness of the level of the risk charge being offered by ABC Re.
- (c) (1 point) Identify the conditions that should be included in this financial reinsurance treaty in order to gain state regulator acceptance.

12. (5 points) Spencer Life is a medium-sized life insurance corporation with approximately \$100 million in assets under management. The Chief Investment Officer has asked you to evaluate a tax-structured deal offered by an investment broker. The following details have been provided:

- Proceeds of the investment are given to the Federal Housing Corporation, a government-sponsored corporation that builds and rents low-income housing.
- The investment pays a quarterly coupon of LIBOR + 100 basis points.
- 50% of the interest income from the investment is deductible for federal tax purposes.
- Alternative investments that are fully taxable and have similar credit risk currently yield 125 basis points over LIBOR.
- The minimum investment is \$1 million.
- Current LIBOR is 1.50%.
- The Federal Tax Rate is 35%.

If Spencer decides to participate in the investment, an interest rate swap will be used to improve the match between the cashflows from the investment and the corporation's fixed-rate liabilities.

- (a) Analyze the potential benefits and costs of participating in the tax-structured deal.
- (b) Recommend how to use the FAS133 hedge accounting rules to minimize net income volatility.
- (c) Describe the impact on the financial statement and the documentation requirements under your recommended approach in part (b).

13. (17 points) Nougat Inc. is a small regional producer of chocolate confectionaries. The founder and CEO of the company recently retired and placed the company up for sale. Butterscotch Inc., Caramel Inc., and Fudge Inc. are all confectionary companies that plan to make bids for Nougat.

- Butterscotch has been a national manufacturer of a variety of candy bars for over 100 years. Butterscotch is 100% owned by a private trust.
- Caramel is a mature multi-national conglomerate that has been in some aspect of the confectionary business for over 300 years. Over the past decade management has been pursuing growth through a small number of strategic acquisitions.
- Fudge was started five years ago after Fudge’s founder cashed out of his internet company and was inspired after reading about a young boy’s trip to a chocolate factory. The financial press has called Fudge “innovating – not imitating – a hip company that is taking a shot at bringing growth back to the chocolate business’ bottom line and waist-line”.

Assume the following:

- All physical assets are owned by corporations.
- Capital markets are frictionless. There are no corporate or personal income taxes, securities can be purchased or sold costlessly and instantaneously, and there are no bankruptcy costs.
- Corporations can issue only two types of securities, risky equity and risk-free debt.
- Both individuals and corporations can borrow or lend at the risk-free interest rate.
- Investors have homogeneous expectations about the future stream of corporate profits.
- There is no growth, so all cash flow streams are perpetuities.
- All corporations can be classified into one of several “equivalent return classes” such that the returns on shares of all firms in that class are proportional to, and perfectly correlated with, all other firms of that class.

You are provided with the following information:

| | Nougat | Butterscotch | Caramel | Fudge |
|--|---------------|---------------------|-------------------------|--------------------|
| Expected return | 10% | 10% | 10% | 10% |
| Expected operating profits | 100,000 | 200,000 | 200,000 | 200,000 |
| Debt outstanding @ 5% interest | 0 | 0 | 1,000,000 | 100,000 |
| Shares of Stock | 50,000 | 40,000 | 20,000 | 38,000 |
| Financing plans for acquisition of Nougat | N/A | 100% equity | 50% debt, 50% equity | Not yet determined |

13. Continued

- (a) (3 points) Demonstrate whether Butterscotch's shareholders or Caramel's shareholders will benefit more from the purchase of Nougat. Show your work.
- (b) (3 points) Adjust the second assumption to assume a corporate tax rate of 25%. Under this assumption demonstrate whether Butterscotch's shareholders or Caramel's shareholders will benefit more from the purchase of Nougat. Show your work.
- (c) (3 points) Explain the reasoning behind the results of (a) and (b).
- (d) (4 points) Fudge has just finished a promotional agreement with a songwriter. They believe that it will increase their market share with young consumers. This has not yet been announced to the public.

Determine how Fudge should fund the acquisition under:

- (i) The pecking order hypothesis
 - (ii) The signaling theory
- (e) (2 points) Describe the issues that Fudge might face if it tries to issue only long term debt to fund the acquisition of Nougat.
 - (f) (2 points) Describe the empirical evidence that could explain Caramel's and Fudge's current capital structures.

- 14.** (9 points) You have been asked to evaluate the performance of the managing directors of your bank's three trading units. You are given the following data from the trading operations:

Target RAROC = 30%

| | Fixed Income Trading (FI) | Equity Trading (EQ) | Money Market Trading (MM) |
|-------------------------|----------------------------------|----------------------------|----------------------------------|
| Trading Earnings | 100 | 70 | 30 |
| Utilized CaR | 300 | 250 | 100 |
| Allocated CaR | 500 | 300 | 100 |

Correlation Matrix Between Trading Unit Returns:

| | FI | EQ | MM |
|-----------|-----------|-----------|-----------|
| FI | 1.0 | -0.2 | 0.3 |
| EQ | -0.2 | 1.0 | -0.1 |
| MM | 0.3 | -0.1 | 1.0 |

- (a) (2 points) Assess the risk-adjusted performance of the bank and each trading unit assuming perfect correlation among the units. Show your work.
- (b) (5 points) Assess the risk-adjusted performance of the bank and each trading unit incorporating imperfect correlation effects. Use an appropriate method to allocate diversification benefits. Show your work.
- (c) (2 points) Evaluate which risk-adjusted measure is best for this purpose.

- 15.** (3 points) The CEO of a small public company has asked you to sit on his board. At the first meeting you learn that the company offers a “savings plan” to its employees. Employees contribute after-tax money to this “savings plan”.

Individual employee account balances are tracked, but all money in the fund is credited with the same interest rate. The rate credited to the plan is the return on the assets, less the actual expenses incurred. Each January 15 the company declares the credited rate for the prior year. Employees who terminate receive a lump sum equal to their full account balance within 30 days of termination. For those employees, interest is applied at the prior year’s crediting rate from January 1 to the termination date.

You point out that the plan is taking interest rate risk, and, since the plan is not a separate entity, the company is assuming the risk. You suggest hedging this risk.

The CEO replies, “Hedging is too expensive! I want to make sure the employees get the highest return possible, and the costs would eat into their returns. Besides, any public company that spends its money to hedge anything is stealing from its shareholders. Business is about risk!”

- (a) Using the principles of qualitative asset transformation, explain why the savings plan is a financial intermediary.
- (b) From the shareholders’ point of view, describe the factors the company should consider in evaluating whether or not to hedge.

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