Guidance for Candidates in Responding to Written Answer Questions

- Beginning with the 2003 exam, illustrative solutions are real model solutions, as opposed to an edited best paper. They are intended to show all the main points of a complete answer and the type of details the graders are looking for. Please note that these model solutions may be more complete than what would be expected under exam conditions.

- Answer the question that's asked, don't just do a brain dump on the topic; often when you do, the requested answer doesn't get included. You will not receive points for providing extraneous information that does not answer the question.

- You are expected to be able to apply the material contained in the course of reading. On the exam, you may need to apply the material from a reading to the case study or to another reading. Additionally, you should be able to do relevant calculations even if there are not sample calculations in the material.

- Where you are asked to make a recommendation and justify it, do so. Don't just list advantages and disadvantages of the possible alternatives. Choose one of the positions and support your selection. Please note that sometimes more than one answer can be correct. In those cases we are testing your ability to apply your knowledge to reach a reasonable conclusion.

- Sometimes there may be alternative approaches to answering a question. In these cases credit is given for any approach that is appropriate.

- There is a guideline to allow 3 minutes per question point. For higher order questions this time includes time to read the question and formulate an answer as well as time to write the answer. However, this also means that a one-sentence answer is not a complete answer to a question worth several points.

- The verbs in the questions are chosen for a reason. For example, "list" can be answered with a bulleted list. "Describe" looks for some details about the items. "Explain" expects some discussion of how or why. "Analyze" asks for a more in-depth analysis of the information.

Solution 1

The candidate should be able to describe how risks and opportunities interact and how they influence firm strategy. The candidate should understand economic and regulatory capital requirements and describe how they effect decisions. The candidate should be able to identify and categorize potential sources of risk.

(a) NADA should be concerned about its liquidity profile as it enters this business. While liquidity is o k. today with current GICs, it will need additional liquidity for Funding Agreements. NADA's rating already being under review, and the sensitivity of this business to ratings, with decreased sales and/or puts following a decreased rating, increases the level of risk.

In the event of real or perceived problems, there might be a run on the bank scenario. This can spiral, as liquidity concerns lead to surrenders, creating further liquidity concerns. The risk to NADA is based on the length of the put period, and 12 days is short. A similar set of events, initiated by a ratings downgrade occurred at General American.

NADA might have to revise their investment guidelines to include more public bonds and shorter duration assets. Achieving profitability will be difficult recognizing the tradeoff between risk and return in selecting assets to back the funding agreements. Assuming that the margin on the existing GIC line could be continued, 36 basis points on the 250 million of incremental sales would contribute 900,000 of additional after-tax income to NADA.

(b) Moody's believes companies are encouraged to take on greater duration and convexity risk in search of yield without associated penalties. In particular there is concern with the upward sloping yield curve and the deliberate bet to go long. They consider interest rate risk as the most important risk facing insurers today, and the static formulas used to determine RBC don't fully address the risks. The use of options has lessened the effectiveness in evaluating risks of different insurance products.

Companies should perform minimum performance stochastic pricing scenario testing to understand the downside risk of embedded options within their liabilities. Companies with sizable asset liability duration mismatches and those with excessive product optionality will most likely be negatively impacted by changes to the RBC formula.

Solution 1 (continued)

The new RBC model reflects a company specific risk level, addresses the convexity risk, and gives credit for any reserve strengthening. This will impact NADA's investment profile for puttable business as the associated risks will be recognized within the new RBC framework.

In testing there is a focus on stress scenarios and tails of distributions with surplus accumulations being provided for each scenario. Providing this level of detail will result in greater transparency. Any red flags that emerge in testing can be followed up upon.

Typically there would be testing of the closed block, then an incremental analysis of the additional risk due to options in the new block.

A stochastic analysis of exposure to interest rate risk will need to be supplemented by an analysis of the liquidity risk. Looking at NADA's balance sheet for GIC business, investment in Privates, commercial mortgages and real estate would not be appropriate for puttable business

Companies will need to invest in their ALM capabilities. In particular, Peterman is likely to ask that NADA strengthen its ALM. Otherwise NADA may need to hold additional capital to cover the risk.

Solution 2

The student is asked to calculate required capital for a line of business and the Risk Based Capital (RBC) ratio for the company both before and after reinsurance. In proposing a reinsurance structure to maximize the RBC ratio, the student should realize that it is desirable to get rid of assets with the highest RBC factors. While this is theoretically possible, it is unlikely that the reinsurer would agree to take all the illiquid/risky assets without additional compensation.

(a) Required Capital = square root of $\left\{C\text{-}2^2 + [C-1+C-3]^2\right\}$

Required Capital for term life 384.44

(b) Need to transfer 35% of assets since reserves equal assets
Initial reinsurance premium is equal to reserve
Maximize upfront reinsurance allowance
Minimize renewal reinsurance allowance

Use biggest RBC factor assets (riskiest assets):

Real estate
Non-inv grade private placements
Non-inv grade public
Commercial mortgages

Solution 2 (continued)

(c)

	Original 2003	New 2003
Inforce Volume	48,362	31,436
Opening Reserve	267.14	173.64
Closing Reserve	314.36	204.33
Assets		
Private Bonds		
Investment Grade	47.15	47.15
Below investment grade	18.86	0.00
subtotal	66.01	47.15
Public Bonds		
Investment grade	125.74	125.74
Below investment grade	31.44	0.00
CMO (investment grade)	28.29	28.29
subtotal	185.47	154.03
Commercial Mortgages		
Investment grade	47.15	3.14
Non-investment grade	0.00	0.00
subtotal	47.15	3.14
Equities	0.00	0.00
Real Estate	15.72	0.00
Cash and Short Term	0.00	0.00
Premiums Due and Unpaid	0.00	0.00

Solution 2 (continued)

Deferred Acquisition costs	0.00	0.00	
Assets held in separate account	0.00	0.00	
Other Assets	0.00	0.00	
Total Assets	314.36	204.33	Calculate

Required capital for Term with reinsurance

	Old	New
C-1 Risk	6.75	0.87
C-2 Risk	384.38	249.85
C-3 Risk	1.57	1.02

C-1 Risk	Base	Investment grade	Non-Investment grade	New Calculation
% of asset value				
Private Bonds		1.0%	7.5%	0.47
Public Bonds		0.2%	5.0%	0.25
CMO		0.2%	5.0%	0.06
Commercial Mortgages		3.0%	6.0%	0.09
Stock-equities	30.0%			
-affiliates	% owned x affiliate's RBC			
Real Estate	10.0%			
Cash and Short Term	0.3%			
Other assets	0.0%			
	Total C1			0.87

Solution 2 (continued)

C-2 Risk

Life Insurance	0.8%	% of net amount at risk	249.85
Long Term Disability	25.0%	% of premiums	0
Long Term Disability	5.0%	% of reserves	0

C-3 Risk

Life Insurance	0.50%	% of reserves	1.02
GICs-all maturities	1.25%	% of reserves	0

New Required Capital 249.86

(d)

Impact on NADA's RBC Ratio

Term RBC	Old	New	Difference
C-1 Risk	6.75	0.87	-5.88
C-2 Risk	384.38	249.85	-134.53
C-3 Risk	1.57	1.02	-0.55
Total RBC			
C-1 Risk	270.8	264.9	apply diff above to total
C-2 Risk	530.8	396.3	
C-3 Risk	49.5	48.9	
Required Capital	620.0	505.5	
Available Capital	1,594.7	1,594.7	
RBC Ratio	257.2%	315.4%	

Solution 2 (continued)

(e)

Manzier's response to the offer:

Probably not interested in only the illiquid assets
Probably not interested in only the risky assets
Might want a pro-rata slice of assets
Could negotiate allowances or other elements to make it more fair
C-1 has a very small impact on the RBC ratio

Solution 3

This question covers corporate finance and strategy with a focus on accounting related to corporate strategies and structures and covers Financial Risk Management and the various measures that can be used. The question is best answered from the perspective of defining what deferred acquisition costs are and specifically how they apply to the GIC products with the resulting amortization schedule. In calculating the amortization, it is best to determine the present value of Estimated Gross Profits via the liability crediting rate to determine the "k-factor".

(a)

- Determine expenses that qualify for deferral. Here all commissions paid would qualify since all commissions are paid at time 0. Expenses are a level percentage per year and not associated with the acquisition, so they cannot be deferred.
- Will amortize over the life of the business.
- The "k" factor will equal PV of deferrals (commission as issue) over the PV of the estimated gross profits (EGP) over the time period.
- The k-factor will be applied to the projected estimated gross profits (EGPs) as they emerge. The model will be trued-up over time as actual profits replace the projected EGPs.
- The "k"-factor can be revised each accounting period.
- Discounting rate for the present value is the assumed credited rated on the liabilities.

(b) & (c)

- DAC = commissions = (5 Yr Business x Commission Rate + 1 Yr Business x Commission Rate) x deposits
  Commissions = [(0.74 x 0.01) + (0.26 x 0.0020)] x 600 = $4.752 MM
- Average credited rate = (5 Yr Business percent of total x 5 Yr crediting rate) + (1 Yr business percent of total x 1 Yr crediting rate) = (0.74 x 0.04) + (0.26 x 0.0225) = 3.545%
- Interest crediting:
  5 Year = 600 x 0.74 x 0.04 = 17.76
  1 Year = 600 x 0.26 x 0.0225 = 3.51
  21.27
- Earned Investment Income = 600 x 0.04295 = 25.770
- Expenses = 600 x 0.0005 = $0.30
- EGP = Inv Income Earned – Inv Income Credited – Expenses = 25.77 – 21.27 – 0.30 = $4.20

Solution 3 (continued)

- PV of EGP at 3.545% for 5 years = 18.939
- K = DAC / PV EGP = 4.752 / 18.939 = 25.091%
- DAC Amortization = k x PV EGP
- $DAC_{t+1} = DAC_t \times (1+i) - k \times PV\ EGP$
- DAC Schedule

Year	*DAC Balance*
Beginning of 2003	4.752
Beginning of 2004	3.866
Beginning of 2005	2.950
Beginning of 2006	2.001
Beginning of 2007	1.078
Beginning of 2008	0.000

(d)

- Beginning DAC Asset in 2005 = 2.95
- Adjusted earned income rate = 4.295% - 0.200% = 4.095%
- Revised Investment Income = 4.095% x 600 = 24.570
- Revised EGP = 24.570 – 21.270 – 0.300 = 3.000
- Revised PV(EGP) {2 Yrs at 4.20 and 3 yrs at 3.00} = 15.806
- Revised k factor = 4.752 / 15.806 = 30.064%
- Revised DAC Balance by year

2005	$2.950
2006	$1.172
2007	$0.871

Solution 3 (continued)

(e)

- Writing new business requires a lot of capital investment upfront which is hurting NADA's profits (surplus strain). Deferring acquisition costs will reduce surplus strain and help NADA's capital position.
- Term business uses SFAS 60
  - Assumptions are best estimates with PADs and assumptions not changed (locked in)
  - If recoverability issue exists, then DAC is written down
  - Need to amortize DAC over expected life of business or over a period long enough to get vast majority of profits.
- GIC and Variable Life uses SFAS 97 which uses EGPs
  - If recoverability issue exists DAC is written down
  - Assumptions are best estimate with no PADs
  - Assumptions are unlocked if future assumptions change

Solution 4

The candidate should be able to recommend specific corporate governance practices and objectives and justify his recommendations

General approach: The candidate needs to utilize the definition of corporate governance, and it helps to be very familiar with the case study as some of this information is spread amongst different sections of the case study.

Strengths:

NADA's management is compensated for exceeding targets, therefore management and shareholders' interests are aligned.
The board members have a strong finance background, many have CEO/CFO experience and are able to provide high level counsel.
There is no free-rider problem, as institutional investors (including Del Boca Vista Bank of Italy) own 85% of the stock.
Senior officers own 5% of the stock giving them a strong incentive for good performance.
The board is comprised of independent members, and the CEO is the only insider on the board.

Weaknesses:

The CEO chairs the board. This is problematic since the chair determines the agenda and information give to the board.
The CEO is not independent, and shouldn't oversee his/her own compensation.
The board is too large, a more optimal size would be a maximum of 8.
A longer term served by the board members would give more incentive to fix problems.
NADA does not have a transparent financial structure or transparent ownership
The board has been very reactive rather than proactive:
Due to a concern over negative publicity, they have hired a public relations firm.
The board has acted late on the ratings downgrade, allowing it to become a crisis.

Solution 5

The candidate should be able to describe how risks and opportunities interact and how they influence firm strategy.

The solution for part A was designed to list those attributes and operations in two groups; those that could hurt their current rating, and those that would help. Part B was designed to have the candidate list improvements that NADA could make by product line either currently or in the future.

(a) Maintain or improve rating:

- NADA has good balance sheet strength
- NADA has a high quantity of investment grade assets
- Underwriting Leverage
- Current premium distribution of NADA
- Current reinsurance agreements
- Current reserve adequacy
- NADA keeps repricing the term line to stay competitive
- NADA wants to decrease reinsurance by increasing the retention limit
- Financial Leverage
- Debt or financial reinsurance
- Asset Leverage
- Very little intangible assets
- Stable income from GIC issues
- GIC's are priced to be competitive
- Business Profile
  - NADA has a good mix of business
  - They have a competitive market position
- Management has depth and experience, it is a mix of old and new
- NADA is taking steps to improve profitability by eliminating sales of unprofitable group LTD
- Trying to introduce a deferred annuity line
- Intercompany relationships with Festivus, Kramerica Bank, and Del Boca Vista Bank
- Holding company provides financial flexibility, can use capital infusions, has access to capital markets and additional cash flow
- Most of senior management has worked together for a couple of years
- Asset liquidity is OK

Solution 5 (continued)

Hurt rating:

- NADA has poor / no ALM
- Possible reinsurance problems with LTD
- May have possible cash flow strain
- Exposure to investment, interest rate, and credit risks
- NADA does not have strong operating performance
- The liabilities have long tails, this increases uncertainty and risk
- NADA needs to have stability and sustainablility of earnings, term and LTD are not stable
- Pending lawsuit could put pressure on rating
- The short tenure of the CEO may be of concern
- Liabilities may be more liquid than NADA realizes

(b)

Term Life

- Don't try to be in the top 10, currently they are to aggressive.
- High replacements because brokers have no loyalty to NADA
- Try to improve lapse experience, try and obtain a relationship with another distribution channel, or try changing the customer
- Increase the reinsurance retention level
- Keep an eye on RBC strain, especially while under ratings watch

GIC's

- Increase the sales of GIC's
- Add a new distribution channel to increase company loyalty
- GIC's suffer from broker based distribution, the brokers are not loyal to the company
- With pension plans ratings are very important, NADA currently is on the lower edge, by increasing the rating NADA could lower the credited rates and increase the spread

Variable Life

- Variable life has little risk associated with it since most is passed on to the customer
- Increasing variable life sales may increase available capital
- Check that guarantees are not too high when compared to NADA's investment earnings
- Verify the circumstances of the class action lawsuit to ensure no additional risk

Solution 5 (continued)

Deferred Annuity

- Deferred annuities are similar to GIC's with longer term guarantees
- Sales of deferred annuities will provide another option besides GIC's to the pension market
- NADA needs to take care in its crediting strategy

Career Agency Field Force

- Creation of a career agency field force would create more loyalty and increase persistency
- This would allow for different types of compensation structures

Group LTD

- Need to make the LTD line more profitable
- Ratings are important to future sales and profitability
- Work with reinsurers to improve profitability and smooth earnings
- Increase the elimination period of higher income individuals to reduce antiselection
- Analyze contracts individually and eliminate the poor policies

Assets

- Improve the mix of assets in NADA's portfolio
- Improve the quality of the assets in NADA's portfolio
- Reduce NADA's intangible assets

Management

- Implement some form of Asset Liability Management
- Coach management in making presentations to rating agencies
- Appoint a liaison to work with the rating agency to improve the rating, create a policy of sharing information with them on a regular basis and when important changes occur
- Change appointment period of board member to be greater than one year
- Use available capital from Del Boca Vista for possible acquisitions

Solution 6

This is the case of risky assets and certain liabilities.
The first two parts of the question required the candidate to apply techniques outlined in study note 8F-100-00. The candidate had to know to apply the case of risky assets and certain liabilities. Most candidates did well on the first two parts of this problem. The third part of this question required candidates to be familiar with the option pricing model as described in study note 8F-207-01, and apply it to the situation when liability risk elements are paired with riskless assets. Many candidates had trouble with this part of the problem, often getting a put mixed up with a call.

(a) Certain asset amount at end of year $= 10,000 \times 1.005 = 10,500$

$$\text{EPD} = \sum_{x710500} (x - 10,500)\Pr[X = x] = (12,000 - 10,500) \times .25 = 375$$

EPD Loss =

$$\sum_{all\ x} \times \Pr[X = x] = (800 \times .15) + (10,000 \times .60) + (12,000 \times .25) = 10,200$$

$$\text{EPD ratio} = \frac{\text{EPD}}{\text{Expected Loss}} = \frac{375}{10,200} = .036765$$

(b) Solve for asset value that corresponds to EPD ratio of .05

$$\text{EPD ratio} = \frac{\text{EPD}}{\text{Expected Loss}} = .05$$

Since expected loss = 10,200, EPD $= 10,200 \times .05 = 510$

Let A=year-end asset value, then solve for A in

$$510 = \text{EPD} = \sum_{x>A} (x\text{-A})\Pr[X - x]$$

with A=9988.235, EPD

$$= (10,000 - 9988.235) \times .6 + (12,000 - 9988.235) \times .25 = 510$$

A=9988.235 is year-end value, discount to find asset value today

$$\frac{9988.235}{1.05} = 9512.60$$

The company's assets exceed 5% EPD requirement by $487.40

Solution 6 (continued)

(c)

Stock	Insurance
Current Stock Price	Current liability value
Stock price in one year	Liability value in one year
Exercise price	Asset value in one year
Present value of exercise price	Current Asset value
Excess of exercise price over current stock price	Current capital value
Option value when exercised	Policyholder deficit

- Liabilities may exceed insurer's assets, so policyholders have given the insurer's owners the option to abandon full payment of claims
- Owners hold a call option
- Situation occurs because liability risk elements paired with riskless assets.

Solution 7

The question was written to test each candidate's ability to integrate the concepts from three readings covering capital budgeting.

- Chew's Financial Theory & Financial Strategy (II6)
- Trigeorgis's Conceptual Framework for Capital Budgeting
- SN8F-313 Disciplined Decisions

Specifically, this question is testing the strengths and limitations of the Real Option approach compared to the traditional DCF approach.

(a)

1. Unlike the Traditional Discounted Cashflow approach (DCF) Jack recognized the value of real options present in the project:
   - Real options allow management strategic operating flexibility rather than passive management
   - Real options examples:
     - Timing (defer) option – additional information before proceeding. Could use stages
     - Growth Options – Expand to alternate production or allow excessive production
     - Other Options include – exit, flexibility and learning options.
   - Real options create an asymmetric distribution for the profit payoff: greater upside potential with less downside risk.
   - Jack's assessment may also reflect a competitive advantage or market opportunity (strategic fit).

2. Other limitations and model errors of applying DCF
   - Incorrect choice of operational cost of capital (discount rate)
     - inconsistent inflation treatment
   - Difficult of risk estimation and modeling
     - risk may decrease over time (undervaluing long term projects)
   - Poor or biased estimates of cashflows
   - Terminal value often questionable and a large percentage of total
   - Difficulty forecasting long range macro-economic variables

Solution 7 (continued)

(b) Extend the theory to include the value of real options using financial option theory

Expanded (strategic) NPV = Direct (passive) NDV + option premium where the option premium is quantified using option based approaches:

- Include all relevant market information
  - find a twin security with same risk return features
  - use market information for option "trigger points"
- If close to market Black-Scholes can be used
- If not a customized mathematics model
  - Decision Tree analysis

Alternate equations: ENPV=Static NPV+Strategic Value+Flexiblity Value-Competition

Capture all options including compound options

Reflect the competition interaction if non-exclusive

- proprietary vs shared investment
- contrarian vs reciprocating

(c) Implementation difficulties:

- Real options are more complex and last longer than traded options especially complex beyond real option frontier
  - Model risk-inadequate fincial information to get model mathematics correct
  - Distance from market
    - imperfect proxy: perfect twin security may not exist
    - lack of observable prices
  - Lack of Liquidity
  - Private Risks of Company need reflected
  - Complexity: Decision Tree Analysis may have unmanageable number of modes and is discrete
  - Non tradable: could abandon for salvage value
  - Compound options creates more complexity
    - across time (strategic) interdependency
    - intraproject-multiple stages in project
    - inter project "compoundness"

Solution 7 (continued)

- Also competition needs considered. Equillibria will affect option
  - exogenous competition-complex optimization
  - Nash (price or quantity) equilibrium
    - firms reqct optimally to each other
- Stackelberg leadership Leader/following game
- Preemption strategy might limit deferral option

Solution 8

This question was drawn from chapter nine of Taxes and Business Strategy: A Planning Approach by Scholes, et al. The intent of the problem was to focus on tax strategy concerns for a typical concern of a large corporation; specifically, a defined benefit pension plan. The question asked the candidates to identify basic tax strategy concerns for the pension plan's trust in (a), state and support a funding recommendation for the trust in (b), and discuss whether or not changes are necessary for the investment distribution or the current valuation assumptions of the pension plan in (c). In general, most candidates tended to fall a little short in (a) and listed only a few important considerations. While several answers are possible for (b), some are more optimal than others and credit was only given for one option. Most candidates did reasonably well on part (b) with the occasional problem of inadequate support for their recommendations. Most candidates also did well on (c) with the most common shortcoming being failure to note that municipal bonds (generally being a tax-free asset) are not typically appropriate for a tax deferred trust (as is used to fund a pension plan).

(a)

Expectations of changing tax rates

- If marginal tax rates are expected to fall, overfunding should be pursued as it allows the company to effectively pre-fund the plan on a tax-advantaged basis. This is reversed if the marginal tax rate is expected to rise.
- The tax status of the company can also change the net effect of a reversion.

Investing in Stocks, Overfunding, and Flexibility

- Holding stocks reduces the tax advantage of the pension plan.
- Investing in stocks generally helps to justify a higher assumed rate of return.
- A higher rate of return assumption will produce a lower PV of Liabilities, which supports the company's overfunding of a pension plan.
- The actuary may select a lower assumed rate of return as a cushion for potentially adverse changes in the marketplace. This lower rate would increase the PV of Liabilities and limit company's ability to overfund the pension plan.

Investment Alternatives with Overfunded Assets

- The risk-adjusted rate of return on pension fund assets will usually exceed the rate of return on marginal investments undertaken in the corporate account.
- The company "owns" the plan's excess assets so, the best strategy is to hold explicitly taxed assets of high-expected return.
- To avoid a $0 maximum tax-deductible contribution, the company should emphasize bonds in the asset mix of the pension plan.

Solution 8 (continued)

Possibility of an Excise Tax

- If a company reverts excess pension plan assets to direct ownership of the company, it must pay a hefty excise tax to offset the additional risk born by government agencies that insure such plans.
- The company may also regain the value of excess assets over time by reducing future funding levels (which will, of course, increase the risk of future uncertainty) or by increasing promised plan benefits in lieu of salary or other benefit increases.

Incentive to underfund because pension represents a put option

- Value of the put option varies with increases in the variance of the returns of the pension plan's assets; thus, favoring stocks and limiting the assets "locked up" in the plan (i.e. outside of direct company access).

(b) Option 1: The optimal funding-related action that should be recommended is for Golden Parachutes to contribute the maximum tax-deductible contribution this year.

This recommendation is based on the following observations:

- The Market Value of Plan Assets exceeds the Present Value of Actuarial Liability by less than 5% when, half of said assets are in stocks (a generally volatile asset) and another quarter of said assets are in bonds with high default risk.
- 60% of Current Liabilities are for plan participants within five years of normal retirement while the asset distribution does not indicate a high level of liquidity to handle the purchase of the requisite annuities that the plan states it will purchase to manage retiree benefits.

Option 2: A less optimal funding –related action that could be recommended is for Golden Parachutes to make a contribution of something less than the maximum tax-deductible contribution.

This recommendation is based on the following observations:

- The Market Value of Plan Assets exceeds the Present Value of Actuarial Liability by less than 5% when, half of said assets are in stocks (a generally volatile asset) and another quarter of said assets are in bonds with high default risk.
- 60% of Current Liabilities are for plan participants within five years of normal retirement while the asset distribution does not indicate a high level of liquidity to handle the purchase of the requisite annuities that the plan states it will purchase to manage retiree benefits.

Solution 8 (continued)

- The current funding level and split opinion of the Board may well make contributing the maximum, tax-deductible amount not a viable option.
- Plan is already overfunded.

Option 3: Another non-optimal funding-related action that could be recommended is for Golden Parachutes to neither make a contribution nor take a reversion from the plan.
This recommendation should be backed by the following justifications:

- The current funding level and split opinion of the Board may well make contributing the maximum tax-deductible amount not a viable option.
- The plan has the option to improve its risk profile, thereby enhancing the value of its current funding position, by changing the asset portfolio to a less volatile mix. Thus, an improvement to plan funding at lower cost than a contribution.
- The plan also has the option to improve its overall return by eliminating municipal bonds from the portfolio and replacing them with higher yielding, taxable assets to take advantage of the tax position of the plan.
- Plan is already overfunded.

Option 4: Another non-optimal funding-related action that could be recommended is for Golden Parachutes to take a reversion from the plan. This recommendation should be backed by the following justifications:

- The current funding level and split opinion of the Board may well make contributing the maximum tax-deductible amount not a viable option.
- The current plan portfolio includes considerable exposure to assets with a relatively high expected rate of return which, would indicate asset growth that could be expected to help offset the drain of taking a reversion from the plan.
- The plan also has the option to improve its overall return by eliminating municipal bonds from the portfolio and replacing them with higher yielding, taxable assets to take advantage of the tax position of the plan.
- The window of opportunity for taking a plan reversion will be closed if the Board does not act during the current plan year.
- Plan is already overfunded.

Solution 8 (continued)

(c)

Option 1: Changes Recommended:

I would recommend that Golden Parachutes consider reducing the assumed rate of return for valuation purposes.

- Justification for this change is: accommodating for the high-risk assets to which the plan is currently exposed.

I would recommend that Golden Parachutes consider changing its asset mix to eliminate the municipal bonds exposure.

- Income from municipal bonds is already tax-free and is therefore a non-optimal investment for a pension plan.

I would recommend that Golden Parachutes consider changing its asset mix to improve liquidity.

- Justification for this change is: the level of current liability attributable to plan participants within five years of retirement and therefore, the plan's expected liquidity needs for life annuity purchases.

I would recommend a lower allocation to stocks

- Justification for this change is: to reduce the tax ineffectiveness

Option 2: No Changes Recommended:

I would not recommend that Golden Parachutes consider changing their financial strategy or valuation assumptions at this time.

- The assumed rate of return for valuation purposes is reflective of the current asset mix.
- The current asset mix includes a sizable portion of relatively high-yielding, taxable assets (to aid rate of return) and some more liquid assets to assist with cash flow concerns.
- The opportunity to maximize return on the entire pool of assets should be utilized before a significant portion of the assets are sold to payoff the expected liabilities that are expected to come to fruition within five years.
- The fact that a large portion of the liabilities are expected to be "paid off" within five years provides a natural opportunity for rebalancing the plan's portfolio and allows more time to better assess the expected needs and therefore, the investment goals of the plan.

Solution 9

This question, drawn from reading of the Fair Value report, requires the candidate to understand the differences between fair value and entity specific valuation. Most candidates scored fairly well on part (a) and part (c), potentially losing marks in part (a) for not clearly defining each of the valuation methods and in part (c) for not identifying all the possible methodologies. In general, part (b) was poorly done with few candidates correctly identifying that the fair value of the liability would decrease in the event of a downgrade in the firm's credit rating.

(a) The fair value of a liability is the amount for which the liability could be settled between knowledgeable, willing parties in an arm's length transaction. Entity-specific value represents the value of an asset or liability to the enterprise that holds it, and may reflect factors that are not available (or not relevant) to other market participants.

Key differences between the two valuations are:

Measure	**Rationale**	**Assumptions**	**Credit Standing**
Fair value	Exit Value	Market Based	Reflected
Entity-specific value	Orderly settlement over the life of the liability	Entity specific	Not reflected

(b) There should be no impact on the entity specific valuation. The present value of the cost to the firm to settle the liabilities has not changed.

The fair value of the liability would decrease in the event of a downgrade to a firm's credit standing. As a result the firm's earnings will increase, which is counterintuitive and not useful to financial statement users.

The rationale for the increase in earnings is due to the following:

- Liability is someone else's asset, and the asset reflects credit standing
- Fair value of debt (or liability) should be set at market value
- No reason to treat differently from other liabilities (e g , public debt)
- Liability can never be greater than assets

(c) The JWG Hierarchy of Valuation Methods is as follows:

1) Use market value when available
2) If not available, use market value of a similar instrument
3) Otherwise, use present value of future cash flows with an adjustment for risk

Solution 9 (continued)

The last method is very flexible and is particular useful in valuing financial instruments where it is possible to estimate cash flows. The approach has the following general principles:

- If there is no risk, discount the cash flows at the risk-free rate, or the risk-free spot curve
- Use higher interest (discount) rates when there is greater risk
- Use all cash flows, including contractual and constructive cash flows such as dividends and non-guaranteed interest credits

The different combination of risk tends to lead to a wide variety of methods that can be used to calculate the present value of the future cash flows:

- Adjust the discount rate
- Use option-pricing techniques (risk neutral) to weight the results under various scenarios
- Adjust the cash flows being discounted – Market Value Margin (MVM)

MVM is preferred for non-diversifiable insurance related risks such as mortality and morbidity.

Solution 10

Question #10 asks the candidate to apply the many rating agency study notes to a mini case study. The many subquestions were an attempt to draw more detail out of the candidates, and were not targeting one-line responses.

(a)

(i) A rating issued by an NRSRO is an opinion regarding the creditworthiness of public companies.
A rating is a published opinion as to the likelihood that the debt will be paid and future obligations met.

A rating is an assessment as to a company's capacity to meet its financial commitments over a long term or short term horizon.
A rating is not an investment advice or a recommendation

(ii) Rating agencies principally rely on public information provided by the issuer. Annual statements, annual reports, SEC Filings.
In addition to reviewing the company's public information, they will request non-public information. These include - budgets, financial projections, historical performance and historic trends.
Meetings with management also form am important source of information - strategic plans.
NRSRO's also ask to review the company's projections of future cash flows and will seek a breakdown by company segment

To determine a rating, analysts will convene a credit committee consisting of 4-12 people, including analysts working on the company, their Managing Director, and other analysts, management, or staff with useful experience
The analyst will use the information mentioned above to make a rating, and the committee will vote.

Solution 10 (continued)

(iii) Insufficient Review of Company Materials
- Analysts do not always have a thorough understanding of the disclosures or financial statements.

Short Term vs. Long Term Focus
- While NRSRO's are supposed to give their opinion on long term creditworthiness, analysts often fail to conduct a long term evaluation of a company's health.

- Place too much reliance on the work of auditors.

- Companies may use the flexibility of GAAP to hide problems.

Lack of Inquisitiveness

- Need to ask probing questions

- Too much reliance placed on the words of senior management

Lack of Accountability

- Credit analysts do not view themselves as accountable for their actions

Fees paid by entity being rated

Shielded from liability for all but fraud

Do not verify info provided by company

(iv) Conflicts of Interests

Code of Conduct
- Limitation on securities ownership and prohibition against relationships that may give rise to conflicts of interests
- Firewalls have been implemented to assure the confidentiality of non-public client information made available to NRSRO's during the rating process

Credit Rating Process
- Ratings assigned by rating committees, not by individuals. At least 2 analysts attend any meetings with company management. Senior practice leader and criteria officers meet regularly to review practices, procedures, and criteria as well as any gaps in or deviations from these procedures.

Credit Rating Fees
- No single issuer fee or group of fees is important to risk the NRSRO's reputation. Therefore, no portion of the analyst's compensation is directly dependant on the performance of specific companies that an analyst rates or amount of fees received from the company.

Solution 10 (continued)

- Separate sales and marketing teams work independently of the analyst that cover the issues/companies.

Organizational Structure

- Credit rating personnel not involved in other business activities of NRSRO's

(b)

(i) The assignment of an interactive Best's Rating involves a comprehensive qualitative and quantitative analysis of a company's balance sheet strength, operating performance and business profile.
Best believes using a qualitative and a quantitative approach provides a good balance and has increased the predictive value of their ratings.
Best's quantitative evaluation is based on an analysis of each company's reported financial performance, utilizing over 100 key financial tests and supporting data.

(ii) Inform Best about Hemlock position
Take the initiative in explaining how MOIC plans to absorb the possible loss of capital
Anticipate and be prepared to answer questions from Best about the Hemlock bankruptcy
Anticipate and be prepared to answer questions from Best about the dwindling insurance sales
Anticipate and be prepared to answer questions from Best about the new inexperienced CEO

(iii) Best will probably place a negative outlook on MOIC.
- because it is experiencing unfavorable financial (Hemlock) and market (dwindling life insurance sales) trends
- if the trends continue, MOIC has a good possibility of having its ratings lowered
- puts more pressure on management, especially on the new CEO

Alternate answer

Best will probably downgrade MOIC
- because of unfavorable financial event (Hemlock) and dwindling life insurance sales
- a ratings downgrade will lead to a higher cost of debt financing
- puts more pressure on management, especially on the new CEO

Solution 10 (continued)

(iv) Ramifications:

- increased cost of capital
- tougher to increase sales levels
- investor and policyholder confidence lowered
- higher withdrawals

(c)

(i) The present value of anticipated losses are charged against total adjusted capital, as calculated for capital adequacy model

This reduces the numerator in the Capital Adequacy Ratio calculation.
An adjustment is made for any statutory loss reserves the insurer may have set aside.

It will have a negative impact on the Capital Adequacy Ratio.

(ii) S&P will use their Liquidity Model
Having an appropriate level of liquidity means being able to meet maturing obligations promptly and to take advantages of market opportunities.

45% of the portfolio is very liquid (Cash, US Treasuries, NAIC I)
- This can help pay any voyage claims of business and any life insurance claims and annuity payments

50% of the portfolio is somewhat liquid (NAIC 2, Common Stock)
- This should be able to be relatively quickly turned into cash if there is a run on the insurer

5% of the portfolio (Non-investment grade bonds) is not liquid
- So the Partheneon event should not have a huge impact on MOIC's overall liquidity position.

Solution 10 (continued)

(iii) Average Earnings Adequacy Ratio = 185.5%
20% * 170% + 30% * [170% + 190% + 185%]/3 + 50% * [170% + 190% + 185% + 200% + 225%]/5
The decline in the life insurance premiums written should lead to a decline in earnings. As a consequence, the EAR should decline.

Capital losses on Hemlock will depress earnings

Solution 11

This question, drawn from the readings on reinsurance, required the candidate to understand both the general concepts surrounding the decision to purchase reinsurance and a technical understanding of the underlying economics of the surplus account. Most of the candidates scored fairly well on the part (a), potentially losing some points due to (ii) incorrectly identifying the opening surplus account (cc) using 100% statutory gains rather than 75% or (iii) making an error on the core formulas: Ending OSA= initial OSA-statutory profit ceded and investment charge and risk charge

(a) WXY needs an initial reinsurance allowance of 12, because it needs income of 10 to use all 10 TLCF. Since it would have –2 stat income, 12 needs to be transferred on 12/31/03 as the initial reinsurance allowance. So the business will be recaptured when 12 is repaid

Outstanding Surplus Account = Previous Balance
+Statutory Gain
-Risk Charge
-Investment Income

	Previous Balance	Stat Gain	Risk Charge	Investment Income	OSA Balance
12/31/04	-12	(+2) (.75)	-(.04)(12)	-(.07)(12) =	-11.82
05	-11.82	(4) (.75)	-(.04)(11.82)	-(.07)(+11.82) =	-10.13
06	-10.13	(5)(.75)	-.04(10.13)	-(.07)(10.13) =	-7.5
08	-7.5	6(.75)	-.04(+7.5)	-(.07)(7.5) =	-3.83
09	-3.83	8(.75)	-.04(3.83)	-(.07)(3.83) =	1.75

by 12/31/09, the business can be recaptured

(b) The level of risk charge depends upon:

- nature of risks assumed
- size of the transaction
- reinsurer's profit objectives
- market condition at the time
- ceding company's stability
- tax considerations
- company relationships

Solution 11 (continued)

- reinsurer's expense for analysis
- reinsurer's expense for administration
- reinsurer's expense for intermediaries

Historic risk charges in the 1%-5% range.

Given that WXY is only rated BBB and does not have previous relationship with ABC Re, should be on the higher end of the "typical" range, hence level is OK.

(c)

- no scheduled gains to reinsurer
- reinsurer can't withdraw unilaterally
- ceding company not obligated to pay back losses unless it is breaking the agreement
- risk charge is appropriate for risk taking
- reinsurer obligated to pay benefits
- treaty can cease once outstanding surplus is repaid

Solution 12

This question required the candidate to recognize the benefits and costs of tax motivated transactions as well as understand the financial reporting requirements and related issues for derivatives as mandated by FAS 133.

Most candidates were able to recognize that the tax-structured deal provided an initial after-tax advantage over the alternative investment with similar risk. However, only the best prepared candidates were able to list a majority of the potential drawbacks.

Most candidates were able to outline the basic requirements of FAS 133, but only the best prepared candidates were able to recognize why the earnings volatility was created and the best way to utilize the hedge accounting rules provided for under FAS 133 to minimize it.

(a) Calculate fully taxable equivalent of tax-structured deal:

$$X(1-.35) = (.5*(.015+.01)*(1-.35)) + (.5*(.015+.01)*(1-0))$$

$$X = 3.173\%$$

$$3.173\% > 2.75\%$$

Provides a higher post-tax return than alternate investment with similar credit risks.

Another benefit is the "positive press" and goodwill created by contributing to a program designed for societal good.

Costs include:

1. Structured Transactions are not very liquid.
2. $1 million represents 1% of AUM. Credit Concentration issues.
3. Potential that tax law changes wiping out tax deductibility benefit
4. Income statement geography issues. Investment income placed by fewer taxes.
5. Due to their complexities, structured transactions have more administrative and monitoring costs.
6. Broker Costs
7. Transaction cost to enter swap contract necessary to fix ALM mismatch created.

Also, tax advantage increases if LIBOR goes up and decreases if LIBOR goes down.

Solution 12 (continued)

(b)

- Swap can be designed to perfectly hedge the variable rate cashflows to fixed rate cashflows.
- FAS 133 requires all requires all derivatives be held on the balance sheet at fair value.
- Because we are hedging cashflows, use cashflow hedge accounting provided under FAS 133. This allows you to recognize the change in the swap value in OCI rather than as part of earnings. Not using hedge accounting would mean that the change in fair value each period at the swap would impact earnings directly creating earnings volatility.

(c)

- Must prove and document hedge effectiveness to use hedge accounting. Shouldn't be a problem if swap is designed to be a "perfect hedge".
- Retrospective and prospective effectiveness testing should be conducted on at least a quarterly basis.

Solution 13

Part A: This is the M&M world. The expected return for the confectionary asset class is 10%. This will not change post-the purchase of Nougat. Shareholders in either Butterscotch or Carmel will not see their expected return change – shareholders will not see a change in stock price. This can be proven via a homemade leverage argument or by an arbitrage argument.

(a) (b) and (c)

- The assumptions listed in the stem are the assumptions of the M&M (1958) Capital Structure Model
- The key assumption is that the shares of firms within a given risk class have both the same expected return and the same probability distribution of expected returns and can therefore be considered perfect substitutes for each other.
- Companies within a risk class thus differ from each other only in scale – they have the same expected profit per dollar of invested capital, and investors can expect their per share returns to be identical.
- Can be proven by using homemade leverage argument.

- Under M&M's Proposition I – the market value of any firm is independent of its capital structure and is given by capitalizing its expected return at the rate p appropriate to its class.

- Under M&M's Proposition II – the expected yield of a share of stock is equal to the appropriate capitalization rate (pc) for a pure equity stream in the class, plus a premium related to financial risk equal to the debt-to equity ratio times the spread between pc and r.

Solution 13 (continued)

- The firm's assets will generate this stream of profits, and an investor will assign a present value to this income stream by discounting each cash flow back to the present using a discount rate appropriate to a company with this degree of business risk.
- The fundamental valuation cannot be increased or decreased by repackaging ownership claims on the cash flow stream into debt and equity income streams.
- Value is derived from a company's investment and operations – not from financial marketing decisions.

Key assumptions to note:

1. Nougat, Butterscotch & Carmel belong to the same risk class
2. Nougat has an expected operating profit of $100,000.
3. Butterscotch & Carmel have the same level of expected operating profit, $200,000.
4. Nougat, Butterscotch & Carmel have the same level risk class required return, 10%.
5. Assumptions 1, 2 & 4 imply that that Nougat should have a market valuation of $100,000/0.10 = $1,000,000.
6. Assumptions 1, 3 & 4 imply that that Butterscotch & Carmel should have market valuations of $200,000/0.10 = $2,000,000.

In a world of corporate taxes, MM implies that the firm should have 100% leverage. Carmel's shareholders will benefit more.

$$Vl = Vu + PV\ Tax\ Shield = Vu + Tc\ D$$
$$Vu = [NOI\ (1-tc)]/p = NI/p$$

Vl = Value levered
Vu = Value Unlevered
Tc = Tax rate
D = amount of Debt
NI = Net Income

Solution 13 (continued)

Butterscotch – Pre Purchase

Vb= [$200,000 (1-0.25)]/0.1 = $150,000/0.1 = $1,500,000

- The introduction of a 25% corporate profit causes an immediate $500,000 reduction in the market value of Butterscotch
- This represents a pure wealth transfer from Butterscotch's shareholders to the government.

Carmel – Pre Purchase

Vc= [$200,000 (1-0.25)]/0.1 + 0.25 (1,000,0000) = $1,500,000+$250,000 = $1,750,000

Nougat – Pre Purchase

Vn= [$100,000 (1-0.25)]/0.1 = $75,000/0.1 = $750,000

Butterscotch – Post Purchase

Butterscotch purchases via equity. Stock is trading at $1,500,000/40,000 shares= $37.50
Butterscotch will issue 20,000 shares at $37.50 ($750,000/$37.50)

Vb2= [$300,0000 (1-0.25)]/0.1 = $225,500/0.1 = $2,250,000 (Value Un-levered Firm)

Vb2-Vb=$2,250,000-$1,750,000 = $750,000 – Change in Market Capitalization.

Share price unchanged at $37.50 ($2,250,000/(40,000+20,000 shares).

Solution 13 (continued)

Carmel – Post Purchase

Carmel purchases via 50% equity & 50% debt. Stock is trading at $1,750,000/20,000 shares= $37.50
Carmel will issue $375,000 of debt and will issue 10,000 shares at $37.50 ($375,000/$37.50)

Vc2= [$300,000 (1-0.25)]/0.1 + 0.25 (1,375,0000) = $2,250,000 (Value Un-levered Firm) +$343,750 (PV Tax Shield) = $2,593,750

Vc2-Vc=$2,593,750-$1,750,000 = $843,750 – Change in Market Capitalization.

Market Value Firm = $2,593,750. Value Debt = $1,375,000 Implied Equity Value =$1,218,750

Share price increases to $40.63 ($1,218,750/(20,000+10,000 shares).

The $3.13 stock price increase is due to the $93,750 increase in the PV Tax Shield ($343,750 - $250,000).

Butterscotch vs Carmel

Alternate solution

Check –Vc2-Vb2 should just be the increase in the PV Tax Shield 0.25 (1,375,000) = $343,750.

(d) *In general – most research and actual company actions indicated that equity should be raised as a last result – various theories are given as to why this is the case – will issue debt prior to equity. The management has positive asymmetric information that is not generally known – management is likely to signal this good news through its actions.*

Under the pecking-order hypothesis:

Pecking Order would imply that a company should first look to internal sources for capital – then look to a debt solution and equity as a final solution.

Solution 13 (continued)

    - Key Assumptions
  - Managers are better informed about the investment opportunities faced by their firms than are outside investors
    - Asymmetric information assumption
  - Managers act in the best interest of existing shareholders.
  - Firms will sometimes forego positive-NPV projects, if accepting these projects means the firm will have to issue new equity at a price that does not reflect the true value of the company's investment opportunities.
- Provides a rationale for firms to value financial slack, such as large cash and marketable security holdings
  - Can explain why debt ratios and profitability inversely related
  - Can explain why markets react negatively to all new equity issues and why managers seem to make such issues only when they either have no choice – or they feel the firm's shares are over-valued
  - Can explain why managers choose to hold more cash – and issue less debt – than either the trade-off theory or common sense suggest they should

- The only reason a company would issue equity is if there was an earnings shortfall, or if the company was known to be overvalued.
- The market reacts positively to a new debt issue and negatively to a new equity issue.
- Managers act in the best interests of current shareholders.
- Management has a preferred order of financing (internal financing, risk free debt, risky debt, convertible bonds, preferred stock and common stock).
- Dividend policy is sticky.
- Managers have asymmetric information.
- There are several market imperfections.

So under the pecking-order hypothesis I think Fudge would use internal financing first and if that's not enough then use debt.

Solution 13 (continued)

Signaling Model would imply that if a company felt that it were a stronger firm – then it would send a signal to the market of the positive information it possessed by increasing leverage (Scoffing at the risk of going BK). By issuing 100% they could signal the market that they have some good news to announce in the near future, specifically the deal with the singer.

- Mangers use costly signals to differentiate their firms from weaker competitors
  - Based on the assumption of asymmetric information (pecking order)
  - Highly levered capital structure
  - Only the strongest firms can adopt such a strategy – so should get a higher valuation than firms that don't.

  Under signaling theory, debt is preferred to equity. Companies only issue stock either as a last resort or when management believes the company is overvalued. Investors know this and react accordingly. Companies that issue debt are confident enough in their future prospects that they will be able to meet the strict tenants of the debt. This is definitely the message Fudge wants to send to investors – so they should use 100% debt. It should be noted that there is little empirical evidence supporting the signaling theory,

(e) As a start-up company, Fudge may face a steep term structure – with high debt costs at increasing maturities due to:

- High indirect costs of financial distress
- Growth options are intangible assets
- Limited history to prove profitability to lenders
- Under investment problem in distress where gains accrue to bondholders in distress situations – so equity holders don't want to invest.
- May be prohibitively expensive to borrow long-term.
- Short-term bank loans may be better
- Generally only low leverage, asset rich firms issue long-term public debt.

Solution 13 (continued)

(f)

Carmel:

- Mature: Over 300 years in business
- A lot of free cash flow: conglomerate / has been acquiring businesses. Confectionary business is a cash cow.
- Has a low cost of financial distress – therefore can issue debt at various terms and on an unsecured basis.

Fudge:

- Start-up
- Thinking how can reinvent confectionary business
- Has a high cost of financial distress – can only reasonably issue debt on a short term basis and on secured terms – anything longer or unsecured would require too high a spread – issue more equity instead.

Bankruptcy Cost – The greater the cost of financial distress or bankruptcy for a firm, the smaller the debt to equity will be.

Reversion to Target Level – As a company moves from its target debt to equity level, over time it will mover back to that target level.

Taxes – Does not really matter

Leverage Increasing Events – Are good news events – raises share price.

Leverage Decreasing Events – Are bad news.

Ownership Structure – Companies wit a more diverse ownership base have a lower percentage of debt in their capital structure.

National Patterns – companies in certain countries have more debt as part of their capital structure

Profitability – The more profitable a company, the smaller the ration of debt to equity.

Transaction Costs – Impacts size and frequency but not types of funding.

Solution 14

The Learning Objectives covered in the question include:

B. Capital Management 3. The candidate should be able to understand economic and regulatory capital requirements and describe how they affect decisions.

C Risk Management 8. The candidate should be able to describe how various measures can be used to evaluate performance of a given firm or venture against objectives.

More specifically, the question required students to recognize and calculate various risk-adjusted RORs, and understand which measures are most appropriate when evaluating performance at different levels and in different capital allocation process situations.

For part (b) there are three possible alternative methodologies to arrive at the solution.

(a)

	A	B	C	
	Fixed Income Trading	**Equity Trading**	**Money Market Trading**	Total
Trading Earnings	**100**	**70**	**30**	200
Utilized CaR	**300**	**250**	**100**	650
Allocated CaR	**500**	**300**	**100**	900
RARO Util CaR	33.3%	28.0%	30.0%	30.8%
RARO Alloc CaR	20.0%	23.3%	30.0%	22.2%
Excess CaR	200	50	0	250

Under Utilized CaR: A exceeds, C meets, B falls short of Target 30%; Company slightly exceed overall.

Under Allocated CaR: C meets, B and A fall short of Target 30% (B better than A): Company falls short overall.

- allocated CaR may not be the best indicator of risk the unit has taken to generate actual earnings.
- arguably, the actual amount of utilized CaR is the "right" risk measure

<u>Utilized CaR is an ex poste measure</u>

- Advantage: cautious units taking smaller risks are not punished, and units with a disproportionate amount of capital in a top-down process are not blamed for excess capital which is beyond their responsibility

Solution 14 (continued)

- Disadvantages: it is not desirable to compare monthly profits to Month End daily CaR as latter can be affected by window dressing (reducing CaR on day it is measured), and it is a measure of daily losses that cannot be compared with monthly returns, which requires a measure – overall utilized CaR
- the best solution would be to establish potential correlations between consecutive losses so as to give a precise picture of how daily P&L distributions can be aggregated in order to determine monthly CaR

Allocated CaR is an ex ante measure

- Advantage: since capital is a costly resource provided by shareholders just meeting unit RAROC targets based on utilized CaR may not be sufficient at the corp level to gtee a reasonable return to s/H's
- established profitability targets based on utilized CaR can have the effect of eliminating each unit's responsibility to exploit fully the resources that have been assigned to it by corp HQ on behalf of the bank's

(b)

Diversified CaR:

Total CaR (Utilized) = sq. root ((300^2) + (250^2) + (100^2) + (300x250x-0.2) + (300x100x0.3) + (250x100x-0.1))

= sq. root (154,000) = 392.43 (vs. 650 Utilized CaR)

RaROC = 200/392.43 (vs. 650 Utilized CaR) = **50.96%**

Total CaR (Allocated) = sq. root ((500^2) + (300^2) + (100^2) + (500x300x-0.2) + (500x100x0.3) + (300x100x-0.1))

= sq. root (332,000) = 576.19 (vs. 900 Allocated CaR)

RaROC = 200/576.19 (vs. 900 Allocated CaR) = **34.71%**

Imperfect correlation amongst business units leads to a reduction in overall CaR for the bank, regardless of which capital measure is used.

Solution 14 (continued)

Alternative 1:
MARGINAL CaR is one method
Equal to the reduction in CaR that would be achieved
if the unit under evaluation weren't part of firm

A - Fixed Income Marg CaR(Util) = 392.43 - sq. root ((250^2) + (100^2) + (250x100x-0.1))
= 392.43 - sq. root (70,000) =392.43 - 264.58 = 127 85

Marg CaR(Alloc)
= 576.19 - sq. root ((300^2) + (100^2) + (300x100x-0.1))
= 576.19 - sq. root (97,000) =576.19 - 311.45 = 264.74

B. Equity Marg CaR(Util) = 392.43 - sq. root ((300^2) + (100^2) + (300x100x0.3))
= 392.43 - sq. root (109,000) = 392.43 - 330.15 = 62.28

Marg CaR(Alloc)
= 576.19 - sq. root ((500^2) + (100^2) + (500x100x0.3))
= 576.19 - sq. root (275,000) = 576.19 - 524.40 = 51.79

C. Money Market Marg CaR(Util) = 392.43 - sq. root ((300^2) + (250^2) + (300x250x-0.2))
= 392.43 - sq. root (137,500) = 392.43 - 370.81 = 21.62

Marg CaR(Alloc)
= 576.19 - sq. root ((500^2) + (300^2) + (500x300x-0.2))
= 576.19 - sq. root (310,000) = 576.19 - 556.78 = 19.41

	A	B	C		
MARGINAL	**Fixed Income**	**Equity**	**Money Market**		**Diversified**
	Trading	**Trading**	**Trading**	**Total**	**Total**
Trading Earnings	**100**	**70**	**30**	**200**	**200**
Utilized CaR	**300**	**250**	**100**	**650**	**392.43**
Allocated CaR	**500**	**300**	**100**	**900**	**576.19**
Div. Util. CaR	**127.85**	**62.28**	**21.62**		
Div. Alloc. CaR	**264.74**	**51.79**	**19.41**		
RARO Div.Util CaR	78.2%	112.4%	138.8%	**30.8%**	**50.96%**
RARO Div.Alloc CaR	37.8%	135.2%	154.6%	**22.2%**	**34.71%**

Under Marginal (Diversified) Utilized CaR: All exceed Target 30%, as does total bank.

Solution 14 (continued)

Under Marginal (Diversified) Allocated CaR: All exceed Target 30% as does total bank.

- Marginal risk capital should be used (vs. Split)
- Marginal risk capital is the right measure of each unit's contribution to total risk (vs. equal split)
- Con: by using marginal CaR some capital remains unallocated
- therefore unallocated capital should not be split among the different units
- Marginal CaR is the right measure to support acquisition and divestiture decisions

Alternative 2:

Split Method (Pro-rata)

is an equal split of the benefits of diversification amongst units

Utilized Ratio = 392.43/650 = 60.37%

Allocated Ratio = 576.19/900 = 64.02%

	A	B	C		
PRO-RATA	**Fixed Income Trading**	**Equity Trading**	**Money Market Trading**	**Total**	Diversified Total
Trading Earnings	**100**	**70**	**30**	**200**	200
Utilized CaR	**300**	**250**	**100**	**650**	**392.43**
Allocated CaR	**500**	**300**	**100**	**900**	**576.19**
Div. Util. CaR	181.12	150.93	60.37		**392.43**
Div. Alloc. CaR	320.11	192.06	64.02		**576.19**
RARO Div.Util CaR	55.2%	46.4%	49.7%	**30.8%**	**50.96%**
RARO Div.Alloc CaR	31.2%	36.4%	46.9%	**22.2%**	**34.71%**

Under Div. Allocated CaR: All exceed, with C best, then B and finally A; Bank exceeds overall.

- the Splitting method is easy to apply; however, it is not correct

Alternative 3:

Internal Beta Method is another approach

beta=ratio of the covariance between Returns of Bus. Units and those of the Bank as a whole, divided by Variance of Bank Returns

Solution 14 (continued)

(c)

Allocated vs. Utilized CaR:

- **the best approach depends on how the capital allocation process operates:**
- the greater the influence of individual units in CaR assignments (as per an internal mkt for capital) the greater their responsibility for the capital they have requested:
- individual units should be evaluated on ALLOCATED CaR (where they influence amount of capital since otherwise they would have an incentive to request as much CaR as possible, while taking no responsibility for its efficient use
- When CaR is allocated in a rigidly centralized, top-down fashion, then UTILIZED CaR should be used (individual units should not be blamed for not utilizing an amt of capital that may be disproportionate to the risk-taking opportunities they face)
- adopting utilized CaR would therefore make it clear that the potential gap between the results of indiv units and aggregate bank performance is caused by an excess of capital whose responsibility lies with top mgmt alone
- when a negotiation process is used, a HYBRID method can be used: the penalty rate on unutilized CaR can be set at any level between 0 and the target ROCaR, depending primarily on how much the business units can influence the amount of capital they receive
- the level of penalty rate could also depend on indiv unit characteristics: since forecasting CaR needs is more difficult for come than others, a comparatively lower penalty rate would be appropriate

Diversified vs. Undiversified:

- the choice of the "best CaR measure depends" on the purpose for which it is intended
- for performance measures of individuals or units, "undiversified" CaR is the only fair measure
- indiv performance measurers should be judged mostly on the basis of their ability to produce desired behaviors rather than by the theoretical soundness of the measure per se
- when performance measures are created to standardize the measure of output for each organizational unit in order to co-ordinate actions, an "undiversified" measure is appropriate

Solution 14 (continued)

- when performance measures are created to support top management decisions, for example, when acquisition or divestiture decisions have to be made, or when units' contributions to the firm's overall risk profile are needed in order to define strategic plans, profitability should be measured on the basis of a "diversified" measure of CaR
- it is not correct to link individual bonuses to the same measure that is used to assess the profitability of each business
- using a RAROC measure based on marginal CaR to assign bonuses to individuals or units would make each unit's performance vary according to a variable outside its control, i.e. the magnitude of diversification benefits
- using undiversified CaR does not mean that diversification benefits should never be taken into account when people responsible for multiple units are evaluated; rather, "diversified" CaR can be used provided that the extent of CaR can be used provided that the extent of CaR savings due to diversification is a variable that such people can control

Solution 15

This question was drawn primarily from the readings from Corporate Finance Theory (Megginson). Part (a) dealt with the various functions of financial intermediaries. Most candidates were able to recognize the list, but did not provide an explanation of how the plan carried out a particular function. In addition, some candidates simply wrote the entire list rather than recognizing that the plan did not perform all intermediary functions.

Part (b) of the question dealt with the issue of whether it is appropriate for public companies to hedge. This part of the question was not answered well, as most candidates did not look at the question from a basic shareholder level.

(a) The principles of qualitative asset transformation indicate that financial intermediaries perform the following functions:

- Maturity intermediation
- Denomination intermediation
- Liquidity intermediation
- Information intermediation
- Diversification intermediation

The savings plan acts as a financial intermediary because it performs the following functions:

- Maturity intermediation – the plan is able to invest in longer maturities than individual employees' time horizon. This leads to higher returns for the employees.
- Denomination intermediation – the plan accumulates smaller deposits into large amounts. As a result, employees get access to investment opportunities they would not have had individually. In addition, pooling allows for reduction in expenses due to economies of scale.
- Liquidity intermediation – the plan guarantees full fund value within 30 days at termination.
- Information intermediation – the plan is able to perform or acquire research more efficiently than individuals could, and may be able to access information that individual employees would be unable to acquire.
- Diversification intermediation – the plan can easily hold a diversified portfolio of investments, which employees participate in indirectly.

Solution 15 (continued)

(b) Yes, the company should hedge the risk.

The shareholders should consider how hedging will affect the value of the firm. Specifically, consider the following:

- Hedging affects the tax position of the firm. The hedge (assuming it is effective) should reduce earnings volatility, which should lead to a reduction in the average tax rate. Note that this only is true in a progressive tax system.

- Hedging affects the agency costs. Shareholders can hedge against this risk themselves in the capital markets. However, managers have a significant portion of their wealth tied up in the firm through future earnings, and may be unable to reasonably hedge against this externally. As a result, managers prefer stability to volatility in earnings. Note that the presence of a hedging program may increase retention and/or recruitment of senior management.

- Hedging may be desirable due to a lack of internal expertise. As the firm is primarily a manufacturing firm, it is not likely to be financially sophisticated, and probably has no comparative advantage in the management of interest rate risk. Furthermore, the risk is not central to the company's business, so it may be best to eliminate it, and a hedge is one way to do that.

- Hedging, by reducing earnings volatility, may reduce the company's use of external financing. Given the presence of capital market imperfections, the company would prefer to use internal financing to external financing.

- Also, by reducing earnings volatility, hedging should reduce the likelihood of bankruptcy, therefore reducing the PV of bankruptcy costs. Note that this may not be an issue, as older industrial firms typically have high positive cash flow.

- Need to consider the cost of the hedge vs. its effectiveness.