Solution 1

Case Study question on reinsurance. The calculations for the funds-withheld coinsurance follow closely from the examples given in the text. In the latter part of the question, the student should realize that new reinsurance proposal is aimed at a completely different risk exposure than Zoolander's prior reinsurance coverage. It is important that candidates support whatever recommendation is made in Part C.

(a)

(i) Income statement after reinsurance

	Projected 2005	
Premiums		
Gross	33,000,000	
Ceded	33,000,000	← normally should be set to be the policy reserve. Here uses gross prem as initial reins prem
Net Premiums	0	
Investment Income		
Gross	1,650,000	
Ceded	0	← ceding company holds assets
Net Investment Income	1,650,000	
Reinsurance Allowance	3,300,000	← 10% of ceded premium
Total Revenue	4,950,000	
Claims & Surrenders		
Gross	19,000,000	
Ceded	19,000,000	
Net Claims & Surrenders	0	
Reserve Increase		
Gross	11,000,000	
Ceded	11,000,000	
Net Reserve Increase	0	
Total Benefits	0	
Expenses & Commissions	3,500,000	
Gain from Operations	1,450,000	

(ii) Beginning Balance = initial expense allowance = -3,300,000

Reinsurer gain during 2005 = 33,000,000-3,300,000-19,000,000-11,000,000 = -300,000

Solution 1 (continued)

a) Beginning Surplus Account	$0
Plus stat gain from ops (Cranberry)	-300,000
Less inv income on surplus	0
Less risk coverage (1% of outstanding surplus 2004)	0
Ending Surplus Account	-300,000

(b) YRT benefits

1) can transfer mortality risk
2) relatively easy to administer
3) no investment risk involved
4) less expensive
5) less regulatory scrutiny

100% funds withheld coinsurance benefits

1) Have surplus relief
2) No reserve credit problem (up to amount of assets withheld)
3) No cash changes hands at the beginning and minimal cash flow throughout treaty

(c) Recommendation

Zoolander should retain the risk and manage it themselves

Risk inherent in term insurance consists mainly of mortality risk and this risk is diversifiable.

Law of large numbers when there is a big enough pool of insureds, the expected cost arising from this pool will be close to the mean

Since there is no investment risk which is systematic and non-diversifiable – this is a feasible option

Company has long history of profitability in the term life market

This also presents an opportunity for the company in that no other YRT reinsurer is out there offering this product at a reasonable cost

Solution 1 (continued)

One way for the company to diversify business operations is by developing reinsurance expertise and entering that market. May help management achieve aggressive growth target.

Furthermore, history in this market gives them foundation

Cost and administrative complexity associated with funds withheld coinsurance makes the option extremely unattractive.

Also would have regulatory concerns.

Solution 2

This Case Study question asked students to evaluate the appropriateness of capital allocation models found in the Course syllabus. The second half of the question is very similar to some asked on prior years' exams. The student must calculate which of Zoolander's lines of business are earning their cost of capital and generating free cash flow. For many candidates, one difficult element was determining the correct weighted average cost of capital.

(a) Required surplus formulas are a convenient and easy way to allocate capital. The formulas attempt to measure each major type of risk the company faces. Allocating capital by line of business allows Zoolander to monitor the return on capital of each line of business, plus they can plan the amount of investment in each line, and control the amount of capital used. This also allows Zoolander to allocate capital to the most strategic uses and take action if results do not equal plan.

(b) GAAP required surplus is more useful than statutory required surplus because it takes into account investment in acquisition costs and surplus strain. Actuary needs to be aware of how GAAP is distorting results. GAAP has limitations:

a. GAAP ROE may not correspond to IRR used in pricing.
b. Interest rate used to amortize acquisition costs is yield on invested assets, but for pricing it is based on IRR.
c. GAAP allows for margins for adverse deviations.

(c)

Line of Business	Projected ROE (proj 2004 earnings/2003 capital)	Equity Growth Rate (EGR)
Annuity	10 / 100 = 10%	(103 – 100) / 100 = 3%
Disability	0 / 150 = 0%	(160 – 150) / 150 = 6.67%
Life	30 / 200 = 15%	(240 – 200) / 200 = 20%
Variable	20 / 215 = 9.30%	(225 – 215) / 215 = 4.65%
Corporate	40 / 367.6 = 10.88%	(390 – 367.6) / 367.6 = 6.09%

Weighted average cost of capital:
Cost of equity capital = 11%
Cost of debt capital = 5%
Desired capital structure = 30% debt
WACC = 0.3 x 0.05 + 0.7 x 0.11 = 9.20%

Annuity:
ROE > WACC, creating economic value.
ROE > EGR, generating free cash flow.

Solution 2 (continued)

Disability:
ROE < WACC, destroying economic value
ROE < EGR, destroying free cash flow.

Life:
ROE > WACC, creating economic value.
ROE < EGR, destroying free cash flow.

Variable:
ROE > WACC, creating economic value.
ROE > EGR, generating free cash flow.

Corporate:
ROE > WACC, creating economic value.
ROE > EGR, generating free cash flow.

(d) Annuity: Growth is desirable, allocate more capital.
Disability: Growth is undesirable. Cash sink, should reduce growth and try to increase profitability.
Life: Growth is desirable. Since creating economic value, this line is ok.
Variable: Growth is desirable. Should allocate more capital here
Corporate: Growth is desirable. Should allocate more capital here

Solution 3

Large corporate governance question using information from the Case Study. The first part was keyed on the bonus program and stock option incentives. The second half of the question asked the student to consider stakeholders inside and outside the company. Zoolander has some major problems on the corporate governance side. However, they were doing some things correctly. Students who related their answers specifically to the Case Study scored higher than those that merely repeated a list from the Course reading

(a) Bonus target

New Sales > $500 Million
- Creates incentives to boost sales at expense of profitability
- Encourages under-pricing

Gross Investment Return > 6%
- Considers return but not risk
- May explain the increase in mortgages and junk
- May encourage asset/liability mismatch or liquidity risk
- 6% may not be a sufficient benchmark to add value

Assets Under Management > $9,750
- May encourage continuation of unprofitable lines (disability)
- May encourage under-pricing new business

Expense management is not rewarded by bonus program

The bonus target is all or nothing so management has no incentive to exceed the goal.

Restricted Option Program

The restricted options and bonus are awarded for items beyond the management's control.

Stock options can dilute ownership

(b) The compensation system fails to align incentives.

Does not provide decision makers with incentive to increase value
- Encourages growth without profitability
- No expense control
- Risky, mismatched assets

Solution 3 (continued)

Added Costs without improved incentive
- Easily attained goals
- Incentive pay to non-decision makers in areas beyond their control
- No benchmarks or reflection of economic factors such as inflation

(c) Role in preventing company failure
- Shareholders
  - Control through voting rights
  - Select Board
  - Institutional investor role in monitoring performance
- Board of Directors
  - Act as agents of shareholders
  - Hire/fire/compensate CEO and managers
  - Possess sufficient expertise to advise management
  - Create proper incentive system for rewarding manager
  - Set overall corporate policy, risk control, risk appetite
- Management
  - Invest in projects that increase shareholder value
  - Reject unprofitable activities
  - Manage and control risks
  - Proper contracting
  - Optimal disclosure, reporting
- Rating Agencies
  - Acts as agent for investor
  - Provide credible information from independent source
  - Provide benchmark
  - Allow for cheaper debt or capital issue
  - Prevention and detection of insolvencies
  - Review strength, business profile

(d) Not Meeting Obligations
- Shareholders
  - Not much individual shareholder can do since management owns 49%
  - However, management ownership should align his interests
  - No active monitoring. Inability to control Board or CEO

Solution 3 (continued)

- Board
  - Loyalty to CEO who is Chairman of Board
  - Board is too cozy. Vacation together. (Even a pair of spouses).
  - Audit Committee and information flow controlled by CEO
  - Entrenched Auditor selected without Board input
  - Need to set up better monitoring/controls
  - Need to set up better management compensation

- Management
  - Pursuing self-interest (agency costs)
  - Continuing unproductive line of business
  - Poor incentives and control
  - Focus on sales before resolving tax questions
  - Failure to forecast
  - Incomplete information by line of business

- Rating Agency
  - Insufficient review last year since company on watch
  - Slow to react to increased risks
  - Skipped interview, only used public information
  - Not inquisitive about lack of clear business plan

Solution 4

Integrated question pulling together the concepts of Real Options, Signaling Theory and Derivatives. The calculations in Part B required the student to demonstrate they understood the different financing implications. Many had problems applying the correct discount rate for the possible future cash flows

(a)

	Advantages	Disadvantages
Equity	-raise large sums -additional risk bearing capital	-negative signal to market -dilitutive to existing stockholders -SEC disclosure/costs
Public Debt	-tax deductibility of interest -make management more disciplined -positive signal to market -raise large sums	-increased chance for default -SEC disclosure/costs -public disclosure of confidential information -covenants
Private Debt	-more positive signal to markets -keep proprietary info confidential -flexibility w/rsp to terms -no SEC disclosure/costs	-increased chance for default -raise smaller sums -covenants
Hybrid Debt	-use embedded derivative that provides offset to lower fuel costs -reduce chance of default so get better financing -market may be willing to offer better financing rate if they want the exposure	-complexity -basis risk

(b) Common Stock
use risk-neutral valuation

$$V_0 = \{ [250(.6) + 30(.4)] / 1.03 \} - I_0$$
$$V_0 = 157.3 - 100$$
$$V_0 = 57.3$$

Solution 4 (continued)

½ Stock and ½ Debt
pay debt in 1 year = 50(1.06)=53
Can default on debt, this creates value

$V_0 = \{ [Max(250-53,0)(.6) + Max(30-53,0)(.4)] / 1.03 \} - I_0$
$V_0 = 114.76 - 50$
$V_0 = 64.76$

All debt
pay debt in 1 year = 100(1.06)=106

$V_0 = \{ [Max(250-106,0)(.6) + Max(30-106,0)(.4)] / 1.03 \} - I_0$
$V_0 = 83.9 - 0$
$V_0 = 83.9$

(c) All debt adds most value to existing shareholders
83.9 > 64.76 > 57.3

debt is also advantageous because:
- interest is tax-deductible
- makes management more disciplined
- positive signal to market

Would issue private debt over public debt because
- even more positive signal than public debt
- flexibility in setting up terms

(d) Yes, makes debt more likely
- make debt more attractive because reduces chance of bankruptcy which should decrease financing costs
- need to weigh this against any cost of the derivatives (i.e., options)
- smooth earning patterns reduce present value of expected tax liabilities

Solution *5*

Focused question on Asset-Liability Management. The assumptions were selected in order to keep the calculations reasonable. One of the teaching points was that it is difficult to optimize multiple criteria and there is no one method that is ideal for every situation. Part C of the question allowed well-prepared candidates to demonstrate that they understood how other techniques from the Course reading could be applied to this situation

(a)

(i) $x(1) + (1-x)(8) = 2.5$
x =78.6% should be allocated to short-term bonds to match effective duration of liabilities

(ii) Holistic matching involves allocating on a firm-wide basis.
Current Duration (Eff) of Assets

$$= \frac{7(6)+4.5(4.8)+2.5(0)+1(7.4)+3(1)}{18} = 4.111$$

$$\text{Current Duration (Eff) of Liabilities} = \frac{7(3.5)+3(8.6)+5(4.2)}{15} = 4.75$$

w/ SPDA included: = 4.49

$$4.49 = \frac{x(1)(2)+(1-x)(8)(2)+74}{20}$$

$$15.8 = 2X + 16 - 16X \qquad X = 1.43\% \text{ Allocated to ST bonds}$$

(iii) Minimization of effective duration of surplus entails 100% investment of Short-Term bonds – as this decreases overall duration of surplus

(b) Limitations: In general, the following are limitations of duration matching:
- Assumes parallel shifts of yield curve
- interest rate risk minimized only for small changes in the interest rate.

(i), (ii), (iii) All include the above, plus:
(i) ignores correlation of different lines of business
(ii) will include interest rate risk because assets > liabilities.
An increase in rates will still cause a loss of surplus.
(iii) minimizing duration may force company's investment returns to decline

Solution 5 (continued)

(c) Specific Approaches to ALM:

VAR methodology: surplus to give a percent chance of insolvency (within a confidence interval)

Investment Policy: invest with duration of surplus in mind
limits on exposures, duration mismatches

Product Design: integrate product design with ALM, ensure a product design with interest rate risks in mind

Dynamic Hedging: constantly hedging to minimize overall effects
Invest in assets that have opposite market characteristics
Managing the "greeks"

Option Pricing: use to price/value (embedded) options with liabilities
Based on Black-Scholes Theory

Securitization: create asset-backed securities

Segmentation: duration matching each product or line separately

Holism: mentioned in example

Optimization: mentioned in example

Price Sensitivity Statistics: use key rate duration or account for non-parallel shift in A&L

Cash Flow Methods
Cash flow testing: test impact of CF's under deterministic or stochastic scenarios

Cash flow marketing: invest so that CF's for assets and liabilities match/eliminates interest rate risk

Dynamic Financial Condition Analysis: analyze multiple risks-holistic approach

Reinsurance: may be used to reinsure equity-indexed/based death benefits

Solution 6

Fairly straightforward test of the student's understanding of basic CARVM definition and concepts in the first half. The second half of the question focused on how deficiency reserves arise and what can be done to minimize them.

(a) Primary issues are related to how to take account of various options available to policyholder.

CARVM Definition
The greatest of the respective excesses of the present values, at the date of valuation, of the future guaranteed benefits, provided by such contracts at the end of each respective contract year, over the present value, at the date of valuation, of any future valuation considerations derived from future gross considerations, required by the terms of the contract, that become payable prior to the end of such contract year.
Can be considered a "worst" case scenario.
Curtate CARVM based on the assumption that contract-holder may exercise his various options only at the end of the year.
Only elective benefits give rise to multiple benefit streams; non-elective benefits assumed to occur based on the valuation standard.

Continuous CARVM
In practice, surrender charge reduces on first day of specified contract years. The PV on last day of contract year may be significantly less than PV of non-forfeiture benefits on first day of the following contract year.
Some states require that reserves based on greatest PV on any day of each respective contract year.

(b) Death and Disability Benefits
Common practice to calculate a separate reserve for these benefits and add it to the basic CARVM reserve

Bailout Provision
If current non-guaranteed interest rate falls below some level, then all or a portion of surrender charges will be waived for some period
Project guaranteed benefits twice choosing the lesser reserve:

(1) use contractually guaranteed interest rate, ignore surrender charges
(2) use minimum rate that would not be less than the bailout rate and recognize surrender charges

Solution 6 (continued)

Market Value Adjustment

Annuity Purchase Guarantees
NAIC Model Reg requires the reserve to be no less than 93% of contract fund value for contracts which contain this provision

Valuation Interest Rates
NAIC valuation law provides for range of interest rates depending on the duration of any guarantees and the nature of the cash settlement provisions contained in the annuity.

(c) Characteristic of simplified net premium reserves that valuation net premium may be larger than the premium actually charged to the policyholder.
May occur either because pricing assumptions are less conservative than the valuation assumptions or because the slope of the premiums does not match the slope of the benefits

(d) Under the Unitary Method lapses are ignored, and valuation net premiums are a uniform percentage of gross premiums
By having steep premium increases in later durations, it is possible to reduce the valuation net premium at earlier durations

Solution 7

Application of using puts and calls to hedge a simple risk. Asks students to draw the payoff profile similar to what was done in the reading. A fair number of candidates confused which side of the deal they were taking so their graphs were backwards. Higher scoring students labeled points on the graph correctly

(a) The insurance company is subject to financial risk and has chosen to hedge that risk. Financial risks can be managed using options. Options are different from a forward, future, or swap in that they give the buyer a right, not an obligation, to buy or sell. The seller has the obligation to buy or sell if the buyer chooses to do so.

The company could purchase a European call option on the S&P 500 index expiring in one year with a strike price equal to 110% of the initial level of the S&P 500 index. If the index ends the year at a level above 110% of the starting point of the index, the company can exercise the option and be paid any excess of the ending index over the 110% level. The company would receive nothing if the index ends the year at less than 110% of the starting point. Exercise of the option would result in value to the insurance company if the index ends the year above 110%.

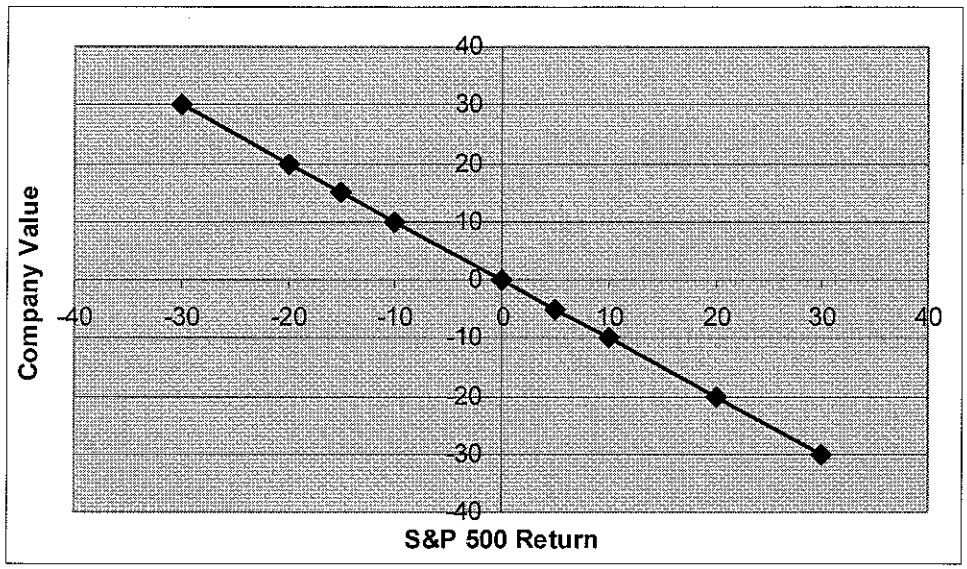
The company has accepted risk up to a 10% increase in the index. Purchasing an out of the money option provides less downside protection, but the option premium is significantly less.

(b) Sell a European put option on the S&P 500 index with an expiration date in one year. Choose a low strike price (assume 85% of the index's starting value). This option gives the purchaser the right to sell the index at the strike price and results in value to the purchaser if the option falls by more than 15%. This results in a loss to the insurance company as it pays the excess of the strike price over the value of the index. The insurance company could adjust the strike price of the put option to further offset the cost of the call option in part A. By using these options in a building block approach, the company has minimized the effect of unfavorable outcomes while still allowing (up to a certain level) the possibility of gaining from favorable outcomes

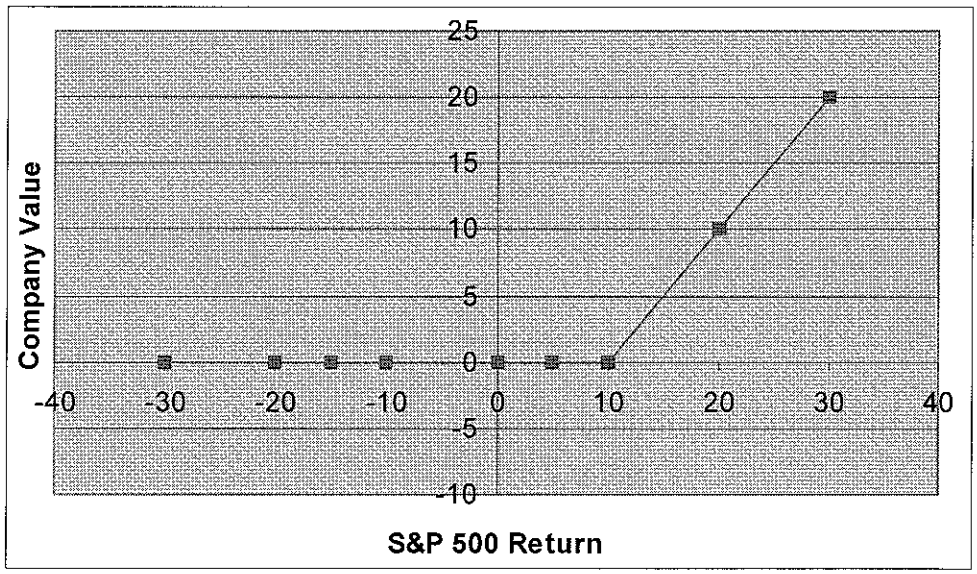
Solution 7 (continued)

(c) Graphs

Impact to company from liability value

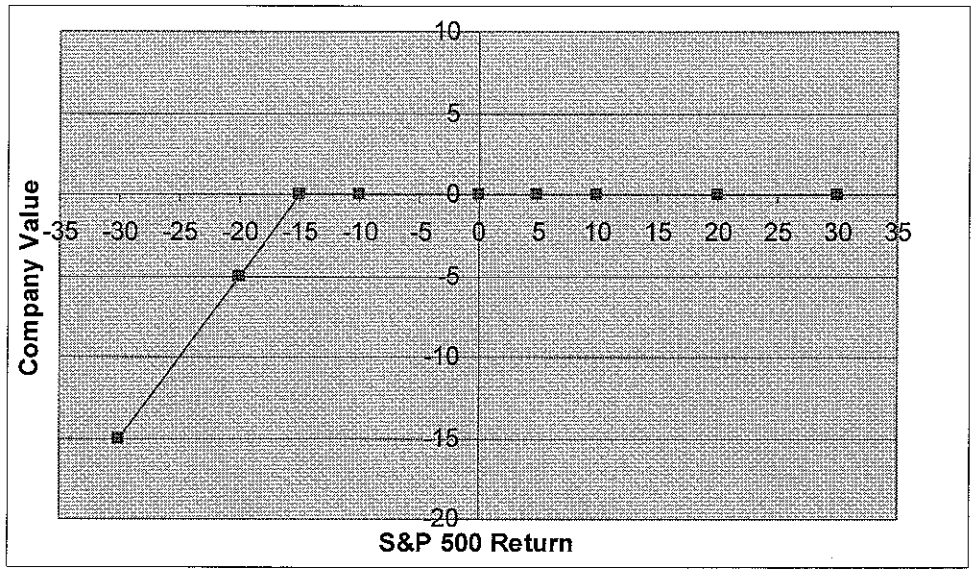


Value of call option / results for Company

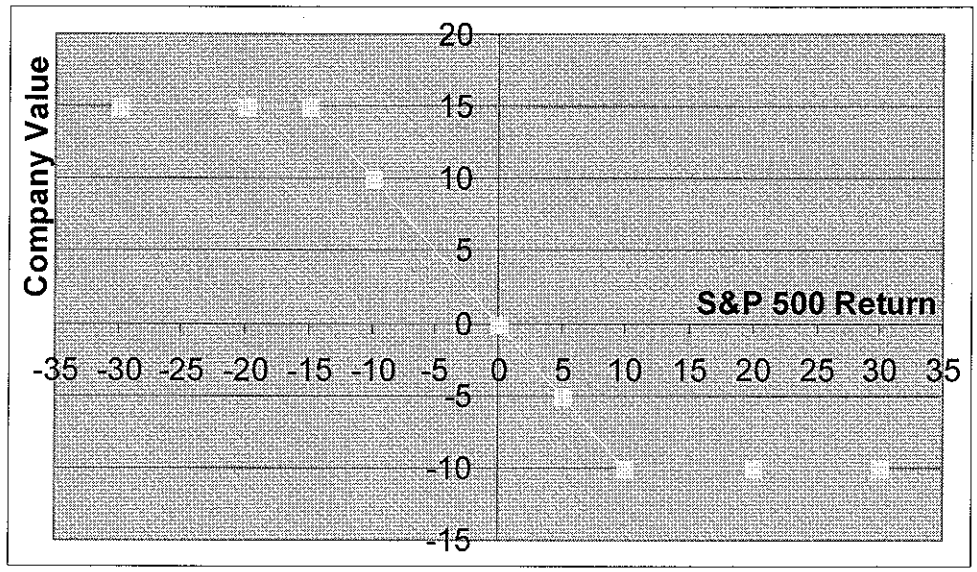


Solution 7 (continued)

Results of writing put option



Combined results



Solution 8

Fair Value of Liabilities question. Since there is no ready market for insurance liabilities, students should describe other methods for determining fair value. The assumptions were selected to make the calculation of Tug Boat Life's GICs fairly simple. Stronger candidates noted that the discount rate had to be adjusted for the credit premium and liquidity premium

(a)

Use Market Value

Market Value may not be Fair Value:

if market is not deep, wide, and open
if liabilities are not traded freely (i.e., subject to trade restrictions)
if size of transaction can influence value

- but there is no market value for insurance contracts, so not appropriate

Use Market Value of similar instruments

find instruments with same risk profile and related characteristics as the liabilities
construct "measurement portfolio"
-but there is no replicating portfolio for insurance risks, so not appropriate

Use the Present Value of future cash flows, if there is no Market Value available

PV model is flexible, with multiple approaches

if cash flows have no risk, must include adjustment for risk:

1) adjust discount rate
2) use option pricing to weight results across scenarios
3) adjust the cash flows (certainty equivalents)
can reflect multiple risks with this method

include all cash flows that could occur under the contract

include costs incurred in fulfilling obligations

-insurance contracts have risk, so must include risk adjustment
-must reflect all cash flows, including non-guaranteed dividends and floors

Solution 8 (continued)

(b)

$r_A = r_f$ + Credit Premium + Liquidity Premium

$r_A = 4\% + 1.25\% + 0.15\%$

$r_A = 5.40\%$

e =Equity/Liabilities

Equity = Assets – Liabilities = 5% * Assets

Liabilities = 95% * Assets

e =(5% * Assets)/(95% * Assets)=5.263%

$$r_L = r_A - e\left(r_E/(1-t) - r_A\right)$$

$$r_L = 5.4\% - 5.263\%\left(12\%/(1-35\%) - 5.4\%\right)$$

$$r_L = 4.713\%$$

Fair Value = PV of Cash Flows at r_L

$$\text{FVL} = \frac{400}{(1.04713)} + \frac{600}{(1.04713)^2} + \frac{750}{(1.04713)^3}$$

FVL = $1,582.42 million

Solution 9

Large Integrated question that pulled together Variable Annuities, minimum guarantee risks, hedging and a fund value calculation. The reserve calculation was difficult for many candidates. One of the teaching points for this question was that pricing assumptions are seldom realized and the actuary should understand the source of any differences. Another was that while there are many ways to hedge, perhaps the first question to be asked is whether hedging the risk make sense for the company.

(a)

- EIAs are generally shorter-term contracts than VAs
- EIAs are general account products generally invested in risk free investments with a call option on an index.
- VAs are invested in segregated accounts (i.e., stock funds) and have put option for Guarantee Minimum Death Benefit
- EIAs are typically in the money at maturity and VAs are not.
- EIAs are generally "price" indices and don't include dividends while VAs use total return including dividends, so must compensate for that.

(b)

- Fund Value Calculation
- $F_t = F_{t-1} \times S_t / S_{t-1} \times {}_1p_x \times (1- m)$
- Death Benefit$_t$ = Max$\{0, G_t - F_{t-1} \times S_t / S_{t-1} \times (1 - m)\} \times (1 - p_x)$
- Reserve$_1$ = Max(PV of DB$_i$) where i = 2 to 5 using valuation rate for PV calculation
- Calculation Details

Assumptions at issue

t	0St	0Ft	Exp. DB	PV0	0Gt
0	100	$ 1,000.00	$ -	$ -	$ 1,000.00
1	105	$ 1,029.08	$ -	$ -	$ 1,024.85
2	103	$ 989.36	$ 0.28	$ 0.26	$ 1,050.32
3	112	$ 1,054.38	$ 0.08	$ 0.07	$ 1,076.42
4	120	$ 1,107.18	$ -	$ -	$ 1,103.17
5	135	$ 1,220.76	$ -	$ -	$ 1,130.58
Reserve at T=0 is max PV(0)				$ 0.26	

Assumptions at T=1

1St	1Ft	Exp DB	PV1	$_1G_t$
100	1000			$ 1,000.00
80	$ 784.06			$ 1,024.85
89	$ 853.17	$ 1.32	$ 1.27	$ 1,048.21
100	$ 937.63	$ 0.90	$ 0.83	$ 1,072.09
110	$ 1,008.81	$ 0.56	$ 0.50	$ 1,096.53
120	$ 1,076.42	$ 0.26	$ 0.22	$ 1,121.52

Anticipated Reserve at Time 1 $ 0.27 ***Reserve at Time 1 is max PV(1) $ 1.27***

	t0 Assumptions	t1 Assumptions
Guar Accum Rate	3%	3%
Prob of Death per annum	0.50%	0.70%
Prob of Survival per annum	0.995	0.993
Annual mgmt expense	1.50%	1.50%
Valuation Rate	4%	4%
Actual death rate in yr 1	0.50%	

Solution 9 (continued)

(c)
- Reinsurance – buy options and pass the risk to a 3rd party. This method completely eliminates the risk but most if not all of the profit would be lost with the cost of the reinsurance.
- Dynamic Hedging – Create a hedge that exactly duplicates the value of the expected liability using Black-Scholes. Must continually rebalance hedge. Investment is the cost of the option. The hedge is not perfect so errors erupt.
- Actuarial Approach – Use stochastic simulation to determine a distribution of liabilities from the option. Use long-term fixed rate of interest to discount liabilities.
- Ad-hoc Method – This method is used when there is almost no risk of a liability. This is a very poor method if there is any risk because the size of the liability is very large if there is a claim.

(d)
- Cost of the hedge
- Management expectations of the market
- Additional capital and costs required if there is no hedge.
- Size of possible loss
- Is product still profitable with the hedge?
- Extent strategy relies on assumptions about policyholder behavior
- Overhead expenses
- Counterparty risk exposure

(e)
- This product can still be more profitable as new liabilities from today will be priced with today's market and future outlook.
- GMDB does not imply that actual economic losses will be at those levels. Could vary based on actual deaths and market performance.
- Hedging can make a difference in financial and economic terms. Can hedging be done prudently and cost effectively?
- To really analyze product and make recommendations, must do stochastic analysis to support the assumptions.

Solution 10

Case Study question on appraising life insurance companies. Part a of this question requires the student to recall various lists from the syllabus regarding assumptions for actuarial appraisals and pull examples from the case study. Students who provided examples specific to the case study in addition to just providing a list of the required assumptions scored better. The second part of this question is looking for students to provide the argument for the buyer's side of an appraisal.

(a)

Economic Assumptions
Macroeconomic – GDP and local inflation
Assets and Asset Valuation – admitted assets vary by country
Projected yields – use investment strategy with CAPM
- leverage an ALM model from valuation effort
- create portfolio rates for existing new business

Choosing a risk discount rate – competitors
Cost of capital – currently 11%
Transaction risk
Taxes
Hurdle rate – internal 9%
Expected long term interest rate
Nominal rates if inflation not a concern
Real rates otherwise

Actuarial Assumptions
Premium growth – have projections of new business
- anticipating full 50% increase in production this year
Mortality
Commissions
Dividends
Lapses
Reserves – should consider adequacy of reserves
Reinsurance – losing current YRT reinsurance, so will need to be restructured
Cost of capital – Kelly's rating on negative outlook
- downgrade may have adverse affect
Expenses – overhead
- parent/subsidiary needs

Solution 10 (continued)

(b)

Differences may arise from:

- different actuarial assumptions (e.g., mortality, lapse)
- different economic assumptions (e.g., expected future interest rates)
- synergy values (arise from the following)
    - cost savings
    - increased revenue
    - financial engineering
    - taxes
    - process improvements

- different discount rate (as this is company specific)
- different cost of capital
- different assumptions about new business growth or profitability
- perception of transaction risk
- value of purchased business as an internal hedge

Solution 11

Question pulls together REMM and behavioral theories of investment strategies. Part a is simply looking for an explanation of REMM. Parts b and c require the student not only to define the concept but more importantly to explain the applicability of each to Wayne.

(a) Wayne views people as:

- Evaluators who care about everything
- Resourceful and will find ways to make their desires and wants satisfied.
- Having unlimited wants and cannot get enough of wants
- Being utility maximizers
  - Individuals have assets and will freely exchange those assets to maximize wealth, personal feelings, acceptance, etc.
  - Individuals recognize and are impacted by their environment, but are not told by their environment how to behave
- People make choices as they see choices important to them.

(b) Contrarian investment strategy:

- Out-of-favor stock price is just under-valued by recent bad events and reaction is overemphasized by short-term negative result.
- Buy out-of-favor stock and hold it for long term to hopefully earn profits
- Therefore, it should be possible to earn excess returns simply by investing in the stocks of companies that have done extremely poorly in past years
- Wayne is using a contrarian-like strategy, but he has more rational reasoning behind it (i.e. people consume Coca Cola, Dairy Queen and Gap in all economic cycles), rather than only the out-of-favor screen used in the contrarian strategy.

(c) Overconfidence:

- People usually overconfident in their own ability
- They always overestimate the reliability of their knowledge

Wayne:

- It is applicable to Wayne
- He made decisions based on the information he collected on his own

Non-Bayesian Forecasting:

Solution 11 (continued)

- People make decisions based on similarities - People use "representativeness heuristic"
- They place more weight on recent data and give too little weight to the base rate or prior odds
- They overreact to recent experiences - making forecasts that are too extreme

Wayne:

- It is not applicable to Wayne
- Although the stock prices of Cola-Cola etc are depressed, he invested heavily in these companies.

Fashion and Fads

- People are influenced by each other
- People feel pressure from their environment when they make decisions.

Wayne:

- It is not applicable to Wayne
- As other investors invested heavily in internet-related companies, he invested heavily in Coca-Cola, Dairy Queen and Gap.

Solution 12

This is a focused question on tax strategies that consists of two situations. For each situation the student must do some calculations to demonstrate the arbitrage situation. Parts b and d required the candidate to state a position regarding the effectiveness of the arbitrage, and provide support for their statement.

(a) Organizational form arbitrage involves a long position in a tax favored (life insurance) asset and a short position in a tax disfavored (loan) asset.

- Buffy owes interest of $2,500,000 x 0.08 = $200,000 from loan.
- She pays the $200,000 interest due from her salary.
- Her net income is $200,000 salary less $200,000 interest on loan = 0.
- Buffy's tax liability is $0 x 0.36 = $0.

- Buffy earns $2,500,000 x 0.08 = $200,000 from policy.
- She can borrow this interest free.

- Her total wealth position is unchanged because of the interest-free loan from the policy

(b) Not Effective

1. Tax regulations limit the deduction of interest to offset investment income.

2. Life insurance contains pure mortality component. Cannot get entire salary replicated, as a portion of the fund value will be reduced by mortality charges.

3. Buffy would have to buy minimum level of insurance coverage to obtain tax free build up (which she may not need).

4. Frictions in purchasing insurance contract, commissions paid, as well as likelihood to get loan at same rate as insurance company credits.

(c) This is Black-Tepper arbitrage

- Invest in bonds for pension asset. The bond return, $r_b = 5\%$. Pension assets grow tax free.
- Issue corporate debt using pension asset as collateral.
- The amount of debt needed has to be grossed up by the corporate tax on capital gains t_{cs}, so issue $100 / (1 - t_{cs})$ Assume $t_{cs} = 0$, then issue $100 mm of corporate debt.
- Note: The arbitrage opportunity begins to disappear when t_{cs} grows beyond t_c.

Solution 12 (continued)

PLAN	INVESTMENT	RETURN
Plan A		
Pension Fund:		
Purchase Stock	\$100 mm	r_c
Plan B		
Pension Fund:		
Purchase Bonds	\$100 mm	R_b
Corporate Account:		
Issue debt	\$(100) mm	$-R_b(1-t_c)$
Purchase Stock	\$100 mm	r_c
Net Position	\$100 mm	$R_c + R_b t_c$
Plan B – Plan A	**\$0 mm**	$\mathbf{R_b t_c}$

(d) Not Effective

1. The above strategy supposes the company has to pay no tax on stock. When tax is considered then the company should issue $100 / (1 - t_{cs})$ and the excess return will be $R_b (t_c - t_{cs}) / (1 - t_{cs})$. This will lower the excess return on the arbitrage opportunity.
2. Since the assets under the pension fund belong to the pension participants (they have the first call in a bankruptcy), not the company, and the pension trustees may change their investment strategy (moving away from bonds to more risky investments), the debt holders may require a higher rate of return as the corporate account has more risk. This will also reduce the excess return

Solution 13

Integrated question pulling together concepts of shortfall risk, financing decisions, capital structure, and valuation of the option component of debt. Parts a and e are similar to calculations from the reading materials and are similar to questions asked in prior years' exams. Part b requires that students identify the factors for the borrower and lender separately; most students just provided a list of the factors that would apply to either one. Part c and d are an application of the text.

(a) Maximum leverage is point where firm line intersects shortfall line.

Shortfall line: $P_r\left(ROE > ROE_{\min}\right) \geq 95\%$

$= P_r\left(ROE > 0\right) \geq 95\%$

Firm line: $E\left(ROE\right) = i + \left[\frac{E\left(ROA\right) - i}{SD_{ROA}}\right] \times SD_{ROE}$

where $SD_{ROE} = \frac{SD_{ROA}}{1-h}$ and

0 = after tax = I* * (1-t) = .10 * (1 - .30) = 7%

$\Rightarrow$ shortfall line: Normalize=1

$$\frac{ROE_{\min} - E\left(ROE\right)}{SD_{ROE}} \leq -Z_R$$

when $Z_R = 1.645$

$\Rightarrow$ intersect at hmax

$$\text{hmax} = \left[\frac{ROA - SD_{ROA} * Z_R - ROE_{\min}}{(i - ROE_{\min})}\right]$$

= (.13 - 0.7 * 1.645 - 0)/(.07 - 0) = 21.2%

(b) Favorable tax treatment of interest payments
Restrictions on operators imposed by creditors
Signals sent to market
Riskiness of cash flows
Nature of assets
Asset quality
Potential value of assets
Liquidity of assets

Solution 13 (continued)

(c) Public debt (PD) has higher seniority than preferred stock (PS)
PD can trigger bankruptcy, but PS cannot
Control:
PD may have right to invest activities specified in covenants
PS may have conditional voting rights (i.e., if payment missed)
Corporate Tax Shields:
PD & Lease & Interest deductible
PS – dividends are not deductible
Tax Liability – Individual:
PD – interest payments fully taxable
PS – dividends fully taxable
Tax Liability – Corporate
PD – interest payments fully taxable
PS – 70% of dividends excluded from taxable income

(d) Equity CF method biased because it doesn't incorporate firm's right to deficit
- expected CFS too low
- discount rate applied too high

Debt is risky and overestimated E
Discount rate too high $\Rightarrow$ E too low

(e) ECF ignored value of guarantee
value of guarantee = Default free debt – Risky debt
Default Free Debt = Face value of Debt = \$50M
Risky Debt = Market value of debt = \$50M × 90%=45M

True Balance sheet: Market Value Approach:
Equity = Assets – Debt
= Assets - [Riskless Debt - guarantee]
= \$700 - [50 – 5] = \$655M

ECF Balance Sheet has
Equity=Assets-Debt=\$700-\$50=\$650M

$\Rightarrow$ ECF underestimated equity by
\$655M-\$650M=\$5M

Solution 14

This is a straightforward focused LBO question. Part c requires that the student state a position and support that position.

(a)

Company should be mostly equity. It is new and rapidly growing, therefore a high risk/high reward profile.

Consider the trade-off model: Vl = Vu + PV Tax Shields - PV Bankruptcy Costs + PV Agency Costs of Equity - PV Agency Costs of Outside Debt.

PV Bankruptcy Costs likely to be high due to lack of tangible assets and the fact that it is a high risk company. As a high risk firm, the agency costs of debt may also be high. Covenants can restrict flexibility and constrain managers from making value-increasing investments.

(b)

Absent an incentive to report higher earnings per share, an accounting method would be chosen to minimize taxes. There is an increased focus on free cash flow to meet debt payments. Typically there is forced discipline on managers and quick intervention in the event of problems. Management's equity holdings bring a focus on long-term success and a reduction in agency costs.

(c)

An LBO is not appropriate for this situation. LBOs work best for low growth, mature businesses with stable cash flows and low capital requirements. There should also be tangible assets to collateralize the loan. None of this applies here.