

ILA LFMU Model Solutions

Spring 2023

1. Learning Objectives:

4. The candidate will understand the fundamental purpose of capital, and its determination and stakeholders.

Learning Outcomes:

- (4a) The Candidate will be able to describe and evaluate the theory of capital (including economic capital), and evaluate its applicability for various purposes and its value to different stakeholders.

Sources:

LFM-854-22: NAIC Own Risk and Solvency Assessment (ORSA) Guidance Manual, National Association of Insurance Commissioners, Dec 2017

A Multi-Stakeholder Approach to Capital Adequacy, Conning Research

Economic Capital for life Insurance Companies, SOA Research paper, Oct 2016 (exclude sections 5 and 7)

Commentary on Question:

This question tested the candidates' understanding of capital management.

Solution:

- (a) List the major areas that should be discussed in the Own Risk and Solvency Assessment (ORSA) Summary Report.

Commentary on Question:

Candidates generally listed some of the major areas. Some candidates listed multiple items within the same area but failed to identify other major areas.

The ORSA Summary Report should discuss the following major elements:

- Description of the Insurer's Risk Management Framework
- Insurer's Assessment of Risk Exposure
- Group Assessment of Risk Capital and Prospective Solvency Assessment

1. Continued

(b) Critique the following statements:

A. *The results of an economic capital model could lead to forced receivership of the company or downgrade of the company.*

Commentary on Question:

Candidates generally did well in their critique of this statement.

False. Economic capital models take a customized view of the insurer's need for capital, but, unlike the standardized regulatory and rating agency models, have no real consequences for the insurer. The results of the economic capital model are currently used only to provide information to the company.

B. *Company ABC determines its interest rate risk as a fixed 10% of reserves factor. The risk assessment is deemed as realistic as the reserves reflect the risk.*

Commentary on Question:

Most candidates correctly identified that this statement was false but did not provide sufficient rationale to receive full credit.

False. We do not classify this as a realistic risk assessment because it does not consider the specific risks faced by the company, is not based on current market data or historical analysis and is not updated frequently.

C. *Both rating agencies and shareholders consider the more capital an insurer has, the better.*

Commentary on Question:

Most candidates correctly distinguished the difference in objectives between rating agencies and shareholders and addressed the opposing objectives shareholders face.

False (True for rating agencies but false for shareholders).

Rating agencies, like regulators, are concerned with the ability of the insurer to meet its obligations. Generally, from a rating agency perspective, more capital is the favored position.

1. Continued

The shareholders' objective is to maximize their return on capital while maintaining enough capital to absorb unexpected, non-diversifiable risk. In addition, shareholders want enough capital to support growth of new and existing operations that will meet their return-on-capital requirements. Shareholders thus have multiple objectives that pull the amount of required capital in opposing directions. That is, some objectives are satisfied with higher capital levels, some objectives are satisfied with lower capital levels.

D. The "correlation matrix approach" is a common approach used for evaluating the diversification benefit. The correlation assumptions are often set by a combination of historical data or expert forecasts that analyze the relationship between risk scenarios. The correlations are applied to the risk scenarios.

Commentary on Question:

Candidates generally did not do well in their critique of this statement. Most candidates correctly identified that the first sentence was correct. Many candidates identified the second sentence as incorrect when in fact it was correct. Many candidates did not identify the last sentence as incorrect. For the second and third sentences, a common mistake was around understanding how risk scenarios are related to the Correlation Matrix Approach.

True statement for how the correlation assumptions are set. False statement for how the correlation assumptions are applied, the correlations are applied to the standalone capital amount not the risk scenarios itself. The implication of this approach is that balance sheets respond linearly to risk scenarios, which can be a severe approximation for some types of business, creating a diversification amount which is a function of individual exposures rather than the underlying relationship between risk drivers.

E. Under the finite risk horizon approach, the Economic Capital represents the current market value of assets required to ensure that the value of liabilities can be covered at a finite point in the future, at the chosen security level, less the current value of liabilities. Under this approach, a run off projection is still required.

Commentary on Question:

Candidates generally did not do well in their critique of this statement. The most common error was to state that a run-off project was not required.

True. It is important to note that even under the finite risk horizon approach, a runoff projection is still required, since a terminal value of liabilities at the end of the risk horizon is needed. Future uncertainty surrounding the risk beyond the risk horizon is captured within the value of the liabilities at the end of the year.

1. Continued

- (c) Describe how Economic Capital can be used as a risk management tool in the following areas below.
- (i) Capital adequacy
 - (ii) Risk appetite

Commentary on Question:

Candidates generally did not do well on this part of the question. Many repeated or rephrased answers already given in previous parts of the question.

- (i)
Capital adequacy is the core use of EC for most insurers—providing a measure of capital that truly captures the risk of the insurer’s own portfolio, free from the distortions of regulatory reserving and capital requirements and the simplified approximations within most rating agency models.

Effective use of EC in measuring capital adequacy requires the EC measure to be integrated into the capital management process, with potential EC requirements along a number of scenario paths being developed and capital funding strategies developed to address these. EC can also be used to help determine asset allocations by lines of businesses.

EC often features strongly in discussions on capital adequacy with regulators, rating agencies, and plays an important role in discussions with shareholders and investment analysts.

- (ii)
EC is a key measure of risk from a policyholder perspective and therefore frequently features as an important component of an insurer’s risk appetite framework and in the monitoring processes implemented to ensure the insurer remains within that risk appetite.

To do this, target ranges for EC utilization need to be established for each geography, business unit and/or risk, and actual EC monitored against these target ranges. The setting of such ranges and limits needs to consider the expected level of diversification between risks as well as the level of granularity. EC can also be used to develop a tiered approach of deploying capital.

As risk profiles of the organization changes, the use of EC for this purpose requires an ability to update EC.

2. Learning Objectives:

1. The candidate will understand and apply U.S. GAAP valuation principles and methods applicable to individual life insurance and annuity products issued by U.S. life insurance companies.

Learning Outcomes:

- (1b) Describe and apply the requirements, calculations, and disclosures related to GAAP "Targeted Improvements".
- (1c) Describe, apply and evaluate the appropriate accounting treatments for derivatives and hedging arrangements.

Sources:

US GAAP for Life Insurers, Chapter 3, Product Classification and Measurement

US GAAP for Life Insurers, Chapter 11, Deferred Annuities

Commentary on Question:

This question tested the candidates' knowledge of US GAAP valuation principles.

Solution:

- (a) Describe the key considerations when classifying the following GAAP reserves of a fixed index annuity (FIA) with a guaranteed lifetime withdrawal benefit:
 - (i) Market risk benefits
 - (ii) Embedded derivatives

Commentary on Question:

This question tested the candidates' knowledge of MRBs and EDs. Most candidates recognized that a "guaranteed lifetime withdrawal benefit" (GLWB) is an MRB. Most candidates recognized that chosen indexes in the FIA will result in an ED. Some candidates recognized that an MRB and ED are both valued at fair value. Order is important per ASU 2018-12 on identifying any MRBs first, then evaluate and identify any remaining ED. Candidates could receive full credit without including any items under "Criteria Details" below. They are available for partial credit and further describe applicable criteria.

- (i) GLWB is a Market Risk Benefit (MRB); accounted under fair value

Two-fold criteria for a feature to be an MRB: 1) It must protect the policyholder from, and 2) expose the insurer to, "other than nominal" capital market risk.

2. Continued

Criteria Details:

a) Protection refers to the transfer of a loss in, or shortfall (difference between account balance and benefit amount) of, the policyholder's account balance from the policyholder to the insurer, with such transfer exposing the insurer to capital market risk that would otherwise have been borne by the policyholder.

b) Protection does not include death benefit component of a life insurance policy (difference between account balance and death benefit amount). This condition does not apply to an investment or an annuity contract (including an annuity contract classified as an insurance contract).

c) A nominal risk, explained in paragraph 944-20-15-21, is a risk of insignificant amount or that has a remote probability of occurring. An MRB is presumed to expose insurer to other-than-nominal capital market risk if benefit would vary more than an insignificant amount in response to capital market volatility.

(ii)

The chosen index(es) within the fixed indexed annuity are embedded derivatives; accounted under fair value

Once MRBs are identified, the remainder is evaluated to determine whether it contains an embedded derivative or meets definition of a stand-alone derivative.

Criteria Details:

a) It contains an underlying and one or more notional amounts or payment provisions

b) It does not require an initial net investment to enter into the contract

c) The terms of the contract permit or require net settlement or allows delivery of an asset of similar value

(b) For a 5-year point-to-point FIA without living benefits, you are given:

Option budget	4.0%
Guaranteed value first year load	12.5%
Guaranteed minimum interest rate	1.5%
Risk-free interest rate	2.0%
Discount rate	2.5%

There are no lapses other than 100% lapse at the end of year 5.

2. Continued

Yr	Mortality	Persistency	Index Credit	Undecrementated		Decrementated	
				Index AV	Guaranteed Value	Index AV	Guaranteed Value
0		1.00000		1,000,000	875,000	1,000,000	875,000
1	0.1%	0.99900	40,800	1,040,800	888,125	1,039,759	887,237
2	0.3%	0.99600	42,465	1,083,265	901,447	1,078,935	897,844
3	0.5%	0.99102	44,197	1,127,462	914,969	1,117,341	906,755
4	0.7%	0.98409	46,000	1,173,462	928,693	1,154,788	913,914
5	0.9%	0.97523	47,877	1,221,340	942,624	1,191,086	919,274

Calculate the following GAAP liabilities at the end of year 2 using the option budget method:

- (i) Value of embedded derivative
- (ii) Host value

Show all work.

Commentary on Question:

This question tested the candidates' knowledge of VED and Host Value. Some candidates correctly calculated the death benefit, while few candidates correctly calculated the maturity benefit (it was frequently omitted leading to a very small VED and Host). Many candidates correctly split the total benefit into guaranteed benefit (covered by the host) and excess benefits (covered by the ED). Few candidates used the risk-free interest rate for VED calculation. Few candidates correctly created Host Cash Flows for an IRR calculation and then correctly used the IRR to calculate the Host Values. Some candidates attempted to calculate year 2 values from years 0-2 only (ignoring the rest of the years), which does not result in a correct calculation for VED or Host Value.

Table of Calculated Values

Year	(1) Death	(2) Maturity	(3) Guaranteed Benefit	(4) Excess Benefit	(5) VED	(6) Host CF	(7) IRR	(8) Host Value
0					233,518	766,482	5.09%	766,482
1	1,000	0	875	125	238,063	(875)		804,606
2	3,119	0	2,662	458	242,367	(2,662)		842,888
3	5,395	0	4,489	905	246,309	(4,489)		881,287
4	7,821	0	6,347	1,474	249,761	(6,347)		919,782
5	10,393	1,210,946	966,584	254,756	0	(966,584)		0

2. Continued

$$(1) \text{ Death } (t) = \text{Undecrementing Index AV } (t-1) * \text{Persistency } (t-1) * \text{Mortality } (t)$$

Note: Persistency provided is cumulative (L_x), mortality is annual (q_x)

$$\text{Alternatively: Death } (t) = \text{Decrementing Index AV } (t-1) * \text{Mortality } (t)$$

$$(2) \text{ Maturity } (5) = \text{Undecrementing Index AV } (5) - \text{Death } (5), \text{ otherwise } 0$$

$$(3) \text{ Guaranteed Benefit } (t) = \{\text{Death } (t) + \text{Maturity } (t)\} * \{\text{Undecrementing Guaranteed Value } (t-1) / \text{Undecrementing Index AV } (t-1)\}$$

$$(4) \text{ Excess Benefit } (t) = \text{Death } (t) + \text{Maturity } (t) - \text{Guaranteed Benefit } (t)$$

Split is:

Excess Benefit \rightarrow Value of Embedded Derivative (VED), Risk-Free Interest Rate

Guaranteed Benefit \rightarrow Host Value, Solved IRR

$$(5) \text{ VED } (t) = \{\text{VED } (t+1) + \text{Excess Benefit } (t+1)\} / (1 + \text{Risk-Free Interest Rate})$$

Risk-Free Interest Rate is given as 2.00%

Note: Solve recursively as VED (5) = 0, work backward from 4 to 0

$$(6) \text{ Host CF } (0) = \text{Premium} - \text{VED } (0)$$

$$\text{Host CF } (t > 0) = - \text{Guaranteed Benefit } (t)$$

$$(7) \text{ IRR (Host Cash flows)} = 5.09\%$$

$$(8) \text{ Host } (0) = \text{Premium} - \text{VED } (0)$$

$$\text{Host } (t > 0) = \text{Host } (t-1) * (1 + \text{IRR}) + \text{Host CF } (t)$$

Reasonableness checks:

✓VED is growing toward Excess Benefit (5) as benefit concentrates there

✓IRR is within a reasonable range

✓Host is growing toward Guaranteed Benefit (5) as benefit concentrates there

$$(i) \quad \text{VED } (2) = 242,367$$

$$(ii) \quad \text{Host } (2) = 842,888$$

3. Learning Objectives:

1. The candidate will understand and apply U.S. GAAP valuation principles and methods applicable to individual life insurance and annuity products issued by U.S. life insurance companies.

Learning Outcomes:

- (1a) Describe, apply and evaluate the appropriate valuation methods and techniques and related accounting treatments for reserves and related items (e.g., DAC), and other assets and liabilities for specific insurance products under U.S. GAAP. Further, describe and recommend assumptions and margins appropriate to these GAAP reserves.
- (1b) Describe and apply the requirements, calculations, and disclosures related to GAAP "Targeted Improvements".

Sources:

LFM-856-23: US GAAP for Life Insurers, 2022, Chapter 4: Expenses

Commentary on Question:

This question tested the candidates' knowledge of US GAAP DAC principles.

Solution:

- (a) Calculate the deferrable acquisition expenses per individual policy.

Commentary on Question:

This part of the question tested the candidates' understanding of expenses, the different drivers (premium, policy size, policy count) and which expenses are deferrable. Many candidates struggled with the policy fee, which are part of the premium, not an expense for the insurer. Many candidates did not know how to use the override. Some candidates calculated the total expenses for the block instead of the deferred acquisition expenses per individual policy. Some candidates did not include the overrides. Many candidates included marketing expenses in deferrable acquisition costs. Many candidates calculated underwriting expense incorrectly.

Premium per policy = premium per 1000 x average size / 1000 + policy fee

Deferrable Commission = (annual rate – ultimate rate) x (1+override) x premium

Underwriting expense is incurred per applications, but only 40% are issued. This is a per 1000 expense so it has to be multiplied by the average size in thousands.

Maintenance and marketing are not deferrable.

3. Continued

Duration	Premium	Deferrable Commission	Issue Expense Per Policy	Underwriting Expense	Total Deferrable Expense
1	\$487.50	\$828.75	\$50.00	\$1,500	\$2,378.75
2	\$487.50	\$91.41	\$0.00	\$0	\$91.41
3	\$487.50	\$26.81	\$0.00	\$0	\$26.81
4	\$487.50	\$26.81	\$0.00	\$0	\$26.81
5	\$487.50	\$0.00	\$0.00	\$0	\$0.00

- (b) Determine the DAC asset to be reported for this block of business at the end of each of the next five years, under the following:
- (i) Individual Contract Approach
 - (ii) Grouped Contract Approach

Commentary on Question:

This part of the question tested the candidates' understanding of the two DAC approaches and the differences between them. The first method requires calculation of the DAC per policy, then aggregating that by multiplying with the expected policies in force. It requires an understanding of capitalization and amortization (the latter updated under US GAAP LDTI). The second method requires aggregating the deferrable expenses before applying the amortization.

Many candidates knew to add current year capitalized expenses to the prior year DAC balance before applying the amortization percentage.

Individual approach:

				End-of-Year	End-of-Year	Total End-of-Year
		Deferrable	DAC	DAC	Number of Policies	DAC
Duration	Persistence	Expense	Amortization	Asset	Inforce	Asset
0	1			\$2,379	10,000	\$23,787,500
1	0.8	\$2,378.8	\$617.2	\$1,762	8,000	\$14,092,017
2	0.72	\$91.4	\$519.4	\$1,333	7,200	\$9,601,101
3	0.684	\$26.8	\$476.9	\$883	6,840	\$6,042,588
4	0.6498	\$26.8	\$466.8	\$443	6,498	\$2,881,514
5	0	\$0.0	\$443.4	\$0	0	\$0.00

DAC Amortization = (Prior year DAC + Current Year Deferrable expense) x current survivorship factor / (sum of current and future survivorship factors)

3. Continued

DAC Asset at EoY = Prior year DAC Asset – Amortization + Current Year Deferrable Expense

Total DAC Asset = End of year number of policies x DAC Asset per policy

Grouped approach:

	Number of Policies	Sum of Current and Future Inforce	Deferrable Expense Incurred	DAC Amortization	Total End-of-Year DAC Asset
Duration 0	10,000	38,538			\$23,787,500
1	8,000	28,538	\$23,787,500	\$6,172,479	\$17,615,021
2	7,200	20,538	\$731,250	\$5,142,973	\$13,203,298
3	6,840	13,338	\$193,050	\$4,696,353	\$8,699,994
4	6,498	6,498	\$183,398	\$4,555,586	\$4,327,806
5	0	0	\$0	\$4,327,806	\$0

Take per policy deferrable expense and multiply by the number of policies inforce to get the aggregate deferrable expense.

- (c) Recommend an approach for calculating the DAC asset. Justify your answer

Commentary on Question:

This part of the question tested the candidates' understanding of DAC and its relevance to insurers. DAC is used to defer expenses, which allows an insurer to recognize earnings even in the early years of a policy. While ease of use is one criterion for choosing a method, the impact on earnings is the key to this question, which many candidates struggled to recognize.

I recommend the group approach.

Under the individual contract approach, the entire DAC asset is written off, which results in faster amortization. This is not true under the grouped contract approach where terminations are built into the amortization schedule and no additional write-off happens because DAC is not explicitly allocated to the individual contract. The grouped approach amortizes DAC more slowly than the individual approach, which results in more GAAP income being reported sooner.

4. Learning Objectives:

1. The candidate will understand and apply U.S. GAAP valuation principles and methods applicable to individual life insurance and annuity products issued by U.S. life insurance companies.
2. The candidate will understand and apply U.S. Statutory valuation principles and methods applicable to individual life insurance and annuity products issued by U.S. life insurance companies.

Learning Outcomes:

- (1a) Describe, apply and evaluate the appropriate valuation methods and techniques and related accounting treatments for reserves and related items (e.g., DAC), and other assets and liabilities for specific insurance products under U.S. GAAP. Further, describe and recommend assumptions and margins appropriate to these GAAP reserves.
- (2a) Describe, apply and evaluate the appropriate valuation methods and techniques and related accounting treatments for reserves and related items, and other assets and liabilities for specific insurance products under the U.S. Statutory rules. Further, describe and recommend assumptions and margins appropriate to these statutory reserves.

Sources:

LFM-856-23: US GAAP for Life Insurers, 2022, Chapter 5: Non-Participating Traditional Life Insurance

Statutory Valuation of Individual Life & Annuity Contracts, 5th Ed, 2018, Chapter 11 – Valuation Methodologies (exclude 11.3.9 to 11.3.11)

Commentary on Question:

This question tested the candidates' understanding of U.S. GAAP principles and methods.

Solution:

- (a) Critique the following statements with regards to IKC's GAAP reserve calculation:
 - A. *IKC expects the GAAP reserve for the traditional block of business to be 0 at issue, similar to the statutory reserve under CRVM.*
 - B. *Since the net premium ratio is required to be capped at 100%, IKC doesn't need to perform loss recognition and profit followed by loss testing for the life block of business.*
 - C. *IKC considered both the spot yield curve and effective yield curve as the discount rate for the term and payout business and expects the effective yield to be always less than all rates on the spot curve.*

4. Continued

- D. *For the payout business, the claim-related expense assumptions will be locked in since IKC expects the expense is less volatile. For the life block, IKC decides to update the expense assumption annually, the same frequency as other assumptions, e.g., mortality and lapse.*

Commentary on Question:

Most candidates received partial credit for this part of the question. Statement B required an understanding of a requirement of both loss recognition and profits-followed-by-losses testing for universal life-type contract at the given situation.

- A. If the net premium ratio ("NPR") is less than 100%, the GAAP reserve at inception will be 0. If the NPR is over 100%, GAAP reserve at inception will not be 0, and equal to the excess of the present value of benefits and applicable expenses over the present value of gross premiums. The time 0 CRVM reserve is 0, and the comment is correct.
- B. Loss recognition and profits-followed-by-losses testing are not applicable for Term and non-par whole life. For universal life-type contracts and participating whole life contracts, both loss recognition and profits-followed-by-losses testing is required.
- C. With premiums payable over multiple years and a normally (upward) sloped yield curve, it is possible for the effective yield to exceed even the long-term spot rates. This is because the negative cash outflows in the early years are discounted at a lower rate than the positive cash outflows in the later years, creating a leveraging effect when calculating the effective yield.
- D. Lock or not lock expense assumption should be the company-wide decision. Should not vary by line of business.
- (b) Calculate the following as of 1/1/2023:
- (i) GAAP reserve
- (ii) Accumulated Other Comprehensive Income

Show all work.

Commentary on Question:

Candidates generally did well on the time 0 NPR calculation. The most common errors were anything to do with calculating the locked in 1/1/2023 reserve: not realizing the need to re-calculate the reserve with 1/1/2023 rates; or shifting the mortality and survivorship when it was not required.

4. Continued

Calculate in the spreadsheet in order:

- Locked in discount rate at time 0: $(1 + \text{locked in spot rate})^{-(t)}$.
- Locked in discount rate as of 1/1/2023: $(1 + \text{locked-in spot rate})^{-(t-1)}$ - assuming the same t as in row 25.
- Current discount rate as of 1/1/2023: $(1 + \text{current spot rate})^{-(t-1)}$ - assuming the same t as in row 25.
- $px = \text{prior period } px * (1 - qx)$.
- $\text{projected face amount} = \text{initial face amount} * px$.
- $\text{Premium} = \text{face amount} * \text{premium per unit}$.
- $\text{Death benefit} = \text{end of prior period face amount} * qx$.
- PV premium for NPR calculation.
- PV death benefit for NPR calculation.
- $\text{net premium ratio} = \min(1, \text{pv death benefit}/\text{pv premium})$.
- Locked in PV premium and PV death benefit.
- Current PV premium and PV death benefit.
- Locked in and current GAAP reserve.
- AOCI.

More details are provided in the spreadsheet.

5. Learning Objectives:

2. The candidate will understand and apply U.S. Statutory valuation principles and methods applicable to individual life insurance and annuity products issued by U.S. life insurance companies.

Learning Outcomes:

- (2a) Describe, apply and evaluate the appropriate valuation methods and techniques and related accounting treatments for reserves and related items, and other assets and liabilities for specific insurance products under the U.S. Statutory rules. Further, describe and recommend assumptions and margins appropriate to these statutory reserves.

Sources:

Statutory Valuation of Individual Life & Annuity Contracts, 5th Ed, 2018, Chapter 10 – Valuation Assumptions

Statutory Valuation of Individual Life & Annuity Contracts, 5th Ed, 2018, Chapter 18 – Fixed Deferred Annuities

Commentary on Question:

This question tested the candidates' knowledge of US Statutory valuation principles.

Solution:

- (a) You are given the following for a fixed deferred annuity contract:

Issue date	6/30/2018
Valuation date	6/30/2020
Issue age	50
Gender	Male
Guaranteed interest credited rate	2.5%
Fund value on valuation date	115,000
Valuation interest rate for death benefits	5.0%
Valuation interest rate for withdrawal benefits	4.0%
Death benefit	Fund value (paid at end of contract year)

Valuation mortality	2012 IAM Male Age Nearest Birthday (1000qx)		Projection Scale G2 Male, Age Nearest Birthday
	Age		
	50	2.285	1.0%
	51	2.557	1.1%
	52	2.828	1.1%
	53	3.088	1.2%
	54	3.345	1.2%
	55	3.616	1.3%
	56	3.922	1.3%
	57	4.272	1.4%
	58	4.681	1.4%
59	5.146	1.5%	
Full surrender during the guarantee period is allowed, but incurs a surrender charge according to the following surrender charge schedule	Year	Surrender Charge %	
	1	5%	
	2	4%	
	3	3%	
	4	2%	
	5	1%	
	6	0%	
	7	0%	

Calculate the present value of the integrated benefit stream with no partial withdrawals that ends in a full withdrawal at the end of the fifth contract year as of the valuation date.

Commentary on Question:

Candidates generally did well on this part of the questions. Key components of successful calculations were the projected fund values, cash surrender values, mortality rates, death benefits, withdrawal benefits, discounted benefits, and the sum of both the death benefits and withdrawal benefits as the integrated benefit stream.

Some areas where candidates struggled were:

- *Timing of the calculations (e.g., 5 years from the valuation date versus 5 years from the contract inception date)*
- *Application of mortality improvement (either did not reflect it or had the wrong number of years)*
- *Properly reflecting the impact of persistency (ip_x).*

Solution provided in Excel sheet.

5. Continued

- (b) Critique the following statements.
- A. *If the contract holder dies during the accumulation phase of a deferred annuity, the standard non-forfeiture law requires that the contract must pay the full fund value, waiving surrender charges.*
 - B. *The appointed actuary must certify quarterly that the insurer complies with the “Hedged as Required” criteria for any CARVM reserves calculated for an indexed deferred annuity product.*
 - C. *If an annuity contract contains a two-tiered interest credit feature, the CARVM reserve should be calculated with all benefits calculated based on the higher rate tier as that will result in the greater present value.*
 - D. *An elective partial withdrawal benefit has a historical utilization rate of 5%. Therefore, it is reasonable to use the 5% for the CARVM calculation.*
 - E. *When determining the valuation interest rates for different benefits on the same contract, the “plan type” is the only parameter that could cause the benefits to have different valuation interest rates.*

Commentary on Question:

In general, candidates did well on this part of the question. Successful candidates did more than just state whether the statement was true/false, correct/incorrect, etc., and provided rationale for their decision.

A: False, contract must pay a benefit equal to or greater than the minimum nonforfeiture value, which may be less.

B: False, this is only true if the reserves are calculated using the Type 1 EDIM method. Type 2 methods do not have this same requirement.

C: False, The funds for the two tiers should each be calculated separately, and each benefit stream should be based on the specific fund that applies to that benefit.

D: False, all possible utilization rates should be considered. It may be possible to show that the utilization rate should be either 0% or 100% can be shown to calculate the greatest present value.

E: False, the interest guarantee period should also be determined at the benefit level.

6. Learning Objectives:

2. The candidate will understand and apply U.S. Statutory valuation principles and methods applicable to individual life insurance and annuity products issued by U.S. life insurance companies.

Learning Outcomes:

- (2a) Describe, apply and evaluate the appropriate valuation methods and techniques and related accounting treatments for reserves and related items, and other assets and liabilities for specific insurance products under the U.S. Statutory rules. Further, describe and recommend assumptions and margins appropriate to these statutory reserves.
- (2b) Describe, apply and evaluate the Principle-Based Reserves valuation methods and techniques for specific insurance products under U.S. Statutory rules.

Sources:

Statutory Valuation of Individual Life & Annuity Contracts, 5th Ed, 2018

Chapter 23 – VM-20: PBR for Life Products (exclude 23.1) LO#2 LFM-143-20:
Fundamentals of the Principle-Based Approach to Statutory Reserves for Life Insurance,
July 2019

PBA Corner, Financial Reporter, Jun 2016

Commentary on Question:

This question tested the candidates' knowledge of US Statutory valuation principles, particularly mortality.

Solution:

- (a) Calculate the Limited Fluctuation credibility factor Z. Show all work.

Commentary on Question:

Candidates generally did well on this part of the question.

Given:

$$r = .1;$$

$$z\text{-value} = 1.96;$$

$$\text{Mortality A/E ratio} = 85\%$$

$$\text{Std Dev value of A/E ratio} = .03$$

$$\text{Formula: } \text{Min}[1, (r \times \text{A/E Ratio}) / (z\text{-value} \times \text{Std Dev})]$$

6. Continued

$$Z = (.1 * 85\%) / (1.96 * .03) = 144.6\%$$

Capped at 1 so $Z=1$

(Some candidates knew the current r factor has been dropped to .05 – they were not penalized for the different calculation)

- (b) Describe the considerations for SYL Life to transition to VM-20, with respect to the following credibility methods:
- (i) Limited Fluctuation
 - (ii) Bühlmann Empirical Bayesian

Commentary on Question:

Candidates generally did not do well on this part of the question. The key was the considerations specifically for SYL Life.

- (i) Limited Fluctuation
- easier to explain and uses only Company information – not industry
 - need to switch from counts to amounts in calculation
 - need to cap error margin at .05 which may reduce credibility
- (ii) Bühlmann Empirical Bayesian
- uses industry and Company information
 - based on face amounts – not counts
 - harder to interpret or explain the calculation
 - VM20 uses formulaic approximations for the industry
- (c) During their transition to VM-20, SYL Life reviewed its process for setting mortality assumptions to assess whether any changes to the process would be necessary.

Critique the following statements in terms of VM-20 requirements:

- A. *SYL Life can use its own mortality improvement experience for all projection years.*
- B. *SYL Life's reinsurance agreements will no longer result in mirrored reserves and the calculation for reinsurance reserve credit is based on PBR standards.*

6. Continued

- C. *Changes in SYL Life's circumstances that raise doubt about the reliability of the anticipated experience assumption would be reflected in the mortality margin.*
- D. *SYL Life can model its term and whole life blocks together for its deterministic reserve calculation.*
- E. *SYL Life's whole life lapse assumption is 100% credible, so even though lapses are a material risk, it would not require a margin.*

Commentary on Question:

Candidates generally did well in their critique of statements A, D and E. Some candidates did not provide the rationale in their critiques.

- A. This is incorrect – mortality improvement can not be projected past the valuation date under VM20
- B. While it is correct that mirrored reserves are unlikely to occur, YRT reinsurance agreements with non-guaranteed rates would use pre-PBR standards.
- C. Correct – the greater the uncertainty in the anticipated experience assumption, the larger the required margin
- D. Incorrect – Term, Whole Life and ULSG should not be modelled together – the methodology and assumptions for the seriatim calculation will be different. (Some candidates explained that Term was required to calculate DR and that WL may qualify for exemption using the Deterministic Exclusion Test)
- E. Incorrect- even with 100% credibility, VM20 requires margins in any material risk not stochastically modelled

7. Learning Objectives:

2. The candidate will understand and apply U.S. Statutory valuation principles and methods applicable to individual life insurance and annuity products issued by U.S. life insurance companies.

Learning Outcomes:

- (2b) Describe, apply and evaluate the Principle-Based Reserves valuation methods and techniques for specific insurance products under U.S. Statutory rules.

Sources:

Statutory Valuation of Individual Life & Annuity Contracts, 5th Ed, 2018, Chapter 23 – VM-20: PBR for Life Products (exclude 23.1)

LFM-143-20: Fundamentals of the Principle-Based Approach to Statutory Reserves for Life Insurance, July 2019

Commentary on Question:

This question tested the candidate's knowledge of VM-20 requirements for a clearly defined hedging strategy as well as the calculation and drivers of the VM-20 reserves.

Solution:

- (a) You are given MSY Life's risk mitigation strategy for ULSG below:

MSY Life will

- *Implement a hedging strategy to reduce long-term economic exposures from sustained low levels of interest rates and/or market volatility.*
- *Mortality and Policyholder behavior risk will be mitigated via a reinsurance strategy.*
- *Maintain dedicated ULSG Assets target levels in excess of the actuarially determined statutory reserves under stressed conditions (level or decreasing interest rates). This excess will be set so minor interest rate fluctuations don't require frequent adjustment of the Target Asset Levels. Assets will include general account assets and interest rate derivatives.*
- *Use interest rate swaps to better protect statutory capitalization in low interest rate environments. This risk mitigation strategy may negatively impact statutory and/or GAAP capitalization when interest rates are rising. It may also result in higher net income volatility due to the insensitivity of GAAP liabilities to changes in interest rates.*

Evaluate whether the above satisfies the VM-20 requirements for a clearly defined hedging strategy.

7. Continued

Commentary on Question:

Candidates received full credit by correctly identify which requirements satisfied by MSY Life's hedging strategy and partial credit if they only list the requirement and incorrectly identify if the requirement is met by the specified strategy.

MSY Life risk mitigation strategy satisfies the VM-20 requirements for a clearly defined hedging strategy (CDHS) in the following ways:

- The hedge objectives: To reduce interest rate and market volatility exposures
- Financial instruments used: Interest rate swaps
- The risks not being hedged: Mortality and policyholder risk mitigation through reinsurance is not in scope of CDHS
- The conditions under which hedging will not take place: minor interest rate fluctuations will not impact hedging targets, with excess assets held instead
- The circumstances under which hedging strategy will not be effective in hedging the risks: adverse impacts of the strategy on capitalization when interest rates rise

Other VM-20 requirements are not satisfied:

- The specific risks being hedged. Additional details on type of market and interest rate hedging should be mentioned
- Frequency of measuring hedge effectiveness
- The hedge trading rules including the permitted tolerances from hedging objectives
- The metrics for measuring hedge effectiveness
- The criteria used to measure hedge effectiveness
- The person(s) responsible for implementing the hedging strategy

- (b) Calculate the Net Premium Reserve under VM-20 (ignoring expense allowance) at the end of year 5. Show all work.

Commentary on Question:

Candidates generally did well for the first four steps. Most candidates did not floor the NPR using the CSV. The cost of insurance is not provided in the question, so candidates are given full credit even if the COI is not mentioned.

Step 1: Determine a net level gross premium at issue = PV of future benefits at issue / PV of annuity at issue

$$= (1,000,000 \times A_{35}) \div a_{35} = 5,088$$

Step 2: Expense allowance is zero given the time is 5 years from inception

7. Continued

Step 3: Calculate the r-ratio of the current fund value to the Guaranteed maturity fund at the valuation date s calculated. The r-ratio cannot exceed 1

$$r\text{-ratio} = \min(5000/34350, 1) = 0.15$$

Step 4: The net premium reserve at the end of fifth year = r-ratio x (PV of future benefits at age 40 – PV of net level gross premium at age 40)

$$\begin{aligned} &= 0.15 \times (1,000,000 \times A_{40} - 5088 \times a_{40}) \\ &= 3,952 \end{aligned}$$

Step 5: A floor of the surrender value and cost of insurance is applied to the net premium reserve. The surrender value is the current fund value given there is no surrender charge. The cost of insurance is not mentioned in the question and therefore candidates were not penalized for not flooring at C_x .

$$\text{Net premium reserve applying floor} = \max(3,952, 5000) = 5000$$

- (c) Describe the effect on GMF and Net Premium Reserve in the following situations:
- (i) The fund value at the end of year 5 is 50,000
 - (ii) The policyholder has a surrender charge of 1,000 at the end of year 5
 - (iii) The 10-year Treasury rate goes up by 50 basis points at the end of year 5
 - (iv) The current credited interest rate is 1% higher than the guaranteed interest rate and fund value at the end of year 5 remains at 5,000

Commentary on Question:

Candidates generally did not do well on this part of the question, especially on the GMF. Candidates need to provide the rationale for their conclusion of impacts on GMF and NPR to receive full credit. Partial credit was received if the correct rationale was provided but not the conclusion.

- (i) The GMF remains unchanged as it is projected using policy guaranteed rates set at inception.
The NPR increases because (1) the increase in r-ratio (capped at 1) and increases in the CSV floor.
- (ii) The GMF remains unchanged as it is not impacted by the surrender charge. NPR decreases because the cash surrender value will be fund \times (1 - surrender charge%) or fund - \$1,000, leading to the lower floor. The new floor would be \$4,000 instead of \$5,000 which is still higher than the pre-NPR reserve (\$3,952)

7. Continued

- (iii) Both GMF and NPR are unaffected given that the former is based on policy guaranteed rates set at issue whilst the NPR is calculated based on valuation interest rates prescribed at issue per prescribed formula by CRVM.
- (iv) GMF is unaffected as it is projected using policy guaranteed rates set at inception
The NPR remains unchanged because (1) the r-ratio is unchanged as the fund value remains the same and (2) cash flows are based on guaranteed credited rates

8. Learning Objectives:

3. The candidate will:
- Understand the significant impact on individual life insurance and annuity product design and management of U.S. insurance product taxation rules.
 - Understand and apply the significant rules of U.S. insurance company taxation as they apply to U.S. life insurers.

Learning Outcomes:

- (3a) Describe and apply the significant US tax regulations relating to the taxation of individual life and annuity insurance products.
- (3b) Describe, apply and evaluate the valuation methods and techniques for specific insurance products under U.S. taxation rules. Further, evaluate and calculate deferred tax items.

Sources:

LFM-845-20: Chapters 1 and 2 of Life Insurance and Modified Endowments Under IRC §7702 and §7702A, Desrochers, 2nd Edition

LFM-850-22: Changes to Section 7702 (IRC) and Nonforfeiture Interest Rates

Commentary on Question:

This question tested the candidates' understanding of the basic mechanics of product tax, and how it relates to the classification of life insurance and taxation on withdrawals.

Solution:

- (a) You are given the following information about a recently sold UL policy:

- Face amount: 1,000,000 level death benefit
- Issue age: 45
- Policy guaranteed interest rate: 3%
- Applicable accumulation test minimum rate: 2%
- Policy expenses: 500 per year
- Premium load: 6% per year

You are also given the following calculations for the policy:

Interest rate	2%	3%	4%
PV Death Benefit	455,245	314,082	220,086
PV Expenses	4,568	4,381	4,206
\ddot{a}_{45}	27.10	22.78	19.45

8. Continued

- (i) Calculate the Guideline Level Premium (GLP) for this policy.
- (ii) Calculate the Guideline Single Premium (GSP) for this policy.

Show all work.

Commentary on Question:

Candidates generally did well on this part of the question. Candidates who used the incorrect interest rates, but correct formula received partial credit.

GLP: use max of insurance rate and guaranteed rate = $\max(2\%, 3\%) = 3\%$, $(PV \text{ Death Benefit} + PV \text{ Expense}) / \ddot{a}_{45}/(1 - \text{Premium load}) = (314,082 + 4,381) / 22.78 / (1 - 0.06) = 14,872$

GSP: uses 4%; minimum is applicable guideline minimum rate + 2% = 2% + 2% = 4%, $(PV \text{ Death Benefit} + PV \text{ Expense}) / (1 - \text{Premium load}) = (220,086 + 4,206) / (1 - 0.06) = 238,609$

- (b) You are given the following information about a UL policy that uses the Guideline Premium test:

GLP	10,000
GSP	120,000
7-pay premium	28,000

Premiums paid	
Year 1	20,000
Year 2	30,000
Year 3	50,000
Year 4+	0

- Premiums are paid at the beginning of the year
 - No surrender charges
 - There have been no material changes since issue
 - Account value at the end of year 3: 130,000
- (i) Determine if the reserves for this policy qualify as life insurance reserves at the end of year 3.
 - (ii) At the end of year 3 the policyholder takes a 40,000 partial withdrawal. Calculate the taxable portion of the withdrawal, if any.

Show all work.

8. Continued

Commentary on Question:

Candidates generally did well on this part of the question.

- (i) Yes, the reserves qualify as life insurance reserves because the policy passes the guideline test; the accumulated prem = 100,000, which is less than $\text{Max (GSP, GLP*t)} = \text{Max (120,000, 30,000)} = 120,000$
- (ii) Amount is taxable because policy is a MEC; accumulated premium of 100,000 is greater than accumulated 7-pay of 84,000. Gain in the policy = account value - premiums paid = 130K-100K = 30K. Therefore, 30,000 of the withdrawal is taxable
- (c) Describe a situation in which a premium payment could violate the Guideline Premium test but not disqualify the contract.

Commentary on Question:

Candidates generally did well on this part of the question. Several potential situations could receive full credit, including but not limited to:

- The premium is allowed if it is necessary to prevent the policy from terminating before the end of the contract year, and the contract would have no CSV at the end of the contract year
- Passing the CVAT test
- Force out occurred

9. Learning Objectives:

6. The candidate will understand important insurance company issues, concerns and financial management tools.

Learning Outcomes:

- (6a) The candidate will be able to describe, apply and evaluate considerations and matters related to:
- Insurance company mergers and acquisitions
 - Management of variable deferred annuities
 - Embedded Value determinations
 - VM-20 financial impacts
 - Rating agency considerations
 - Model Audit Rule and Sarbanes-Oxley Section 404 considerations
 - Source of Earnings analysis

Sources:

LFM-144-20: The Modernization of Insurance Company Solvency Regulation in the US (exclude Sections 7 and 9)

LFM-141-18: IFRS 17 Insurance Contracts – IFRS Standards Effects Analysis, May 2017, IASB (sections 1, 2, 4 & 6.1-2 only)

Commentary on Question:

This question tested the candidates' understanding of IFRS 17.

Solution:

- (a) Critique the following statements related to the transition to IFRS17:
- A. *The purpose of any accounting model should be to communicate relevant financial and nonfinancial information to users of financial statements that allows such users to make decisions on that information.*
- B. *Regulators believe that the current system for U.S. insurance regulatory accounting has not performed, and wish to make substantial changes*
- C. *The NAIC will have the final say in how statutory reporting adopts changes in GAAP reporting*

9. Continued

D. *The options being considered for how to align statutory with the GAAP/IFRS reporting changes include:*

- *Freezing SAP without any changes*
- *U.S. GAAP with statutory adjustments*
- *IFRS with statutory adjustments*
- *IFRS for public companies and IFRS/GAAP with statutory adjustments for non-public companies*
- *IFRS without adjustments*

Commentary on Question:

Candidates generally did well in their critique of statements A, B and C. Candidates generally did not do well in their critique of statement D.

Statement A is True

Statement B is False. With the introduction of methodologies like PBR and AG43 in the recent past and IFRS on the GAAP side, regulators feel it has performed well and don't see a reason to make significant changes.

Statement C is False. The NAIC is an industry group that puts forth proposals but the final decision and approval of those lies with the individual states. The states can accept this proposal as is or modify it to suit their own needs and desires.

Statement D is False. Stat reserves are more prescriptive. IFRS17's goals are different than stat. The suggestions given are not appropriate for stat.

(b) You are provided the following information for a sample block of term life insurance business that is issued on 12/31/2020. Assume:

- Premiums and commissions are paid at the beginning of the year
- Claims and expenses are paid at the end of the year
- Policy coverages terminate by the end of 2025 for this block

Total Net Amount at Risk	1,000,000
Nonforfeiture interest rate	3%
Adjustment for uncertainty	2% of the PV of claims

9. Continued

Year	2021	2022	2023	2024	2025
Premiums	5,750	5,750	5,750	5,750	5,750
Commissions	575	575	575	575	575
Claims	4,000	4,320	4,666	5,039	5,442
Expenses	115	115	115	115	115
Economic discount rate	5.0%	4.8%	4.5%	4.3%	4.1%
2001 CSO mortality	0.0050	0.0055	0.0061	0.0067	0.0073

Calculate the initial IFRS17 CSM assuming a transition date of 12/31/2020.

Commentary on Question:

Candidates generally did reasonably well on this part of the question.

The cash flow projections provided had decrements, so no additional decrementing of the cash flows was necessary.

The RA for every year was to be the PV of claims from that point forward. So the RA in the first year is 2% of the PV at issue, the RA in the second year is 2% of the PV at duration 1, etc. The total PV of RA is the PV of those 5 yearly RAs. Many candidates did not calculate the RA correctly. Partial credit was received for a total RA equal to 2% of the total BOY PV.

First we need to calculate the present value of cash flows. We'll break that into a premium component and a benefits and expenses component. All discounting is done at the economic discount rate. For simplicity we're using the rounded discount rates here rather than the figures with more decimal places given in the spreadsheet.

Premium is a beginning of year cash flow. The PV is
 $5750 * (1 + 1/1.05 + 1/1.05/1.048 + 1/1.05/1.048/1.045 + 1/1.05/1.048/1.045/1.043) = 26,246.$

Commissions are 10% of premiums and are also a beginning of year cash flow so their PV must be 2,624.60.

Claims are an end of year cash flow. The PV is
 $4,000/1.05 + 4,320/1.05/1.048 + 4,666/1.05/1.048/1.045 + 5,039/1.05/1.048/1.045/1.043 + 5,442/1.05/1.048/1.045/1.043/1.041 = 20,353.$

Expenses are an end of year cash flow. The PV is
 $115 * (1/1.05 + 1/1.05/1.048 + 1/1.05/1.048/1.045 + 1/1.05/1.048/1.045/1.043 + 1/1.05/1.048/1.045/1.043/1.041) = 502.$

9. Continued

So total PV of cash flow is $2,624.60 + 20,855 - 26,246 = -2,766$.

The risk adjustment each year is 2% of the PV of all future claims at that point.

PV of claims each year is

year 1 = 20,353 as calculated above

year 2 = $4,320/1.048 + 4,666/1.048/1.045 + 5,039/1.048/1.045/1.043 + 5,442/1.048/1.045/1.043/1.041 = 17,371$

year 3 = $4,666/1.045 + 5,039/1.045/1.043 + 5,442/1.045/1.043/1.041 = 13,885$

year 4 = $5,039/1.043 + 5,442/1.043/1.041 = 9,843$

year 5 = $5,442/1.041 = 5,228$

So Risk Adjustments each year is 2% of these. Note that these have already been converted to BOY figures from the initial discounting we did. The PV of all RAs is

$0.02 * (20,353 + 17,371/1.05 + 13,885/1.05/1.048 + 9,843/1.05/1.048/1.045 + 5,228/1.05/1.048/1.045/1.043) = 1,259$

Pulling this all together, the CSM is the negative of (the PV of cash flows plus the risk adjustment). CSMs are also floored at zero.

$CSM = - \text{Min}(0, -2,766 + 1,259) = 1,507$

10. Learning Objectives:

6. The candidate will understand important insurance company issues, concerns and financial management tools.

Learning Outcomes:

- (6a) The candidate will be able to describe, apply and evaluate considerations and matters related to:
- Insurance company mergers and acquisitions
 - Management of variable deferred annuities
 - Embedded Value determinations
 - VM-20 financial impacts
 - Rating agency considerations
 - Model Audit Rule and Sarbanes-Oxley Section 404 considerations
 - Source of Earnings analysis

Sources:

Embedded Value: Practice and Theory, SOA, Actuarial Practice Forum, March 2009

LFM-106-07: Insurance Industry Mergers and Acquisitions, Chapter 4 (Sections 4.1-4.6)

Commentary on Question:

This question tested the candidates' understanding of Embedded Value in the context Insurance Mergers and Acquisitions. The question also tested the candidates' understanding of the relationship between Adjusted Net Worth (ANW) and Embedded Value, and the different approaches to calculate ANW.

Solution:

- (a) Describe two methods of determining a discount rate when assessing a merger and acquisition transaction.

Commentary on Question:

Candidates generally did well on this part of the question. To receive full credit, candidates had to describe the two approaches used to determine the discount rates for mergers and acquisitions.

Using a Weighted Average Cost of Capital to determine the discount.

Using an internal hurdle rate used in pricing

Using M&A market place discount rates that are taking place in industry

Cost of funds for transactions - a potential buyer may have a specific cost of funds for a given transaction which will be the appropriate discount rate

10. Continued

- (b) PDX Life is calculating Embedded Value (EV) on a block of business.
- (i) List three differences between an EV and an Actuarial Appraisal
 - (ii) Describe the two approaches to determining Adjusted Net Worth (ANW)
 - (iii) Describe how each approach affects the calculation of EV
 - (iv) Describe the circumstances under which each approach would be more appropriate for PDX Life.

Commentary on Question:

Most candidates received full credit for identifying the differences between EV and Actuarial Appraisal. However, candidates generally struggled on the remainder of the question. Successful candidates emphasized that Required Capital can be either valued on market or book value and that Free Surplus should be valued at market value but failed to recognize that this distinction would impact the RDR used to discount EV. Candidates received credit for understanding that valuing both Free Surplus and Required Capital using market values would result in more volatile EV compared to using book value for Required Capital.

- (i)
 - Actuarial Appraisals typically assign a value to the contribution of future new business, whereas EV focuses on only the current block of business.
 - Actuarial Appraisal are typically calculated using a higher discount rate than EV
 - Assumptions used to calculate Actuarial Appraisal tend to be more reflective of the industry assumptions, while EV focuses on assumptions that are more company specific
- (ii) The two approaches are the Literal Approach and the Less Literal Approach

The Literal Approach requires a company to mark their Free Surplus to market value and their Required Capital at book value. This is because Free Surplus is distributable while required capital is not immediately. This results in the Risk Discount Rate/Cost of Capital for this approach to use book yield for required capital and market yield for free surplus.

The Less Literal Approach is to treat Free Surplus and Cost of Capital at Market value, where the Risk Discount Rate and the Cost of Capital is based on market yield.

10. Continued

- (iii) EV is calculated as Inforce Book Value + Adjusted Net Worth. Depending on the approach used and the book & market yields, the Adjusted Net Worth may be different and have varying effects on EV.

If the market yields are higher, the less literal approach would result in a lower ANW and a lower EV. If the book yields are higher, the literally approach would result in a lower ANW and a lower EV.

Additionally, Market Yields tend to be more sensitive and book yields tend to be more stable. As a result, the literal approach should generate a more stable ANW as book yields are used for the calculation of the Required Capital. However, in the less literal approach, when Market Yields are used for both portions, there is more variability introduced.

- (iv) It would depend on whether PDX would want a higher EV or not and where their book & market yields are at.

If PDX wants a higher EV, and the book yield is lower than the market yield, the literal approach would be preferable as the Required Capital would be higher, resulting in a higher ANW. If their market yield is lower than their book value, using the less literal approach would be preferable as both Required Capital and Free Surplus will be discounted at the lower market yield.