CURATED PAST EXAM ITEMS
- Questions and Solutions -

CP 341– Advanced Life Reinsurance

Important Information:

- These curated past exam items are intended to allow candidates to focus on past SOA fellowship assessments. These items are organized by topic and learning objective with relevant learning outcomes, source materials, and candidate commentary identified. We have included items that are relevant in the new course structure, and where feasible we have made updates to questions to make them relevant.
- Where an item applies to multiple learning objectives, it has been placed under each applicable learning objective.
- Candidate solutions other than those presented in this material, if appropriate for the context, could receive full marks. For interpretation items, solutions presented in these documents are not necessarily the only valid solutions.
- Learning Outcome Statements and supporting syllabus materials may have changed since each exam was administered. New assessment items are developed from the current Learning Outcome Statements and syllabus materials. The inclusion in these curated past exam questions of material that is no longer current does not bring such material into scope for current assessments.
- Thus, while we have made our best effort and conducted multiple reviews, alignment with the current system or choice of classification may not be perfect. Candidates with questions or ideas for improvement may reach out to education@soa.org. We expect to make updates annually.

Course CP 341

Curated Past Exam Questions and Solutions

All Learning Objectives

1. **Types of Reinsurance Arrangements and Methods**
2. **Transferring Risk**
3. **Key Accounting and Regulatory Considerations**
4. **Reinsurance Administration and Management**

The following questions are taken from ILA Exams offered from 2020 to 2024. They have been mapped to the learning objectives and syllabus materials for the CP 341 2025-2026 course and in some cases modified to fit the 2025-2026 curriculum.

The related solutions and Excel spreadsheets are provided in separate files.

Table of Contents

1. Fall 2024 ILA LAM Exam (LOS 1d)

Learning Objectives:

1. The candidate will understand different types of traditional and advanced reinsurance transactions for life insurance.

Learning Outcomes:

The Candidate will be able to:

1d) Explain reasons for using inforce reinsurance, approaches used for inforce reinsurance, and advantages and disadvantages of each approach

Sources:

Life, Health & Annuity Reinsurance, Tiller, John E. and Tiller, Denise, 4th Edition, 2015

- Ch. 7: Reinsurance of Inforce Risks
- Ch. 17: Nonproportional Reinsurance

Exam Question:

1. (*9 points*) Your company would like to model mortality, lapse, and reinsurance on a stochastic basis for a universal life (UL) product.

   You are considering the use of reinsurance for inforce UL policies. The face amounts of the policies are high and actual-to-expected mortality experience has been volatile, deviating significantly from 100%.

   (d) (*2 points*) Recommend which of the following reinsurance structures the company should use for this block. Justify your response

   - Excess Loss Reinsurance
   - Multi-year Stop Loss Reinsurance
   - Experience Refund Reinsurance

Commentary on Question:

Overall, candidates answered well. Candidates who provided either Excess Loss or Multi-year Stop Loss with supporting justification received full marks. Few candidates suggested experience refund received no marks.

Excess Loss Reinsurance

Generally pays out all death claims in excess of a set retention limit

Multi-year Stop Loss Reinsurance

Calculated on a cumulative basis over the life of the contact. The reinsurer will pay above a certain amount.

Experience Refund Reinsurance

Requires the insurer to pay the reinsurer a premium first, and then if A/E ratios on mortality are better, then they will receive a refund.

The portfolio has high mortality risk and bad A/E. Experience refund is not appropriate as the insurer would likely lose on the agreement. Excess reinsurance or multi-year stop loss is more appropriate, both can be used depending on actual term and cost of the contract.

5. Fall 2024 LPM Exam (LOs 1b, 1c, 1e)

Learning Objectives:

1. The candidate will understand different types of traditional and advanced reinsurance transactions for life insurance.

Learning Outcomes:

a) Understand the key aspects of automatic and facultative reinsurance

c) Explain various methods and perform financial statement calculations of reinsurance transactions, including yearly renewable term, coinsurance, modified coinsurance, and funds withheld arrangements

e) Demonstrate knowledge of different forms of reinsurance for different products; specifically, PRTs/longevity swaps, annuity coinsurance, and life insurance yearly renewable term

Sources:

Life, Health & Annuity Reinsurance, Tiller, John E. and Tiller, Denise, 4th Edition, 2015

- Chapter 4: Basic Methods of Reinsurance
- Chapter 7: Reinsurance of Inforce Risks

Exam Question:

(*11 points*) ABC Life, a US insurance company, issues a whole life policy:

Face amount	750,000
Annual premium rate per 1,000	15
Annual policy fee	25

Assume:

- Premium tax rate is 2% for all years
- There are no surrenders, lapses, or deaths
- The accounting is on a US statutory basis

You are given:

ABC Statutory Gain from Operations (no reinsurance)	**Year 1**	**Year 2**
Premiums	11,275	11,275
Investment Income on Surplus	80	40
Investment Income on Reserves	0	36
Total Revenue	**11,355**	**11,351**

Claims	0	0
Surrenders	0	0
Reserve Increase	450	4,050
Total Benefits	**450**	**4,050**
Commissions	10,148	1,128
Acquisition	1,000	0
Maintenance	30	30
Premium Tax	226	226
Total Expenses	**11,403**	**1,383**
Gain from Operations	**-498**	**5,918**

ABC is evaluating two reinsurance proposals from XYZ Re:

- Proposal 1: 80% Coinsurance
- Proposal 2: YRT with an initial ceded face amount of 600,000

You are given:

- XYZ Re acquisition expenses are 40 per ceded policy
- XYZ Re maintenance expenses are 20 per ceded policy annually
- ABC and XYZ Re each have an initial surplus of 1,000 and an investment rate of return of 8% in all years
- The reserves per unit are the same for the ceding company and the reinsurer
- NAAR is defined as face amount – mean reserves

	Year 1	**Year 2**
Mean Reserves per 1,000	0.60	6.00
YRT Mean Reserves per 1,000	0.70	0.90
YRT Reinsurance Premium Rate per 1,000	0.65	0.80

Commentary on Question:
This was a challenging question for candidates where the concepts were generally understood but had difficulty putting them into clear practice with the calculations.

Solution:
(a) Explain the advantages and disadvantages of each reinsurance proposal for ABC.

Commentary on Question:
Candidates generally had a pretty good grasp of the key advantages and disadvantages of the reinsurance types.

Coinsurance Advantages

- Relatively simple to administers and well understood by regulators. Provides for a clear transfer of risk.
- As all risks are reinsured the accounting is simpler as a % of all premiums, claims, reserves, etc. are transferred.

Coinsurance Disadvantages

- Main disadvantage is the need to transfer assets from insurer to reinsurer. This brings exposure to credit risk of the reinsurer and investment strategy of the reinsurer
- If the reinsurance is terminated the reinsurer must transfer assets back which could lead to capital gains implications

YRT Advantages

- Typically a cheaper form of reinsurance as it is focused just on mortality risk
- Limits the reinsurance exposure to investment risk as unlike coinsurance assets are not transferred.
- The reinsurance pricing and yearly renewable feature may be competitive leading to lower cost

YRT Disadvantages

- The lower cost may lead to less possible future profits
- Also not the best form of reinsurance for surplus relief

(b) Explain why the change in XYZ Re's Gain from Operations in year 1 may not mirror the change in ABC's Gain from Operations in year 1 under either proposal. No calculations are required.

Commentary on Question:
Many candidates understood the main point of why the gain from operations may be different with reinsurance. Some candidates got confused with other concepts and put information that was not relevant.

When facilitating reinsurance XYZ will incur its own maintenance and acquisition costs/expenses to process and assess the deal. These costs would not exist if it was just being assessed by ABC without reinsurance. These additional costs are why XYZ Re's gain from operations will not exactly mirror ABC's gain on a proportionate basis.

(c)

(i) Determine the minimum first year expense allowance as a percent of ceded premium that would be needed in Proposal 1 for ABC to avoid a negative Gain from Operations in year 1. Show all work.

(ii) Determine whether XYZ Re could afford to pay this first year expense allowance without exhausting all of its surplus in year 1. Show all work.

Commentary on Question:
Candidates did reasonably well here. Many understood what was being asked and how to get at the answer. Few got full marks often missing a piece of the complete calculation along the way but still showed good understanding.

See accompanying Excel file.

(d) ABC would like to avoid additional surplus strain in the first two policy years. To help meet this objective, ABC plans to ask XYZ Re to offer a ZFT scale (zero first year YRT premium) instead of the proposed premium scale, which requires an increase in the YRT rates in subsequent years to offset the cost.

Determine the maximum increase that ABC could accept in the second year YRT premium, as a percent of ceded face per 1,000. Show all work.

Commentary on Question:
This question was very challenging for candidates. Many did not understand what was being asked or how to formulate a response. For those that did respond there was confusion about what were the relevant parts of the question to use and how to apply them in formulating a response.

See accompanying Excel file.

1. Spring 2024 LPM Exam (LO 1d, 1e, 1g)

Learning Objectives:

1. The candidate will understand different types of traditional and advanced reinsurance transactions for life insurance.

Learning Outcomes:

1d) Explain reasons for using inforce reinsurance, approaches used for inforce reinsurance, and advantages and disadvantages of each approach

1e) Demonstrate knowledge of different forms of reinsurance for different products; specifically, PRTs/longevity swaps, annuity coinsurance, and life insurance yearly renewable term

1g) Describe and evaluate types of reinsurance transactions for annuity contracts

Sources:

Pension Risk Transfer in Canada and the U.S., SOA Research Institute, Simmons, 2022

Life, Health & Annuity Reinsurance, Tiller, John E. and Tiller, Denise, 4th Edition, 2015

- Chapter 19: Annuity Reinsurance

Commentary on Question:

The question was to test the candidate's knowledge of pension risk transfer (PRT)~~ and structured settlement (SS) products~~. For part (a), Most candidates demonstrated their knowledge about the SS, some candidates lost some points as they mixed the concept between PRT and FA. For part (b), most candidates didn't receive the full marks as they only described the impacts from policyholder behavior under the different interest environments, very few candidates mentioned the pricing strategy and product design under the low/high interest scenarios. For part (c), most candidates made the recommendation with reasonable justifications.

Exam Question:

(10 points) ABC Life Insurance is a small insurance company that specializes in individual fixed annuities (FA), whole life (WL), and universal life (UL) products. ABC Life is evaluating expanding into the pension risk transfer (PRT) market ~~or structured settlement market~~. The market is now entering a rising interest rate environment after a period of sustained low interest rates.

Solution:

(a) Compare and contrast the following pricing considerations for retirement annuities and structured settlements.

A. Asset Return/Interest Rates

B. Longevity/Mortality

C. Annuitant Behavior

D. Expenses

E. Liquidity

Commentary on Question:
Most candidates were able to provide reasonable considerations for these items, except for Expenses – The candidates were expected to understand the types of different expense items, the difference of how they are determined from pricing~~: between these two, i.e. SS is priced individually, while~~ PRT ~~it~~ is a group contract. Some candidates also lost points on the annuitant behavior as they treated the pensioner as a general holder of fixed annuity (and even variable annuity from some candidates) instead of retirement-specific products.

- Assets Return/Interest Rates:

  Both types of annuities are long-duration products, so insurers often use illiquid assets in their portfolios.
  The inability to match all the projected long duration cash flows with equally long duration assets creates reinvestment risk for both products.

- Longevity/Mortality

  The insured populations for retirement annuities ~~and SS is vastly different which~~ creates different types of longevity risk.
  For PRT, insurers often use several data points in their underwriting such as ZIP code, job type, and other experience data.

~~SS insureds tend to be much younger than retirements annuities at issue, and underwriting is a challenge for SS due to physical and medical impairments of many annuitants which impacts the shape of the mortality curve.~~

- Annuitant Behavior

  Deferred annuitants are able to choose their retirement date and form of pension. If these options are subsidized (as opposed to being actuarial equivalent) then pricing needs to reflect an assumed retirement date and pension form for each deferred annuitant.
  ~~Since SS are used to fund a tort settlement and are not individually purchased by the annuitant, there isn't the type of longevity-related anti-selection or behavior risk that exists with other life annuities.~~

- Expenses

  ~~For SS, expenses such as maintenance, overhead, commission, and other acquisition expenses must be factored into the pricing of the product. Most expenses can be covered by adding a fixed percentage to the premium.~~
  For PRT, similar expense categories apply but at a larger scale. While SS are generally individually priced, PRT's are group annuity contracts that can be thought of as a mini-M&A transaction. The pricing for each quote is highly customizable and expenses are of larger scale and are less fixed than SS.

- Liquidity:

  For PRT, deferred annuitants sometimes have the option to commute their pension, so pricing needs to reflect the proportion of annuitants expected to choose a pension versus lump sum commuted value. The asset portfolio should have enough liquid assets to cover these amounts.
  ~~For SS, the benefit payments (annuity certain, single life annuity, temp life annuity, lump sum) are fixed and determinable at issue so there is no uncertainty of when benefits will be due, only for how long.~~

(b) Compare the impact of a sustained low interest rate environment against a rising interest rate environment for each of the following:

1. ABC Life's inforce FA block

2. ABC Life's inforce life insurance block

3. Pricing of future PRT deals ~~and structured settlements~~

Commentary on Question:
Many candidates were unable to cover all the aspects as presented in this model solution, but points were given to answers that had reasonable justification. Many candidates mainly focused on the impacts due to the policyholder behavior under the low/high interest environment, and failed to touch on other aspects. Very few candidates mentioned what the company could do to actively manage the inforce blocks to react to these interest scenarios.

- Fixed Annuity:
  In the sustained low interest rate environment, fixed annuity writers have increased the use of reinsurance to provide surplus relief or to allow for access to a broader range of investment options.
  FA sales growth has occurred during periods of credit spread widening, flow reinsurance mechanics and new capital injection from PE backed companies.

- Whole Life and UL:
  The sustained low interest rate environment in recent years followed by increases since late-2020 has been less impactful on WL than UL. WL products are generally more stable in changing interest rate environments, likely due to the simple design of the product.
  In contrast, products that are more interest rate sensitive, including UL products, tend to have lower sales as these products are more expensive for policyholders to keep in force when interest rates are low.
  In the current interest rate environment, insurers must participate in active management on non-guaranteed elements, including raising COI charges on UL products, to ensure profitability. Management also need to maintain a reasonable level of profitability and minimize market value loss on the sale of fixed income by adjusting crediting rate.

- PRT ~~and SS~~:
  PRT ~~and SS are both~~ is a long duration product~~s~~. The inability to match all the projected long duration cash flows with equally long duration assets creates "reinvestment risk" for both products.
  As interest rates start to slowly rise, carriers in the long-duration insurance market may be prudent to react given past interest rate trends to be competitive in the annuity market. Leveraging lessons learned during prior periods of rising interest rates can better position carriers for long-term competitiveness and profitability~~, particularly for PRT cases~~.

(c) Recommend one of the following business strategies for ABC Life. Justify your response.

Strategy A: Enter the PRT market
~~Strategy B: Enter the structured settlement market~~
Strategy C: Focus on growing the WL business
Strategy D: Focus on growing the FA business

Commentary on Question:
Most candidates made a recommendation with appropriate justifications. Partial credits were given to candidates who provided reasonable analysis but did not get to enough details. No points were given if the candidate made a recommendation without explaining the reasons, or the reasons given were not correct.

Option 1 - Enter the PRT market:

I recommend that the company enter the PRT market.
The PRT market is a massive opportunity for expansion for ABC with PRT transactions often worth premiums of hundreds of millions or even billions of dollars. Additionally, ABC may be average to leverage some of its experience on fixed annuities to developed customized mortality assumptions for each PRT transaction.
~~In contrast, the SS market is a niche market. Additionally, the complexities of setting unique mortality assumptions, factoring in level of impairment, may be a challenge for ABC since the mortality curve of structured settlements can differ than traditional annuities or retirement annuities.~~

~~Option 2 - Enter the SS market:~~

~~I recommend that the company enter the SS market.~~
~~Of the two new markets proposed, SS is more appropriate for ABC due to the size of the company. PRTs are generally large deals which can be thought of as mini-M&As. ABC may not have the infrastructure to handle such a financially large block of business.~~
~~In contrast, SS is a niche market with annuities used to fund tort settlements. ABC's experience with fixed annuities would be a benefit while entering the SS market.~~

Option 3 - Focus on growth of WL business:

I recommend that the company grow its WL business.
In a period of sustained low interest rates followed by a moderate increase in recent years, ABC should focus on product designs that perform well in rising interest rate environments, such as Whole Life. Historically, WL products have performed well in dramatically changing interest rate environments due to their simple design.
The company should focus on WL over UL because it is less interest sensitive. In the UL line, the company may need to adjust COIs to stay profitable.

Option 4 - Focus on growth of FA business:

I recommend that the company grow its FA business.
As a small company, ABC may not have the appropriate infrastructure to expand its product offerings; however, in the current period of heightened mortality, the company may be able to see profits on their annuity business.
While expanding its FA business, ABC should increase the use of reinsurance to aid profitability, provide reserve relief, and to use offshore reinsurance transactions utilized to better recognize asset-liability-management and allow for access to a broader range of investment options.

2. Spring 2024 LPM Exam (LO 1c-g, 2b, 3a)

Learning Objectives:

1. The candidate will understand different types of traditional and advanced reinsurance transactions for life insurance.
2. The candidate will understand the fundamentals of risk transfer between two counterparties.
3. The candidate will understand regulatory frameworks for reinsurance transactions across US, Canadian, and global jurisdictions.

Learning Outcomes:

1c) Explain various methods and perform financial statement calculations of reinsurance transactions, including yearly renewable term, coinsurance, modified coinsurance, and funds withheld arrangements

1d) Explain reasons for using inforce reinsurance, approaches used for inforce reinsurance, and advantages and disadvantages of each approach

1e) Demonstrate knowledge of different forms of reinsurance for different products; specifically, PRTs/longevity swaps, annuity coinsurance, and life insurance yearly renewable term

1f) Describe and evaluate types of non-proportional reinsurance transactions

1g) Describe and evaluate types of reinsurance transactions for annuity contracts

2b) Describe the elements and considerations of risk transfer between counterparties, and evaluate their impact on reinsurance agreement provisions

3a) Describe and evaluate elements of reinsurance requirements within the US regulatory framework

Sources:

Life, Health & Annuity Reinsurance, Tiller, John E. and Tiller, Denise, 4th Edition, 2015 - Ch. 5, ~~6,~~ 7, 9, 11, 17

Commentary on Question:

The question tested the candidate's understanding of a variety of types of reinsurance transactions, how to prepare financial statement entries, and the NAIC's model regulations on acceptable risk transfer. Overall, candidates did reasonably well on this question. Candidates performed the best on part a.

Exam Question / Solution:

(a) Recommend a method of reinsurance for each of the following. Justify your answers.

(i) Company A is looking to free up surplus for the issuance of a new line of universal life (UL) products. Company A would like to run off its old whole life (WL) block and is looking to reduce the size of its balance sheet immediately.

(ii) Company B is looking to mitigate its lapse risk on the fixed annuity business by transferring 30% of its lapse risk exposure using reinsurance without reducing its total invested assets or reserves. Company B also prefers to have frequent cash flow settlements.

(iii) Company C would like to reduce 90% of its mortality risk on its UL business while retaining all other risk. Company C is looking for a fast and efficient solution.

(iv) Company D discovered if the surrender rate on their whole life block were to exceed 35% in any given year, the company may not have sufficient cash on hand to pay out the surrender benefits. The block has profitable experience with surrender rates around 3%, and Company D does not seek to give up much profit generated from the mortality and investment experience.

(v) Company E's investment yield ranks among the highest in the industry due to its aggressive investment strategy and utilization of alternative assets, but its mortality and lapse experience has been undesirable on its WL, term, and UL business. Company E would like to transfer 40% of its underwriting risk using reinsurance without altering its investment portfolio.

Commentary on Question:

Candidates performed well on this question. Candidates who selected the appropriate method of reinsurance and described why the method was the best choice received full credit. Credit was also given for other methods of reinsurance that were appropriately justified. Many candidates did not recognize that part (iv) was a non-proportional reinsurance structure.

(i) Recommend coinsurance. Coinsurance will reduce the balance sheet and free up surplus. It is also efficient and quick to administer. Assumption reinsurance is not appropriate in this scenario because Company A wishes to reduce the size of the balance sheet immediately.

(ii) Recommend modified coinsurance. Modified coinsurance allows Company B to mitigate its lapse risk without reducing its total invested assets or reserves, as opposed to coinsurance. Company B also prefers to have frequent cash flow settlements, which would happen with modified coinsurance, but not with funds withheld modified coinsurance.

(iii) Recommend YRT. This will allow the ceding company to reduce their exposure to mortality risk. YRT is also a fast and efficient solution and is low cost.

(iv) Recommend stop loss reinsurance. Company D seeks to reduce excess risk, which is best handled by stop loss reinsurance. This type of reinsurance will also be low cost, which will allow Company D to retain profit generated from mortality and investment experience

(v) Recommend modified coinsurance. Modified coinsurance will not alter the asset positions of the ceding company and thus not affect the portfolio. Although a funds withheld could also aim to achieve this, the alternative assets may cause additional regulatory scrutiny under this structure. Thus, modified coinsurance is the best choice.

(b) Calculate the following for each of the three quotes above:

(i) Initial reinsurance premium

(ii) Initial amount due from UWU Life to the reinsurer

(iii) UWU Life's net reserve as of the reinsurance effective date

(iv) UWU Life's invested assets as of the reinsurance effective date

Commentary on Question:
Candidates needed to be able to demonstrate their understanding of how reinsurance of in-force business is calculated. Full credit was awarded for a correct response to each part, including work shown. Candidates received partial credit for each result they correctly calculated for a particular quote.

(i) The initial premium is based on a pro-rata share of the reserve backing the policies to be reinsured.

Initial Premium = quota share * reserve inforce

Quote #	**Initial Premium**
Quote 1	=80% * 2,200,000,000 = 1,760,000,000
Quote 2	=75% * 2,200,000,000 = 1,650,000,000
Quote 3	=75% * 2,200,000,000 = 1,650,000,000

(ii) For Quote 1, the initial amount is equal to the ceded premium less allowance less the modco reserve adjustment. Thus,

initial amount due = initial premium - initial allowance – modco reserve adjustment

initial amount due = 1,760,000,000 – 1,760,000,000 * 9% – 1,760,000,000
= -158,400,000

For Quote 2, the initial amount is equal to the ceded premium less allowance. Thus,

initial amount due = initial premium - initial allowance
= 1,650,000,000 – 1,650,000,000 * 10%
= 1,485,000,000

For Quote 3, the initial amount due is 0 because it is a funds withheld basis where the new position is reflected via payable / receivable. Thus,

initial amount due = 0

(iii) On a Coinsurance or Funds Withheld Coinsurance basis, the net reserve is simply the pro-rata share of the gross reserve (i.e., 25% of 2,200,000,000), while on a Modified Coinsurance basis, all assets are retained by the ceding company and therefore the net reserve is equal to the gross reserve. Thus,

Quote #	**Net reserve at reinsurance effective date**
Quote 1	= 2,200,000,000
Quote 2	= 2,200,000,000 * 25% = 550,000,000
Quote 3	= 2,200,000,000 * 25% = 550,000,000

(iv) In general, the invested assets are equal to the surplus and reserve, plus the initial gain (allowance) from the reinsurer. However, on a Funds Withheld Coinsurance basis, a paper liability (accounts payable) results in the invested assets remaining the same since no funds physically change hands.

First, the surplus = total invested asset – reserve inforce = 200,000,000

Quote #	**Net reserve at reinsurance effective date**
Quote 1	Invested assets = surplus + reserve from (iii) + allowance = 200,000,000 + 2,200,000,000 + 1,760,000,000 * 9% = 2,558,400,000
Quote 2	Invested assets = surplus + reserve from (iii) + allowance = 200,000,000 + 550,000,000 + 1,650,000,000 * 10% = 915,000,000
Quote 3	invested assets = original total invested assets = 2,400,000,000

(c) XYZ is considering reinsurance to improve capital efficiency on their long term care block. XYZ is evaluating the use of the following reinsurance structure which combines modified coinsurance and coinsurance:

	Modified Coinsurance Component	**Coinsurance Component**
Initial Quota Share	90%	10%
Initial Allowance	10%	10%

Critique the following characteristics of the proposed reinsurance structure with respect to the NAIC's model regulations on acceptable risk transfer:

(i) *Based on recent asset performance, XYZ will use a constant modified coinsurance interest rate of 5%.*

(ii) *XYZ will use assumption reinsurance to maximize the value of the transaction but seeks the option to recapture the business in 5 to 10 years if experience improves.*

(iii) *XYZ is looking to receive an experience refund at the end of every month, settled on a cash basis.*

(iv) *XYZ will adjust the quota shares of modified coinsurance and coinsurance to minimize the size of periodic cash settlements.*

Commentary on Question:

To receive full credit, candidates needed to not only say if they agreed or disagreed with the statement, but needed to explain why the statement was correct or incorrect. For statements that could violate model regulations, alternative options were required for full credit. Credit was also given for other reasonable responses.

(i) The constant modified coinsurance interest rate is inappropriate. XYZ should use a rate that references actual asset performance, otherwise risk transfer will not be met.

(ii) Assumption reinsurance transfers policy obligations directly to the assuming insurer, and therefore would not permit recapture. Indemnity reinsurance should be used if recapture is a requirement.

(iii) There is nothing wrong with the structure in settlement frequency as it is more frequent than quarterly. The experience refund is also acceptable since it appears that the risk to the reinsurer is not eliminated (e.g., by requiring the ceding company to subsidize losses

(iv) This structure is also known as partially modified coinsurance. An increase in quota share when reserves increase may not be appropriate as some states may not allow it, thereby losing any reserve/surplus credit. It would be preferable to choose a reinsurance method with clearer risk transfer that requires the reinsurer to pay for its share of cash losses, such as traditional modified coinsurance.

5. Spring 2024 LPM Exam (LO 1e, 1g)

Learning Objectives:

1. The candidate will understand different types of traditional and advanced reinsurance transactions for life insurance.

Learning Outcomes:

1e) Demonstrate knowledge of different forms of reinsurance for different products; specifically, PRTs/longevity swaps, annuity coinsurance, and life insurance yearly renewable term

1g) Describe and evaluate types of reinsurance transactions for annuity contracts

Sources:

Pension Risk Transfer in Canada and the U.S., SOA Research Institute, Simmons, 2022

Life, Health & Annuity Reinsurance, Tiller, John E. and Tiller, Denise, 4th Edition, 2015

- Chapter 19: Annuity Reinsurance

Commentary on Question:

Candidates were generally able to list much of the appropriate content and showed knowledge of the concepts making the question reasonably well done overall. Few were able to demonstrate a complete depth of understanding which was needed to get full marks.

Exam Question:

5. (*9 points*) ONA Life specializes in long term care insurance, individual annuities, and the conversion of defined benefit pension plans to group annuities.

The partners at DNS, a small legal firm, wish to continue offering a pension benefit but would like to know more about converting it to a group annuity. They have asked ONA Life to develop a proposal to understand the process.

Solution:

(a) List four reasons that the group annuity proposal could be advantageous to DNS.

Commentary on Question:

Many were able to list 2 or 3 solid reasons. Often candidates repeated the same item twice but in different words or gave a reason quite similar to one they had already given which was not sufficient for full marks.

- It would transfer investment and longevity risk from DNS to ONA which are significant components in the cost of a benefit plan. ONA has more experience managing these type of risks.

- If a buy-out transaction was used this would also transfer a lot of administrative and operational work to ONA allowing DNS to focus on their specialty of legal work.

- Life insurers are well-regulated and the plan members generally have increased confidence in their benefit payments being made when pensions are transferred to insurers. So a plus for the DNS plan members.

- Insurers have access to their interest and industry experience data which may allow ONA to offer a more competitive quote.

(b) Critique each of the following statements from the proposal to DNS:

(i) *ONA Life plans to use individual annuity experience to price the group annuity.*

(ii) *The best way to mitigate longevity risk is to fully reinsure the business.*

~~(iii) *Since this is an established block of business for ONA Life, a deterministic model with a single set of assumptions would be sufficient.*~~

Commentary on Question:
Candidates typically showed understanding of the concepts and could respond to the statements. A proper critique or opinion was required for full markets. Listing some relevant content but leaving the response too open ended only earned partial credit. For part (iii) some candidates simply stated stochastic models as the better approach but without giving some context or justification.

(i) This is not an appropriate plan. Individual and Group annuity experience are often different due to the nature of who uses each product. Individual annuities are selected by individual customers where group contracts are generally based on the customers type of employment. This can cause differences in data. ONA would be better to look at internal group data and supplement it with relevant industry data for group products.

(ii) This is not the case. For a well-established life insurer typically the best way is to naturally hedge longevity risk with products containing mortality risk like permanent life insurance or term insurance. It does not appear ONA has mortality risk products based on their specialties listed, but this is the first suggestion. Reinsurance can still be a tool but not the best way to mitigate longevity risk.

(iii) A deterministic model with a single set of assumptions is not sufficient. Experience can vary and it is unlikely that one model will have every assumption precisely accurate. Sensitivity testing a variety of assumptions in a deterministic model can work to assess the range and magnitude of possible risks. Depending on the size of risk and length of contract a stochastic model for interest rates or mortality may also be appropriate. But either way a deterministic model with one set of assumptions will not suffice to assess the potential risks.

(c) DNS is interested in providing long term care insurance for their employees, but is concerned about recent premium increases.

(i) Describe four challenges that the long term care insurance industry has faced that has led to premium rate increases.

(ii) Propose a strategy to address one of the challenges.

Commentary on Question:
Many candidates could list 3 or 4 key challenges but often missed some points in not truly describing them and why they caused premium rate increases. Part (ii) was not well done. Many candidates listed a solution but did not connect it to what challenge it was trying to address or give sufficient detail to support why their proposed strategy would be beneficial.

(i)

1. Lapse rates were much lower than expected. Because there was no benefit from surrendering policyholders developed a 'use it or lose it' mentality and held onto the policies longer than expected or even incentivized them to go on claim resulting in higher likelihood of claims payout.
2. Mortality improvement was higher than expected and mortality lower than expected. People living longer led to longer time when on claim, and less terminations due to death, and thus higher amount of benefits being paid
3. Interest rates turned out to be much lower than originally forecasted when the products were initially priced. The investment return was a large component of the product as the product is a longer duration product. The expectation was investment returns would support the pricing but low interest rates led to low investment returns.
4. Inflation and long-term care costs were higher than expected. The cost of LTC increased substantially between when the products were initially priced and when the majority of people started making claims. There was no mitigation for inflation in the premiums.

~~(ii)~~

~~To address that lapse rates were much lower than expected and that policyholders developed a 'use it or lose it mentality' the company could add a return of premium or non-forfeiture benefit. The price of the benefit would need to be included in the overall price meaning customers would still have higher premiums, but a return of premium or other non-forfeiture benefit can encourage the policyholder to consider lapsing the policy if they haven't made a claim by a certain time period and thus reduce the risk of policies staying on longer than expected. Encouraging some lapsation shortens the overall duration of the product.~~

7. Spring 2024 LPM Exam (LO 1c, 2a, 2b)

Learning Objectives:

1. The candidate will understand different types of traditional and advanced reinsurance transactions for life insurance
2. The candidate will understand the fundamentals of risk transfer between two counterparties

Learning Outcomes:

1c) Explain various methods and perform financial statement calculations of reinsurance transactions, including yearly renewable term, coinsurance, modified coinsurance, and funds withheld arrangements

2a) Describe the elements within reinsurance treaties

2b) Describe the elements and considerations of risk transfer between counterparties, and evaluate their impact on reinsurance agreement provisions

Sources:

Life, Health & Annuity Reinsurance, Tiller, John E. and Tiller, Denise, 4th Edition, 2015 - Ch. 4: Basic Methods of Reinsurance

Life Reinsurance Treaty Recapture Provisions, SOA, Jun 2020

CP341-105-25: Lapse Risk and Capital Management Strategies: Back in the Spotlight, pp. 8-12

Commentary on Question:

The candidates did an average job answering this question. In section ~~(a) and~~ (c), most answers relied on overall actuarial knowledge, which was duly rewarded. However, considering the intent of these exams, the better answers drew upon the readings from the syllabus. ~~Section (b) was a bit surprising due to the difficulty a fair number of candidates had in identifying the MCEV formula, a key concept.~~

Exam Question:

7. (*7 points*) You are given the following information about your company's inforce block of individual life insurance:

	Whole Life	**Term Life**	**Universal Life**
Present value of future profits	3,000	1,500	2,000
Time value of financial options and guarantees (TVOG)	100	200	120
Required capital	900	500	700
Free surplus	200	500	300
Mortality risk costs	250	2,000	150
Long-dated equity option costs	50	500	50
Additional taxes and investment costs incurred by shareholders	40	20	30

Lapse experience has been adverse for all products.

Solution:

~~(a) Evaluate the advantages and disadvantages of an Embedded Value (EV) approach to measuring profitability versus accounting-based metrics.~~

~~**Commentary on Question**:~~

~~*Partial credit was given if the answer was actuarially sound but did not appear in the solution. Optimal answers discussed both advantages and disadvantages. At times the key aspects of MCEV vs accounting based metrics were switched.*~~

~~Advantages:~~

- ~~MCEV recognizes the relative riskiness of different business lines better than accounting based metrics.~~
- ~~MCEV better addresses the long-term nature of the life insurance business.~~
- ~~MCEV values assets and liabilities on a market-consistent basis to capture their value at the time of valuation.~~
- ~~MCEV provides a common methodology for comparison that is missing due to the differences in rules and practices between statutory, local GAAP, and IFRS accounting.~~

~~Disadvantages:~~

- ~~Accounting based metrics provide more transparent profit indicators.~~
- ~~Accounting-based metrics are straightforward and easy to access.~~
- ~~MCEV has lost some steam after the financial crisis as investors concentrate less on long term cash flows and become more concerned with current cash generating power.~~

(b) Calculate the Market Consistent Embedded Value (MCEV) of each product. Show all work.

Commentary on Question:
Straightforward calculation question that required the candidate to properly use Market Consistent Economic Value (MCEV) and Value In Force (VIF) equations. Partial credit given if the correct equation was listed and the numerical answer was not correct. A common error was that candidates confused required capital and frictional costs of required capital in the equations.

	VIF=Present Value of Future Profits-Time value of financial options and guarantees-Cost of residual non-hedgeable financial and insurance risks-Frictional costs of required capital	MCEV=VIF + Required Capital + Free surplus
Whole Life	=3000-100-250-50-40=2560	=2560+900+200=3660
Term Life	=1500-2000-200-500-20= 1220	= 1220+500+500= 220
Universal Life	=2000-120-150-50-30=1650	=1650+700+300=2650

(c) Critique each of the following proposals to improve profitability of the inforce products:

(i) Increase persistency on the universal life block by sending annual reminders about all the benefits of holding a policy

(ii) Up-sell term life policyholders by providing annual reminders that they may convert to a permanent policy which will have higher premiums

(iii) Recapture whole life policies following a series of YRT reinsurance rate increases which have made the reinsurance more expensive than the benefit provided.

Commentary on Question:
Partial credit was once again given for actuarial sound analysis with the better answers using insight directly form the syllabus.

(i) While improving customer service may improve customer persistency, it is important to realize that if this is a lapse supported product, it would harm profitability. Answers that mentioned the generally superior profitability of a Universal/Whole Life product compared to Term Life products, also received some credit.

(ii) Anti-selection should be a key concern when upselling policyholders to a permanent policy due to high risk policyholders oversubscribing to this conversion. Additional underwriting or data analytics may diminish this risk. Reputational risk may also be an issue if a policyholder denied the option to convert was to find out about the missed opportunity.

(iii) Before recapturing a reinsurance block of business, it is important to understand the implications of any recapture fees. It is also important that the ceding company understands the causes of the higher mortality found in the reinsurance agreement. The reinsurer may have additional insight into the block of business the ceding company does not have.

4. Fall 2023 LPM Exam (LO 1c)

Learning Objectives:

1. The candidate will understand different types of traditional and advanced reinsurance transactions for life insurance.

Learning Outcomes:

1c) Explain various methods and perform financial statement calculations of reinsurance transactions, including yearly renewable term, coinsurance, modified coinsurance, and funds withheld arrangements

Sources:

Life, Health & Annuity Reinsurance, Tiller, John E. and Tiller, Denise, 4th Edition, 2015

– Ch. 4: Basic Methods of Reinsurance

– Ch. 5: Advanced Methods and Structures of Reinsurance

Commentary on Question:

The first few parts of this question provided an opportunity for candidates to demonstrate their mastery of several pricing and earnings concepts, through a series of calculations on a term life insurance product. The latter parts of the question evaluated the candidate's understanding of basic reinsurance structures by analyzing statutory cash flows, statutory reserves, and invested assets vis-à-vis the term life product without reinsurance.

Exam Question:

(*8 points*) XYZ Insurance is developing a new term life product. You are given the following pricing assumptions and projections:

End of year	**2022**	**2023**	**2024**	**2025**	**2026**
Statutory Reserve	0	350	700	650	0
GAAP Benefit Reserve	0	250	500	700	0
Tax Reserve	0	325	650	603	0
Earnings Reserve	0	100	375	600	0

	2023	2024	2025	2026
Premium Income	400	390	380	350
Investment Income	15	68	86	85
Investment Income on Required Capital	10	25	20	35
Benefits	100	125	200	995
Expenses	175	0.5	0.5	0.5
DAC Amortization	-150	25	25	100
PermDiff*	0	0	0	0
Tax Rate	21%	21%	21%	21%

* Permanent difference between solvency earnings and taxable earnings

(a) (*1.5 points*) Calculate the pre-tax stockholder earnings for each year 2023 through 2026. Show all work.

The response for this part is to be provided in the Excel spreadsheet.

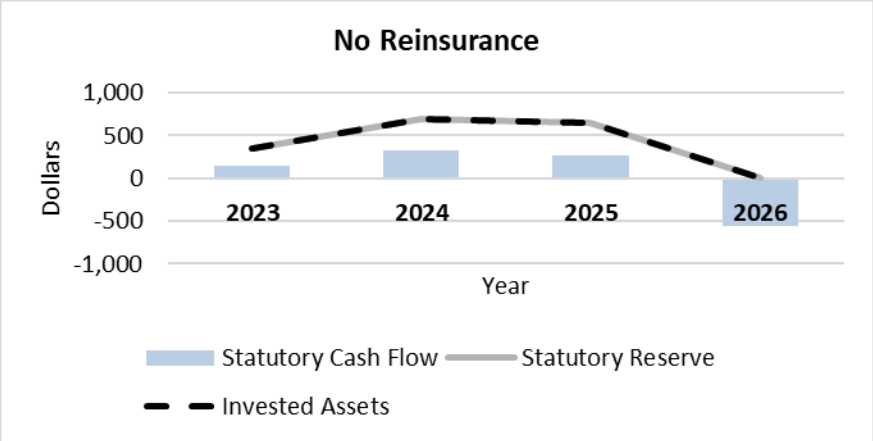
(b) (*1.5 points*) Calculate the taxes payable on solvency earnings for each year 2023 through 2026, assuming no DAC tax. Show all work.

The response for this part is to be provided in the Excel spreadsheet.

(c) (*1 point*) Calculate the Deferred Tax Liability for years 2024 and 2025. Show all work.

The response for this part is to be provided in the Excel spreadsheet.

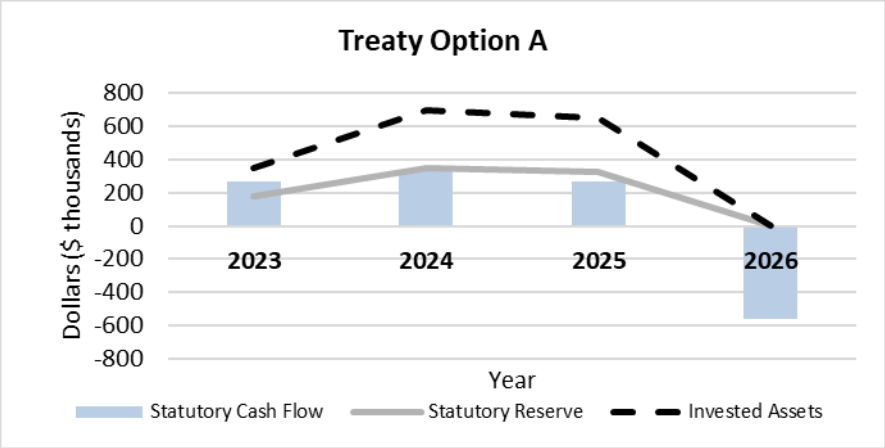
You are given the following graph detailing the current statutory cash flow and reserve pattern of XYZ's term product without reinsurance.

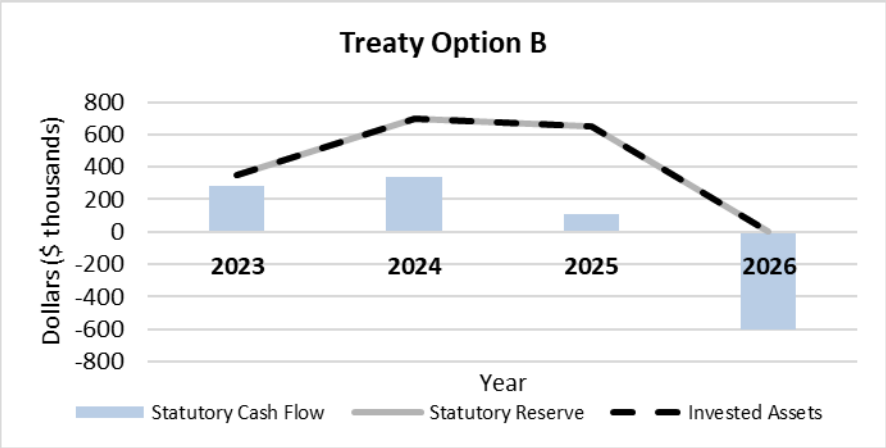


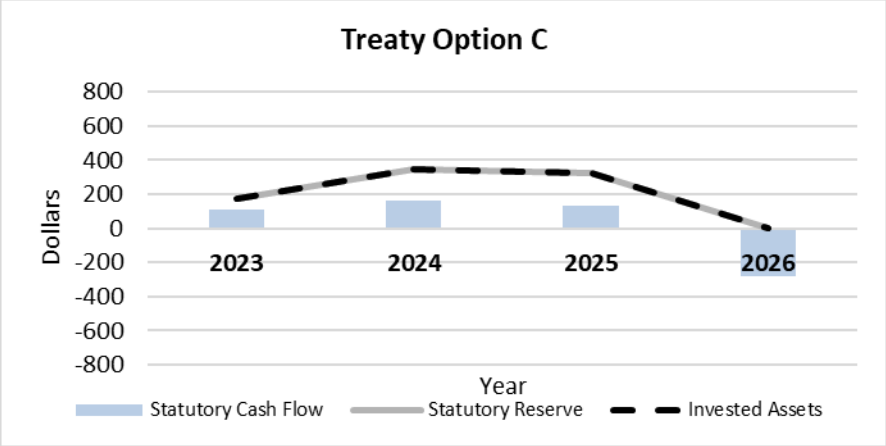
XYZ Insurance is considering three reinsurance treaty options with the following terms:

- Initial expense allowance equal to 125
- 50% quota share
- Mod Co interest rate equal to the asset earned rate, where applicable

You are given three graphs illustrating XYZ's statutory cash flow and reserve pattern under the three reinsurance treaty options.







(d) (*3 points*) Identify which of the following reinsurance methods corresponds to each treaty option above. Justify your response.

(i) Coinsurance

ANSWER:

(ii) Funds Withheld Coinsurance

ANSWER:

(iii) Modified Coinsurance

ANSWER:

(e) (*1 point*) Recommend one of the above three reinsurance methods for XYZ Insurance. Justify your response.

ANSWER:

Solution:

Commentary on Question:
The first few parts of this question provided an opportunity for candidates to demonstrate their mastery of several pricing and earnings concepts, through a series of calculations on a term life insurance product. The latter parts of the question evaluated the candidate's understanding of basic reinsurance structures by analyzing statutory cash flows, statutory reserves, and invested assets vis-à-vis the term life product without reinsurance.

Solution:

(a) Calculate the pre-tax stockholder earnings for each year 2023 through 2026. Show all work.

Commentary on Question:
Most candidates performed well on this question, as they were able to successfully recall and apply the pre-tax stockholder earnings formula. Partial credit was assigned if candidates had minor errors in the formula, such as using a reserve other than the Benefit Reserve, but the calculation was otherwise correct.

Pre-tax stockholder earnings = ProdCashFlow – BenResIncr – DACAmort + InvIncome + InvIncRC
ProdCashFlow = Prem – Ben – Exp
BenResInc(t) = BenRes(t) – BenRes(t – 1)

Year 2023: (400 – 100 – 175) – (250 – 0) – -150 + 15 + 10 = 50.00
Year 2024: (390 – 125 – 0.5) – (500 – 250) – 25 + 68 + 25 = 82.50
Year 2025: (380 – 200 – 0.5) – (700 – 500) – 25 + 86 + 20 = 60.50
Year 2026: (350 – 995 – 0.5) – (0 – 700) – 100 + 85 + 35 = 74.50

(b) Calculate the taxes payable on solvency earnings for each year 2023 through 2026, assuming no DAC tax. Show all work.

Commentary on Question:
Candidates generally did well on this question and were able to apply tax formulas to determine the taxes payable. Partial credits were assigned for formula errors, such as including InvIncRC or using a reserve other than TaxRes.

No points were deducted for not explicitly including PermDiff in the calculation since it is given in the question as 0 in all years.

TaxableEarn = ProdCashFlow + InvIncome – TaxResIncr + PermDiff†
OR
TaxableEarn = Prem + InvIncome – Ben – Exp – TaxResIncr + PermDiff†
TaxResIncr = TaxRes(t) – TaxRes(t – 1)
TaxOnEarn = TaxableEarn × EarnTaxRate

† *PermDiff was given in the question as 0 in all years.*

Year 2023: [125 + 15 – (325 – 0) + 0] × 21% = -38.85
Year 2024: [264.5 + 68 – (650 – 325) + 0] × 21% = 1.58
Year 2025: [179.5 + 86 – (603 – 650) + 0] × 21% = 65.63
Year 2026: [-645.5 +85 – (0 – 603) + 0] × 21% = 8.93

(c) Calculate the Deferred Tax Liability for years 2024 and 2025. Show all work.

Commentary on Question:
Candidates generally had difficulty with this question.
A common mistake was using the incorrect reserve basis in the calculation, which is a key part of the question.
Several candidates did not apply the tax rate at all, and did not receive any credit.

DefTaxLiab = (TaxRes – EarnRes) × EarnTaxRate

Year 2024: [650 – 375] × 21% = 57.75
Year 2025: [603 – 600] × 21% = 0.63

(d) Identify which of the following reinsurance methods corresponds to each treaty option above. Justify your response.

(i) Coinsurance

(ii) Funds Withheld Coinsurance

(iii) Modified Coinsurance

Commentary on Question:
Candidates generally did well on this question and were able to correctly match the graphs to the basic reinsurance methods. Most candidates explicitly described effects on assets, reserves and cashflows. To receive full credit, the correct treaty along with appropriate justification in comparison to the scenario with no reinsurance was required.

Coinsurance – Design C
In a coinsurance arrangement, the reinsurer establishes its proportionate share of the policy reserves. Since there is a 50% quota share agreement, the reinsurer bears 50% of the reserve and takes 50% of the assets. Compared to no reinsurance, design C shows a 50% reduction in reserve and assets and is therefore coinsurance.

Funds Withheld Coinsurance – Design A
Similar to ModCo, under funds withheld coinsurance the assets are retained by XYZ. Under design A, invested assets match the no reinsurance design. Additionally, the ceding company has a reserve credit similar to coinsurance. Under design A, the reserves are 50% of the no reinsurance design. Therefore, design A is funds withheld coinsurance.

Modified Coinsurance – Design B
Unlike coinsurance, under ModCo the statutory reserve on the ceded portion of the policy is an obligation of, and held by the ceding company rather than the reinsurer. The ceding company also retains the assets. Under design B, the statutory reserves and invested assets match the no reinsurance scenario and is therefore ModCo reinsurance. Additionally, cash flows are impacted vs no reinsurance due to the initial expense allowance and ModCo adjustment.

(e) Recommend one of the above three reinsurance methods for XYZ Insurance. Justify your response.

Commentary on Question:
Most candidates did well by recommending one of the reinsurance frameworks with justification. However, only some candidates tied the recommended reinsurance framework back to the given scenario. To receive full credit, candidates must recommend one of the three reinsurance frameworks given, justify their recommendation, and tie the recommendation back to either company XYZ or to Term Insurance.

Option 1: Coinsurance
- This is the most commonly used reinsurance for term products since term products have little or no cash value build up, and, therefore minimal investment risk. From the graphs in part d, coinsurance shows the greatest reduction in reserves.
- Product features such as dividends, policy loans, and non-forfeiture status (ETI/RPU) can present reinsurance problems under a coinsurance arrangement. Since Term does not have these features, coinsurance provides a simple risk transfer solution for XYZ.

Option 2: Modified Coinsurance

- ModCo allows XYZ to retain the assets for investment purpose (giving them more control over investment decisions) while still obtaining the surplus relief aspects of coinsurance. Under the ModCo design, invested assets remain in full and year 1 cash flows are higher than the no reinsurance scenario which may relieve some of the initial shock of developing a new term insurance product.
- ModCo eliminates some of the problems with coinsurance. Since XYZ maintains the policy reserves, there is no question about reserve credits.
- ModCo allows the ceding company to maintain a higher level of assets and, therefore, can attain a higher comparative asset ranking than coinsurance.

Option 3: Funds Withheld Coinsurance

- This allows XYZ to retain the assets for investment purposes (giving them more control over investment decisions) while still getting the quota share reserve relief like coinsurance. XYZ will need to set up a liability for funds withheld since they are retaining the assets while getting reserve relief. Under this design, invested assets remain in full but the reserve is reduced by half. Since term insurance does not have product features such as dividends, policy loans, funds withheld coinsurance provides an appropriate derisking solution for XYZ.

5. Fall 2023 LPM Exam (LO 1c)

Learning Objectives:

1. The candidate will understand different types of traditional and advanced reinsurance transactions for life insurance.

Learning Outcomes:

1c) Explain various methods and perform financial statement calculations of reinsurance transactions, including yearly renewable term, coinsurance, modified coinsurance, and funds withheld arrangements

Sources:

Life, Health & Annuity Reinsurance, Tiller, John E. and Tiller, Denise, 4th Edition, 2015

- Ch. 4: Basic Methods of Reinsurance
- Ch. 5: Advanced Methods and Structures of Reinsurance

Commentary on Question:

This question tested candidates' knowledge and understanding about three common methods used to determine reinsurance premium and allowance for banded policies. Candidates were also expected to understand how to interpret income statement results and make recommendations and decisions utilizing the statements.

Exam Question / Solution:

(a) GHI Life is entering into a coinsurance treaty with FSD Re and negotiating premiums for banded policies as follows:

Band	Face Amount	Expense allowance (% of premium)	Ceded Face Amount	Gross premium per 1,000
1	1 million or less	10%	100,000,000	15
2	Over 1 million	12%	250,000,000	10

You are given the following options to determine reinsurance premium and allowance:

- **Option 1**: reinsurance premium is based on the gross premium rate charged the policyholder, using 11% of premium as the expense allowances for all policies.
- **Option 2**: reinsurance premium is based on the gross premium rate charged to the policyholder, with different expense allowances for each band.
- **Option 3**: reinsurance premium and expense allowances are based on the policy with the highest face amount.

(i) Describe one advantage to GHI Life for using each of the options.

(ii) Identify which option will yield the highest ceded premium net of allowances. Show all work.

Commentary on Question:
Candidates generally did well on part (i). Candidates received partial credit if concluding that the advantage of option 3 is simply the highest expense allowance. Candidates did very well on part (ii).

(i) Describe one advantage to GHI Life for using each of the options.

Option 1: It is the simplest to understand or to use.
Option 2: It leads to an equitable, fair, balanced, or accurate cost to the ceding company on all bands.
Option 3: The reinsurance premium for the reinsured portion will never exceed the lowest premium received by the insurance company. One set of allowances is used for all sizes, resulting in a common net reinsurance premium rate (reinsurance premium rate less allowance) for all policy sizes. This can simplify the administration. The use of a common net reinsurance rate based on the highest band's premium results in an additional margin on reinsurance for the ceding company on policies written on the lower bands.

(ii)

Option	1	2	3
Reinsurance Premium (A)	actual gross premium = 4,000,000	actual gross premium =4,000,000	10% * Total Face = 3,500,000
Allowance (B)	Reinsurance premium * 11% = 440,000	Reinsurance premium * allowance % = 450,000	Reinsurance premium * 12% = 420,000
Ceded Premium – Allowance = (A)-(B)	3,560,000	3,550,000	3,080,000

Option 1 would yield the highest ceded premium net of allowance.

(b) GHI Life is evaluating a reinsurance treaty at 80% quota share with BBB Re on its new business at issue. You are given the following information about the reinsured business, before reinsurance:

Policy Year	**Gross premium**	**Investment income (5%)**	**Total Claims**	**End of year Reserves**
2				2,000
3	6,000	100	600	6,000

- Investment income(t) = reserve(t-1) * earned rate
- BBB Re proposed a modified coinsurance structure, with the modco rate set to its investment earned rate at 4%.
- BBB Re will pay an experience refund equal to half of its pre-tax statutory income to GHI Life

Assume:

- Reinsurance treaty was effective at policy issue
- No expenses

(i) Calculate the pre-tax statutory income for BBB Re in policy year 3, before the experience refund. Show all work.

(ii) Calculate the pre-tax statutory income for GHI Life in policy year 3, including the experience refund. Show all work.

(iii) Recommend whether coinsurance or modified coinsurance is more beneficial to GHI Life, assuming BBB Re has also offered a coinsurance quote with the same 80% quota share. Justify your response.

Commentary on Question:
Candidates generally did well on part (i). Most candidates were able to calculate the ceded premium and benefit. Many candidates were unable to correctly calculate the mod co adjustment. A common mistake on part (ii) was to assume the ceding company also transferred the asset. Candidates generally did well on part (iii). Very few candidates were able to clearly mention GHI Life can receive experience fund.

(i) BBB income statement

Pre-tax Income for BBB Re = Ceded premium – Ceded claim – Mod co adjustment - Increase in reserves + Investment income

BBB Re		
Revenue:		
Ceded Premium:	$ 4,800	(=80% * 6,000)
Investment InIncome:	0	(mod co-reinsurance doesn't transfer asset)
Total Revenue	$ 4,800	
Benefits		
Ceded Claim:	$ 480	(=80% * 600)
Reserve Increase	0	
Mod-co Adjustment	$ 3,136	(=80%*(6,000-2,000-2,000*4%)
Total Benefits	$ 3,616	
Pre-tax Income	$ 1,184	

(ii) GHI income statement

Pre-tax income for GHI Life = Net premium – Net claim + Mod co adjustment – Increase in reserves + Investment income + Experience Refund

GHI Life		
Revenue:		
Net Premium:	$ 1,200	(=20% * 6,000)
Investment InIncome:	100	(given as mod co doesn't transfer assets)
Mod-co Adjustment	$ 3,136	(from b(i))
Experience Refund	$ 592	(50% * 1,184)
Total Revenue	$ 5,028	
Benefits		
Ceded Claim:	$ 120	(=20% * 600)
Reserve Increase	$ 4,000	
Total Benefits	$ 4,120	
Pre-tax Income	$ 908	

(iii) Modified coinsurance is recommended as it's more beneficial to GHI Life. GHI Life will receive an experience refund equal of 50% of BBB Re's pre-tax statuary income. Modified coinsurance allows GHI life to retain the assets and generate higher investment income while still obtaining the surplus relief aspects of coinsurance.

6. Fall 2023 LPM Exam (LO 2b)

Learning Objectives:
2. The candidate will understand the fundamentals of risk transfer between two counterparties.

Learning Outcomes:
2b) Describe the elements and considerations of risk transfer between counterparties, and evaluate their impact on reinsurance agreement provisions

Sources:

CP341-105-25: Lapse Risk and Capital Management Strategies: Back in the Spotlight, pp. 8-12

Exam Question:

6. (*8 points*) UXS is a publicly traded company that operates in multiple regulatory regimes, with half of its business written in the U.S.

~~(a) (*2 points*)~~

~~(i) Define embedded value.~~

~~ANSWER:~~

~~(ii) List one reason why embedded value is not based on economic principles.~~

~~ANSWER:~~

(b) (*2 points*) UXS has a block of term to 100 business that was sold 15 years ago. Lapses have been lower than assumed at pricing, and profitability has been below expectations.

Critique the following statements:

A. Given the poor performance of the business, UXS proposes exiting the business using indemnity reinsurance with 100% quota share.

B. *UXS should invest in programs that increase customer satisfaction, which will improve policy persistency and profitability. Higher than expected lapses will prevent UXS from recouping expenses, which ultimately hurts the profitability of the block.*

(c) (*4 points*) For its U.S. business, the product team has proposed three potential products.

	A	**B**	**C**
Profit Metrics	**Term**	**Whole Life**	**Annuity**
IRR on distributable earnings	13%	9%	14%
Profit Margin	8%	9%	8%
PV (of distributable earnings) @ 8%	10,000,000	4,000,000	28,000,000

UXS senior management has the following objectives:

- The required return on capital is 14%.
- Using the CAPM, the hurdle rate is 8%.
- Decisions should be made based on long term value impact.

(i) (*3 points*) Evaluate each of the three profit metrics in terms of their appropriateness for comparing the profitability across all three products.

ANSWER:

(ii) (*1 point*) Recommend a product that best aligns with UXS senior management's objectives. Justify your answer.

ANSWER:

Solution:

(a)

(i) Define embedded value.
(ii) List one reason why embedded value is not based on economic principles.

Commentary on Question:

The question asked candidate to provide the definition of embedded value and its limitation. Candidates only needed to offer one reason why embedded value is not based on economic principle to receive full credit. Many candidates failed to include adjusted net worth in the embedded value definition. Deductions were made for candidates who provided the definition of Market Consistent Embedded Value (MCEV) instead of Embedded Value.

(i) Define embedded value

The embedded value is the sum of the in-force value and the market value of the statutory shareholder capital. It calculates the value of existing business, termed in-force value, as the discounted future statutory profits (PVFP) that are expected to emerge on this business.

(ii) Below are the reasons why embedded value is not based on economic principles

(1) Using the embedded value method, value is based on the composition of the backing assets rather than on the risk characteristics of the cash flows being valued. This is because the projected statutory profits are calculated incorporating expected investment returns. The embedded value method creates a bias towards high-yield investments that is not justified from an economic perspective. The value of the liabilities should be independent of the composition of the backing assets.

(2) The embedded value method levies frictional capital costs solely on the basis of regulatory restrictions. It does not explicitly allow for frictional risk capital costs. Thus, in the extreme, if two lines of business were written in different territories, the one line being virtually risk-free but requiring high regulatory reserves, the other being risky but only requiring low levels of regulatory reserves. Then the embedded value method would penalize the former line regardless of the level of risk inherent in the other line.

(3) Under the embedded value method, the level of the regulatory capital charge is highest for business backed by the lowest yielding assets. This would typically mean that the least risky business would be allocated the highest frictional capital costs.

(4) As the embedded value method is based on expected cash flows, it does not easily accommodate options and guarantees. The economic method properly allows for these by valuing them based on a corresponding replicating portfolio. Valuing these options based on expected cash flows is likely to understate their value.

(b) UXS has a block of term to 100 business that was sold 15 years ago. Lapses have been lower than assumed at pricing, and profitability has been below expectations.

Critique the following statements:

A. Given the poor performance of the business, UXS proposes exiting the business using indemnity reinsurance with 100% quota share.

B. UXS should invest in programs that increase customer satisfaction, which will improve policy persistency and profitability. Higher than expected lapses will prevent UXS from recouping expenses, which ultimately hurts the profitability of the block.

Commentary on Question:

This question tested candidate's understanding of key difference between indemnity and assumption reinsurance as well as characteristics of a lapse supported product. For both statements, the candidate should clearly indicate that the statement is incorrect and provide their rationale to receive full credit. Deductions were applied where candidates provided conflicting and ambiguous information in the response. Most Candidates did well in this question. Some candidates failed to recognize that term to 100 business is a lapse-supported product.

A. This statement is not correct.

To exit the business, Assumption reinsurance should be used instead of indemnity reinsurance. UXS should use assumption reinsurance as a vehicle to exit T100 business if it no longer wants the risk or administrative expense. Assumption reinsurance has been used to divest entire lines of business or to sell problematic blocks of business.

B. This statement is not correct.

- T100 is a lapse-supported product. Improving policy persistency will not necessarily boost the profitability.
- For a Term Life insurance product that was sold 15 years ago, it is likely that Company already had the time to recoup majority of the expenses. Thus, higher than expected lapse will not have material impact on the profitability of the business.

~~(c) For its U.S. business, the product team has proposed three potential products.~~

	A	B	C
Profit Metrics	**Term**	**Whole Life**	**Annuity**
IRR on distributable earnings	13%	9%	14%
Profit Margin	8%	9%	8%
PV (of distributable earnings) @ 8%	10,000,000	4,000,000	28,000,000

UXS senior management has the following objectives:

- The required return on capital is 14%.
- Using the CAPM, the hurdle rate is 8%.
- Decisions should be made based on long term value impact.

(i) Evaluate each of the three profit metrics in terms of their appropriateness for comparing the profitability across all three products.

(ii) Recommend a product that best aligns with UXS senior management's objectives. Justify your answer.

Commentary on Question:

The question asked candidates to evaluate common profit metrics and their appropriateness in measuring profitability for different insurance products. Candidates generally did not perform well on this question. Some candidates only described what each profit metric is in general without providing specific comparison between different insurance products. Most candidates failed to identify that only IRR is an appropriate profit metric for comparing life and annuity business. For the Present value of distributable earnings (PVDE), most candidates did not comment on the appropriateness of the discount rate obtained through CAPM.

i. IRR

For comparing Life and Annuity business. the internal rate of return ("IRR") is an appropriate profit metric, it is the breakeven rate which solves for the interest rate at which the present value of profits and (usually first year) losses equals zero.

All other things being equal, IRR using distributable profits is lower than when it is calculated using book profits, else equal. It is the more appropriate indicator of the general level of return on total capital, since the amounts of surplus being held as target or required surplus is "sterile" capital and cannot be utilized by the company to produce additional new business.

ii. Profit margin

Profit margin is commonly used for life product. It is not an appropriate profit metric for comparing Life and Annuity business mainly because Profit Margin does not reflect the timing of profits or losses, cost of capital and the relative riskiness of the business are not considered.

iii. PVof Distributable Earnings

It is not appropriate to use the PV of Distributable Earnings discounted at the hurdle rate of 8% developed using the CAPM model, mainly due to two reasons:

- CAPM focuses on the systematic risk a company takes while systematic risk is not the most important driver of the cost of taking insurance risk. Frictional capital costs are more important although CAPM does not explicitly capture them, which will inevitably lead to wrong conclusions regarding the cost of taking risk for insurers.
- Insurance companies take most of their systematic risk on the investment side. Whatever systematic risk is embedded in insurance liabilities can be hedged by offsetting positions on the asset side.

(i) Based on IRR, only Block "C" is greater than the required return on capital of 14%, so annuity product best aligns with UXS senior management's objectives.

3. Spring 2023 LPM Exam (LO 1e)

Learning Objectives:
1. The candidate will understand different types of traditional and advanced reinsurance transactions for life insurance.

Learning Outcomes:
1e) Demonstrate knowledge of different forms of reinsurance for different products; specifically, PRTs/longevity swaps, annuity coinsurance, and life insurance yearly renewable term

Sources:
Pension Risk Transfer in Canada and the U.S., SOA Research Institute, Simmons, 2022

Life, Health & Annuity Reinsurance, Tiller, John E. and Tiller, Denise, 4th Edition, 2015
- Chapter 19: Annuity Reinsurance

Commentary on Question:
Overall, candidates were able to demonstrate a general understanding of risk considerations associated with pension risk transfer (PRT) business. However, candidates generally did not perform well when asked to evaluate the individual cases. Depending on the case, candidates were able to identify the risk associated with the design and structure of individual cases. Some candidates confused pricing considerations vs. risk considerations per the reading material.

Exam Question:

3. (*9 points*) You are a group annuity pricing actuary for ABC Life, a large life insurance and annuity company with a large operations department and whose risk appetite favors non-financial over financial risk. Your company wants to bid on a new pension risk transfer (PRT) deal.

Solution:
(a) Explain how to mitigate two main risks underlying assumptions that need to be made for group annuities.

Commentary on Question:
Most candidates were able receive full credit by identifying two main risks and explaining how to mitigate them. Partial credit was given for identifying the risks without providing any mitigation. Full credit was awarded for identifying two of the below risks

and providing an acceptable mitigation per identified risk for which the bullets provide examples.

Investment Risk

- Careful credit underwriting
- Using higher credit quality fixed income assets and limit amount of non-fixed income assets

Interest Rate Risk

- Closely matching the duration of insurer's asset portfolio with the duration of group annuity cash flows
- Strong asset-liability management (ALM)

Longevity Risk

- Limit number of deferred annuitants
- Use a more conservative longevity assumption
- Manage life and annuity business to create a natural risk hedge
- Reinsurance

Annuitant Behavior Risk

- Conservatism in choosing the assumed retirement date

Operational Risk

- Verifying that annuitants are still alive

(b)

(i) Describe the risk characteristics of each of the three cases.

(ii) Recommend which case your company should bid on.

Commentary on Question:

(i) Candidates did not perform as well on this question; they needed to define buy-in vs. buy-out, and identify risk characteristics for each of the cases to receive full credit. Partial credit was given for commentary related to risks associated with each case.

(ii) Most candidates struggled to provide complete justifications to receive full credit. Partial credit was given for recommending a case and some justification.

(i) Case 1
This is a buy-out deal where the life insurer makes monthly pension payments directly to the pension plan members. The pension plans covers over 5,000 current employees and 25,000 retirees and is a material PRT

deal. ABC will take on operational risk and annuitant behavior risk (from the active employees).

Case 2
This is a buy-in deal where the life insurer makes a monthly bulk payment to the pension fund, which will continue to pay pension members directly. Consequently, ABC avoids much of the operational risk. As all participants have retired, there is no annuitant behavior risk.

Case 3
This is a buy-out deal where the life insurer makes monthly pension payments directly to the pension plan members. ABC will take on operational risk. There is no annuitant behavior risk as the plan has only retired participants. However, benefits are linked to CPI, which introduces inflation risk to ABC.

(ii) Model solutions dependent on case recommendation:

Examples of justification for recommending Case 1:

- ABC favors non-financial over financial risk.
- This is a buy-out deal. ABC has large operations department. Therefore, they can take on operational risk on administering monthly pension payments directly.
- Annuitant behavior risk is inherent in this case due to the active employees. ABC can leverage experience from the retired cohorts to develop appropriate assumptions for the active employees.
- This case does not take on inflation risk as the pension benefits are not linked to CPI (unlike case 3)

Examples of justification for recommending Case 2:

- ABC favors non-financial over financial risk.
- This is a small plan with lower financial exposure/risk (both upside and downside).
- This is a buy-in deal. ABC will have low operational risk, as the gas company will retain administration associated with making pension payments to the retirees.
- This case has no active employees (only retirees), thus no annuitant behavior risk as no active employees, just retirees.
- This case does not take on inflation risk as the pension benefits are not linked to CPI (unlike case 3)

Examples of justification for recommending Case 3:

- ABC favors non-financial over financial risk.
- This is a buy-out deal. ABC has large operations department. Therefore, they can take on operational risk on administering monthly pension payments directly.

- This case has no active employees (only retirees), thus no annuitant behavior risk as no active employees, just retirees.
- This case does take on inflation risk as the pension benefits are linked to CPI, which will need to be mitigated.

(c)

(i) Explain why a different longevity assumption might be required for each case.

(ii) Identify how ABC Life can reduce the financial impact of incorrectly estimating the assumptions related to longevity.

Commentary on Question:

(i) Candidates did not perform well on this question, as they needed to provide commentary related to occupational types and geographic differences on these cases for full credit. Partial credit was given for commenting on either occupation or geographic differences. Candidates received no credit for speculative justifications (e.g., mix of gender, age, etc.)

(ii) Candidates did not perform well on this question, as they need to provide all mitigation methods associated with longevity for full credit. Partial credit was given for subset of the mitigation methods.

(i) Longevity assumption may vary by zip code or region, meaning the assumption needs to be consistent with where the plan members live. The employees of a company operating locally within a small geographic area may exhibit different longevity than those from a wider region or an entire country. The job type also matters as occupational hazards are different between white-collar jobs (e.g. telecommunications) vs. blue-collar jobs (e.g. gas company, manufacturing).

(ii) ABC can reduce the financial impact of incorrectly estimating longevity assumptions through the following mitigation methods:

- Limit number of deferred annuitants
- Choose more conservative longevity assumptions
- Manage life and annuity business to create a natural hedge
- Transfer longevity risk via reinsurance

6. Spring 2023 LPM Exam (LO 1c-g, 2b)

Learning Objectives:

1. The candidate will understand different types of traditional and advanced reinsurance transactions for life insurance.
2. The candidate will understand the fundamentals of risk transfer between two counterparties.

Learning Outcomes:

1c) Explain various methods and perform financial statement calculations of reinsurance transactions, including yearly renewable term, coinsurance, modified coinsurance, and funds withheld arrangements

1d) Explain reasons for using inforce reinsurance, approaches used for inforce reinsurance, and advantages and disadvantages of each approach

1e) Demonstrate knowledge of different forms of reinsurance for different products; specifically, PRTs/longevity swaps, annuity coinsurance, and life insurance yearly renewable term

1f) Describe and evaluate types of non-proportional reinsurance transactions

1g) Describe and evaluate types of reinsurance transactions for annuity contracts

2b) Describe the elements and considerations of risk transfer between counterparties, and evaluate their impact on reinsurance agreement provisions

Sources:

Life, Health & Annuity Reinsurance, Tiller, John E. and Tiller, Denise, 4th Edition, 2015
- Ch. 4: Basic Methods of Reinsurance
- Ch. 5: Advanced Methods and Structures of Reinsurance
- Ch. 7: Reinsurance of Inforce Risks
- Ch. 9: Risk Transfer Considerations

Risk Transfer Practice Note, AAA November 2022

Exam Question:

6. (*9 points*) TPL Life is seeking to transfer a portion of investment risk on a block of Universal Life business via reinsurance. They will partner with XYZ Re, a newly established reinsurer, for this transaction.

Although the statutory reserves will be ceded to XYZ Re, TPL Life wishes to retain control over the investment strategy of the assets backing the reserves, as well as limit their counterparty credit exposure. In addition, TPL Life intends to recapture the underlying business eventually.

Commentary on Question:
Candidates were expected to evaluate and analyze traditional and advanced reinsurance transactions and prepare related financial statement entries. Candidates were also expected to describe risk transfer considerations and evaluate their impact on reinsurance agreement provisions.

Solution:
(a) Propose an appropriate reinsurance method for TPL Life. Justify your answer.

Commentary on Question:
In order to receive any credit for this section, candidates had to first identify Funds Withheld Coinsurance as the appropriate type of transaction. Additional points were awarded for providing information on why this is the best solution to meet management goals.

Funds Withheld Coinsurance (FWC) is the best reinsurance method for TPL Life as FWC does not require asset transfer to the reinsurer.

- This allows TPL Life to keep the assets on their books and manage the investment strategy.
- Counterparty credit exposure is very minimal with FWC because the assets stay with the ceding company. Given that XYZ Re is a new reinsurer, counterparty risk could be higher.
- Recapture is easier under FWC because the assets are not transferred, avoiding any capital gains/losses from moving assets.

(b) The following information is provided for the transaction:

General Assumptions (for all years)	
Coinsurance percentage	80%
Invested assets earned rate	8%
Allowance percentage	20%
Year 1 Projections	
Direct premium	100
Gross death benefits	0
Risk charge	0
Experience refund	0

Year 2 Projections	
Direct premium	80
Gross death benefits	10
Increase in reserve	30
Risk charge	3
Experience refund	6

(i) Calculate the total amount due to XYZ Re at the end of Year 2 under coinsurance

(ii) Calculate the total amount due to XYZ Re at the end of Year 2 under funds withheld coinsurance

(iii) Calculate the funds withheld balance at the end of Year 2 under funds withheld coinsurance

Commentary on Question:
Most candidates received more points on part (i) than on parts (ii) or (iii). Very few candidates received full points on this section.

(i) Coinsurance

TPL Life
Reinsurance Report
Coinsurance - Year 2

Ceded premiums = Direct premiums * Coinsurance %	64.00
Allowances = Ceded premiums * Allowance %	12.80
Benefits = Gross Death Benefits * Coinsurance %	8.00
Experience refund	6.00

Total due to XYZ Re = Ceded Premiums – Allowances – Benefits – Experience refund = 37.2

(ii) and (iii) Funds withheld coinsurance

TPL Life

Reinsurance Report
Funds withheld coinsurance - Year 1

Funds withheld beginning balance	0
Ceded premiums = Direct premiums * Coinsurance %	80
Allowances = Ceded premiums * Allowance %	16
Benefits	0
Experience refund	0
Risk charge	0
Total due to XYZ Re = Ceded Premiums – Allowances – Benefit – Experience	64
Funds withheld ending balance	64

TPL Life
Reinsurance Report
Funds withheld coinsurance - Year 2

Funds withheld beginning balance	64.00
Ceded premiums = Direct premiums * Coinsurance %	64.00
FWH investment income = Funds withheld beginning balance * Invested asset earned rate	5.12
Allowances = Ceded premiums x allowance %	12.80
Benefits = Gross Death Benefits * Coinsurance %	8.00
Experience refund	6.00
Risk charge	3.00

Total due to XYZ Re at the end of year 2 =
+ Ceded Premiums
+ FWH Investment Income
- Allowances
- Benefits
- Experience Refund =
$64 + 5.12 – 12.80 – 8 – 6 = 42.32

Funds withheld ending balance =

+ BOY FWH Balance
+ Total due XYZ Re
– Risk Charge =
$64 + 42.32 - 3 = 103.32

(c) Critique each of the following statements with respect to reinsurance in general, and not related to the TPL company information above:

A. *While yearly renewable term reinsurance can be a cost-effective solution to transfer mortality risk, it provides little surplus benefit to the ceding company.*

B. *Modified coinsurance is not an appropriate solution for ceding companies focused on developing policyholder dividend scales or interest credits.*

C. *Pure coinsurance provides the benefit of minimizing capital gains and losses on assets at initiation of the reinsurance.*

Commentary on Question:
Points were awarded for correctly identifying the statement as True, Partly True, or False. Further points were awarded for explaining why the statement was true or false.

For part A, partial credit was awarded for mentioning coinsurance provides higher surplus relief.

A. This statement is partly true. Year Renewable Term (YRT) is a more cost-effective solution to transfer mortality risk, it can also be used to transfer the C2 (mortality/morbidity) component of the ceding company's risk based capital requirements, which can be relatively significant.

B. This statement is not true. Modified Coinsurance allows the ceding company more control over their asset investments, which is important in developing policyholder dividend scales or interest credits and in matching assets

C. This statement is not true. Other forms of coinsurance (e.g., funds withheld coinsurance, modified coinsurance) enable the benefit of minimizing capital gains and losses on assets at initiation of the reinsurance, since they eliminate the movement of assets from ceding company to reinsurer that is required with pure Coinsurance. Movement of assets will require liquidation and thus may have large capital gain/loss implications for the ceding company.

6. Fall 2020 LPM Exam (LO 1c, 1d, 1e)

Learning Objectives:

1. The candidate will understand different types of traditional and advanced reinsurance transactions for life insurance.

Learning Outcomes:

1c) Explain various methods and perform financial statement calculations of reinsurance transactions, including yearly renewable term, coinsurance, modified coinsurance, and funds withheld arrangements

1d) Explain reasons for using inforce reinsurance, approaches used for inforce reinsurance, and advantages and disadvantages of each approach

1e) Demonstrate knowledge of different forms of reinsurance for different products; specifically, PRTs/longevity swaps, annuity coinsurance, and life insurance yearly renewable term

Sources:

Life, Health & Annuity Reinsurance, Tiller, John E. and Tiller, Denise, 4th Edition, 2015

- Ch. 4: Basic Methods of Reinsurance
- Ch. 5: Advanced Methods and Structures of Reinsurance
- Ch. 7: Reinsurance of Inforce Risks

Commentary on Question:

The purpose of this question was to test the candidate's knowledge of reinsurance options and their impact on company financials. Most candidates did well on part (a) but struggled with part (b).

Exam Question:

6. (*11 points*) Life Co is a life insurance company exploring various reinsurance options for its life insurance business. Life Co's management has the following company objectives for the current year:

1. Reduce capital,
2. Expand into the annuity business,
3. Achieve expense efficiencies, and
4. Mitigate mortality exposure.

Solution:

(a) Compare the effectiveness of the following types of reinsurance for each of the company's objectives.

(i) YRT
(ii) Coinsurance
(iii) Modified Coinsurance
(iv) Funds Withheld Coinsurance

Commentary on Question:
Candidates generally performed well on this question. Full credit was given if the candidate answered correctly whether each of the four company objectives were effective or ineffective, for each of the four types of reinsurance.

(i) YRT

1. Effective for reducing capital based on mortality risk.

2. Ineffective for expanding into the annuity business due to focus on mortality risk

3. Ineffective for achieving expense efficiencies due to small expense allowances.

4. Effective for mitigating mortality risk.

(ii) Coinsurance

1. Effective for reducing capital based on various risks (mortality, lapse, asset/investment, etc.).

2. Effective for expanding into the annuity business since it covers many risks associated with annuity products.

3. Effective for achieving expense efficiencies because of the expense allowance from the reinsurer.

4. Effective for mitigating mortality risk.

(iii) Modified Coinsurance

1. Effective for reducing capital based on various risks (mortality, lapse, asset/investment, etc.).

2. Effective for expanding into the annuity business since it covers many risks associated with annuity products.

3. Effective for achieving expense efficiencies because of the expense allowance from the reinsurer.

4. Effective for mitigating mortality risk.

(iv) Funds Withheld Coinsurance

1. Effective for reducing capital based on various risks (mortality, lapse, asset/investment, etc.).

2. Ineffective for expanding into the annuity business due to funds withheld.

3. Ineffective for achieving expense efficiencies due to additional costs associated with setting up trust or escrow accounts.

4. Effective for mitigating mortality risk.

(b) Life Co is entering a Mod-Co reinsurance arrangement with Reinsurance Inc.

Life Co	**Year 1**	**Year 2**
Premiums	2,000	0
Expenses	50	10
Commissions	250	0
Reserves	1,500	1,800
Benefits Paid	0	50
Investment Income	10%	10%
Reinsurance Co.	**Year 1**	**Year 2**
Allowance	10%	10%
Mod-Co Interest Rate	5%	5%

(i) Construct Life Co's Gain from Operations statement for years 1 and 2 under the reinsurance agreement.

(ii) Construct Reinsurance Inc's Balance Sheet for years 1 and 2 under the reinsurance agreement.

Commentary on Question:
For part (i), most candidates who had a broad knowledge of financial values in reinsurance agreements received some credit for this part, but very few candidates achieved full credit for this question. Full credit was given if the

candidate not only provided Life Co's gain from operations in year 1 and in year 2, but also showed their work in obtaining those values.

For part (ii), candidates generally performed poorly on this question. The most important step in getting this correct was recognizing that the question was asking for the Balance Sheet values of Reinsurance Inc. Candidates that recognized this received partial credit. Full credit was given if the candidate was able to provide the correct asset, liability, and surplus values in year 1 and year 2, but very few were able to do that.

Note the solution provided here assumes 100% coinsurance. However, since the question did not state the coinsurance percentage, values were adjusted based on the coinsurance percentage assumed by the candidate.

See Excel attachment.

6. Spring 2021 LPM Exam (LO 1c, 1d, 1e, 2b)

Learning Objectives:

1. The candidate will understand different types of traditional and advanced reinsurance transactions for life insurance.
2. The candidate will understand the fundamentals of risk transfer between two counterparties.

Learning Outcomes:

1c) Explain various methods and perform financial statement calculations of reinsurance transactions, including yearly renewable term, coinsurance, modified coinsurance, and funds withheld arrangements

1d) Explain reasons for using inforce reinsurance, approaches used for inforce reinsurance, and advantages and disadvantages of each approach

1e) Demonstrate knowledge of different forms of reinsurance for different products; specifically, PRTs/longevity swaps, annuity coinsurance, and life insurance yearly renewable term

2b) Describe the elements and considerations of risk transfer between counterparties, and evaluate their impact on reinsurance agreement provisions

Sources:

Life, Health & Annuity Reinsurance, Tiller, John E. and Tiller, Denise, 4th Edition, 2015
- Ch. 4: Basic Methods of Reinsurance
- Ch. 7: Reinsurance of Inforce Risks
- Ch. 9: Risk Transfer Considerations

Exam Question:

6. (*11 points*) ABC Life is pursuing a coinsurance agreement with XYZ Re which includes the following terms:

Policy Assumptions	
Plan of Insurance	Whole Life
Face Amount	500,000
Amount Reinsured	250,000
Premium Rate per 1000	15

Annual Policy Fee	50
Mean reserves per 1000	
Year 1:	1.00
Year 2:	7.00
Commissions	
Year 1:	95%
Year 2:	8%
Premium Tax	2%
Expenses	
Underwriting and Issue:	455 per policy
Maintenance:	20 per policy annually

Ceding Company and Reinsurer Assumptions		
	ABC Life	**XYZ Re**
Initial Surplus:	1000	1000
Investment Rate of Return:	10%	10%
Reinsurance Expenses:		
Issue:	(included in policy expenses)	20
Maintenance:		10

Reinsurance Allowance Assumptions	
Policy Year	**Expense Allowance**
1	100%
2-10	20%
Over 10	10%

Assumptions:

- Investment income is assumed to be earned only on assets present at the beginning of the calendar year and not on cash flows.

- Policy and reinsurance premiums are assumed to be paid on an annual basis.
- Expenses are assumed to be incurred at issue and on policy anniversaries.
- No deaths or surrenders are assumed.
- Federal Income Tax effects are ignored.
- All calculations are rounded to the nearest dollar.
- XYZ Re will reimburse for premium tax.

Commentary on Question:

The purpose of this question was to test the candidate's knowledge of reinsurance arrangements and their impact on company financial statements.

Solution:

(a) Calculate the following for ABC and XYZ:

(i) Gains from Operation Sheet for Year 1. Show all work.

(ii) Balance Sheet for Year 1. Show all work.

(iii) Gains from Operation Sheet for Year 2. Show all work.

Commentary on Question:

Candidates generally performed well on this question.

Full credit was given if candidates created the financial statements and correctly calculated the corresponding values. Note the solution provided here assumes the annual policy fee is not included in the ceded premium, but is included in commissions and premium taxes for ABC Life. Since the question did not state how the annual policy fee should be handled, values were adjusted based on the assumption by the candidate.

The most common mistake was the calculation of the reinsurance allowance. This is equal to a percentage of the ceded premium plus the reinsurer's share of the premium tax. Other common mistakes were including the policy fee in expenses rather than revenue and calculating the initial surplus plus gain from operations as the assets rather than the surplus.

	Gain from Operations				
	Year 1			Year 2	
	ABC Life	XYZ Re		ABC Life	XYZ Re
Revenue					
Premiums					
Gross	7,550	3,750		7,550	3,750
Ceded	3,750	0		3,750	0
Net	3,800	3,750		3,800	3,750
Investment Income					
Surplus	100	100		68	75
Reserves	0	0		25	25
Total	100	100		93	100
Reinsurance Allowance	3,825	0		825	0
TOTAL REVENUE	7,725	3,850		4,718	3,850
Benefits					
Claims	0	0		0	0
Surrenders	0	0		0	0
Reserve Increase					
Gross	500	250		3,000	1,500
Ceded	250	0		1,500	0
Net	250	250		1,500	1,500
TOTAL BENEFITS	250	250		1,500	1,500
Expenses					
Commissions	7,173	3,750		604	750
Acquisition	455	20		0	0
Maintenance	20	10		20	10

Premium Tax	151	75		151	75
TOTAL EXPENSES	7,799	3,855		775	835
GAIN FROM OPERATIONS	(324)	(255)		2,443	1,515

	Balance Sheet	
	Year 1	
	ABC Life	XYZ Re
Assets		
Invested Assets	926	995
TOTAL ASSETS	926	995
Liabilities & Capital		
Policy Reserves		
Gross	500	250
Ceded	250	0
Net	250	250
TOTAL LIABILITIES	250	250
Surplus	676	745
TOTAL CAPITAL	676	745
TOTAL LIABILITIES & CAPITAL	926	995

(b) Calculate the differences between the Balance Sheet for the above coinsurance arrangements and each of the following:

(i) Funds Withheld Coinsurance arrangement. Show all work.

(ii) Modified Coinsurance arrangement. Show all work.

Commentary on Question:

Candidates generally performed poorly on this question.

For part (i), full credit was given if the balance sheet still showed a ceded reserve, set up an accounts receivable and accounts payable for the ceded reserve, and left surplus unchanged. Note the solution provided here assumes the receivable/payable is equal to the ceded reserve. However, credit was given for alternate assumptions.

For part (ii), full credit was given if the balance sheet showed no ceded reserve and the corresponding impact on surplus. Although a mod-co adjustment would be calculated for this type of reinsurance, it was not necessary for this question.

	Funds Withheld Coins			Modified Coins	
	Year 1			Year 1	
	ABC Life	XYZ Re		ABC Life	XYZ Re
Assets					
Invested Assets	1,176	745		1,176	745
Accounts Receivable	0	250		0	0
TOTAL ASSETS	1,176	995		1,176	745
Liabilities & Capital					
Policy Reserves					
Gross	500	250		500	0
Ceded	250	0		0	0
Net	250	250		500	0
Accounts Payable	250	0		0	0

TOTAL LIABILITIES	500	250		500	0
Surplus	676	745		676	745
TOTAL CAPITAL	676	745		676	745
TOTAL LIABILITIES & CAPITAL	1,176	995		1,176	745

(c) With respect to coinsurance:

(i) Assess ABC's ability to claim the reserve credit under each of the terms proposed.

(ii) For each treaty term, if appropriate, propose changes to make them acceptable for the credit reserve.

Commentary on Question:

Full credit was given if the candidate answered correctly whether each of the give treaty terms would allow or prohibit the company from claiming a reserve credit and provided reasonable changes to make the problematic treaty terms acceptable.

Most candidates were able to correctly identify the 1st and 5th treaty terms would prohibit ABC Life from claiming a reserve credit. For the other treaty terms, candidate performance was mixed.

Note the solution for the 2nd and 4th treaty terms provided below assumes a modified coinsurance arrangement. However, since the question was not specific, credit was given for correct responses assuming a coinsurance arrangement.

Similarly, the solution for the 5th treaty term provided below assumes the cedent, ABC Life, is required to guarantee future performance. However, credit was given to candidates that assumed the reinsurer, XYZ Re, is providing the guarantee.

1. XYZ Re is required to terminate the reinsurance agreement after 10 years.

Assessment: This treaty term would <u>prohibit</u> ABC Life from claiming a reinsurance reserve credit. Requiring mandatory termination after a specific date means the risks beyond that date were never reinsured and thus cannot be included in the reserve credit.

Proposal: This treaty term could be removed entirely. Alternatively, ABC Life can have the ability, but not the obligation, to recapture the business.

2. ABC Life will retain the assets for investment purposes while still obtaining the surplus relief.

Assessment: This treaty term would allow ABC Life to claim a reinsurance reserve credit. This is a normal requirement of modified coinsurance.

Proposal: No changes needed.

3. ABC Life will be insulated from selling at a loss when surrenders or policy loans increase while asset values are low.

Assessment: This treaty term would prohibit ABC Life from claiming a reinsurance reserve credit. Insulating from selling at a loss means there is no disintermediation risk transfer, which is a significant risk for this product.

Proposal: This treaty term could be removed entirely or altered such that disintermediation risk is reintroduced.

4. XYZ Re will be responsible for funding any increases to the reserve, less a credit for the investment income.

Assessment: This treaty term would allow ABC Life to claim a reinsurance reserve credit. This is a normal requirement of modified coinsurance.

Proposal: No changes needed.

5. XYZ Re is required to guarantee the future performance of the reinsured business.

Assessment: This treaty term would prohibit ABC Life from claiming a reinsurance reserve credit. If the ceding company guarantees the performance, the reinsurer will be reimbursed for any shortfalls. Thus, the reinsurer has not assumed any risk and there has not been a significant risk transfer.

Proposal: This treaty term could be removed entirely or altered such that there is a significant transfer of risk. For example, an experience refund could be included.

7. Fall 2021 LPM Exam (LO 1a, 1d, 1g, 2b, 3e)

Learning Objectives:

1. The candidate will understand different types of traditional and advanced reinsurance transactions for life insurance.
2. The candidate will understand the fundamentals of risk transfer between two counterparties.
3. The candidate will understand regulatory frameworks for reinsurance transactions across US, Canadian, and global jurisdictions.

Learning Outcomes:

1a) Describe basic terms and concepts related to reinsurance

1d) Explain reasons for using inforce reinsurance, approaches used for inforce reinsurance, and advantages and disadvantages of each approach

1g) Describe and evaluate types of reinsurance transactions for annuity contracts

2b) Describe the elements and considerations of risk transfer between counterparties, and evaluate their impact on reinsurance agreement provisions

3e) Understand key international reinsurance regulatory frameworks, especially as they relate to the use of offshore reinsurance and private equity backed reinsurers.

Sources:

Life, Health & Annuity Reinsurance, Tiller, John E. and Tiller, Denise, 4th Edition, 2015

- Ch. 4: Basic Methods of Reinsurance
- Ch. 7: Reinsurance of Inforce Risks
- Ch. 9: Risk Transfer Considerations

Risk Transfer Practice Note, AAA November 2022

CP341-105-25: Lapse Risk and Capital Management Strategies: Back in the Spotlight, pp. 8-12

CP341-113-25: Supervision and Regulation of PE Insurers in Bermuda

CP341-114-25: The Bermuda Monetary Authority's Approach to Private Equity-Owned (Re)insurers

CP341-115-25: Solvency II Equivalence FAQs

Asset Intensive Reinsurance Ceded Offshore from U.S. Life Insurers (With Focus on Bermuda), AAA, Feb 2024

Exam Question and Solution:

7. (*12 points*) Your company is investigating the use of reinsurance and has summarized the main motivations in three broad categories:

1. Structured protection and risk transfer
2. Corporate finance driven
3. Enabling strategy and growth

(a)

(i) Explain the objectives for the company in considering the use of reinsurance for each motivation category.

(ii) Identify the mapping of the following reinsurance solutions to the motivation categories. Justify your answer.

1. Life in force solutions
2. Solutions supporting growth
3. Solutions for mutual insurers

Commentary on Question:

Few candidates provided the complete answer for this section. Most provided limited information. Most candidates provided some detail to the Corporate Finance Driven section of part a(i). For the other motivations, candidates did not provide enough details that supported the correct answer. Overall students performed poorly on part a(i).

Candidates performed fairly well on the second part of the question, a(ii). Most understood the question and was able to provide at least one mapping answer for each category.

(i)

Structured protection:

- Improve the efficiency of their current risk transfer programs (like reducing the cost of mortality or reducing their exposure to interest rate risk)
- Improve their capacity for difficult to reinsure risks
- Reduce their exposure to certain risk concentrations (like catastrophic risks in a certain geographic area).

Corporate finance driven:

- Free up any redundant capital (that could be held up due to the regulation XXX requiring redundant capital) which can help improve their financing results (such as their return on equity)
- Optimize their capital structure
- Replace traditional capital

- Use reinsurance as a means of reducing surplus and earnings volatility to reduce their Cost of Capital.

Enabling strategy and growth:

- The insurer and reinsurer could cooperate together in a way that aligns their long term strategic goals and objectives and they could mutually achieve growth together through a strategic partnership

(ii)

Life in force solutions could be mapped to Corporate Finance Driven solution, helps free up capital to pursue other more profitable ventures and improve overall returns.
It could also be mapped to Enabling Strategy & Growth, which supports expansion into new markets and to launch new products.

Solutions supporting growth would map to Enabling Strategy and Growth, whereby the reinsurer provides advise and expertise to the insurer to help them grow their business.

Solution for Mutual Insurers would map to Corporate Finance Driven and Enabling Strategy & Growth, the reinsurer could help provide them with additional source of capital that they would normally be unable to raise on the capital markets. The reinsurance can also help provide financial flexibility to handle unexpected events.

~~(b) Describe areas where reinsurance provides value to buyers and sellers in merger and acquisition deals.~~

~~**Commentary on Question**:~~
~~*Candidates demonstrated a good understanding of what was being asked in this question. Most were not able to provide all the details for the answer but almost all candidates that attempted an answer received some credit. A typical response from candidates included about 3-5 bullet points. For full credit, about 8-10 bullet points were needed.*~~

- ~~The reinsurer can provide a flexible/efficient form of financing for the M&A deal, without increasing the leverage for the buyer. This capital financing can be done before or after the deal has been completed.~~
- ~~Reinsurance can be used to restructure the risks in a way that would improve the value of a business to make it more attractive for an M&A deal.~~
- ~~Reinsurance can be used to transfer away risks that are not attractive or risks that the acquirer does not want to retain after an M&A~~
- ~~There is more confidence that the dividends of the merged business can be met over a longer term horizon which helps to manage the expectations of policyholders and shareholders~~

- ~~The reinsurer can also provide advice and risk management expertise both before and after the deal has been completed~~
- ~~Reinsurers can provide confidence to all stakeholders and external audiences in an M&A deal. They provide assurance that the best risk management practices and due diligence have been applied throughout the M&A process~~
- ~~Reinsurers provide stakeholders with more confidence that they are making a financial commitment~~
- ~~Finally, it provides stakeholders with reassurance that the merged/acquired entity will be managed using best practices in terms of risk management moving forward~~

(c) Critique each of the following statements concerning reinsurance:

A. *Reinsurers cost of capital is less expensive than insurer cost of capital*.

B. *Reinsurance capital offers more flexibility to a company than traditional capital*.

C. *An insurance company should avoid the use of collateral when it uses reinsurance to monetize the value of long-term savings and protection policies*.

D. *Increasingly sophisticated regulatory capital requirements will increase the use of reinsurance employed by smaller mono-line insurers, with the objective to avoid being acquired*.

E. *Under Solvency II, non-life reinsurance has become more attractive for insurers*.

Commentary on Question:
Candidates were given additional credit for making an explicit statement of True or False. They then gained additional points for justification. The majority provided a True or False answer to each statement, however, only very few were able to provide enough details to earn full credit for this question.

A. **This is true**, as reinsurers are often more diversified and are therefore less risky, so the cost of capital that they provide for insurers in corporate finance driven solutions is often lower than the cost of capital of the insurer

B. **This is true**, this is because reinsurance capital is often provided over a shorter term than other forms of capital, it is also private and does not need to be approved by shareholders or by the SEC, so the capital can be raised quickly and efficiently. Because of these factors, the capital can also be more tailored and targeted to address specific risks in the company that traditional forms of capital are unable to achieve.

C. **This is not true** as collateral would provide the reinsurer with more security and reduce the reinsurer's counterparty risk with the insurer. The structure of the reinsurance could require upfront ceding commission to the reinsurer.

D. **This is partially true**, as the smaller mono line insurers are less diversified. Reinsurance will be held to reduce their risks and reduce their required capital which will allow them to become more competitive. The main objective is to improve their solvency position and to improve their overall competitiveness, and may increase the company's attractiveness for acquisition.

E. **This is true**, as non-life valuation better reflects the risk mitigating effects of reinsurance. Not all types of reinsurance are adequately considered under the standard formula for life valuation.

9. Fall 2021 LPM Exam (LO 1d, 2b)

Learning Objectives:

1. The candidate will understand different types of traditional and advanced reinsurance transactions for life insurance.
2. The candidate will understand the fundamentals of risk transfer between two counterparties.

Learning Outcomes:

1d) Explain reasons for using inforce reinsurance, approaches used for inforce reinsurance, and advantages and disadvantages of each approach

2b) Describe the elements and considerations of risk transfer between counterparties, and evaluate their impact on reinsurance agreement provisions

Sources:

Life, Health & Annuity Reinsurance, Tiller, John E. and Tiller, Denise, 4th Edition, 2015

- Ch. 4: Basic Methods of Reinsurance

CP341-105-25: Lapse Risk and Capital Management Strategies: Back in the Spotlight, pp. 8-12

Exam Question:

9. (*11 points*) You are the Chief Actuary of XYZ Insurance Company, a US subsidiary of a European holding company. XYZ's liability in force business is exclusively comprised of fixed Universal Life.

XYZ's current asset portfolio backing these policies has large segments of:

- Long-term lower rated Bullet bonds
- Euro-denominated Bullet bonds

XYZ wishes to avoid selling or transferring such assets during this calendar year.
To help mitigate risk, XYZ is considering entering an interest rate swap with a notional value of 100 million and the following forward rates:

	Forward Rate
Q1 2021	2.0%
Q2 2021	5.0%
Q3 2021	8.0%
Q4 2021	11.0%

Assume 90 days in all quarters.

Solution:

Commentary on Question:
This question required candidates to explain tools for managing common interest rate and related asset risks associated with accumulation-driven life insurance products.

(a)

(i) Define the swap rate.

(ii) Calculate the present value of the floating rate payment.

(iii) Calculate the swap rate.

Commentary on Question:
Candidates were generally able to define the swap rate, however many candidates had difficulty applying their knowledge to the calculations. Common errors included incorrectly computing the period forward rates and forward discount factors from the given forward rates.

(i) The swap rate is the singular rate on which the fixed payments in a swap are based.

(ii) Period Forward Rate = Forward Rate * number of days in quarter / 360

FDF = Forward Discount Factor
Q1 FDF = 1 / (1 + Q1 Period Forward Rate)
Q2 FDF = Q1 FDF / (1 + Q2 Period Forward Rate)
Q3 FDF = Q2 FDF / (1 + Q3 Period Forward Rate)
Q4 FDF = Q3 FDF / (1 + Q4 Period Forward Rate)

Floating Rate Payment = Notional Amount * Period Forward Rate

PV Floating Rate Payment = Floating Rate Payment * FDF

	Number Days in Q	Forward Rate	Period Forward Rate	FDF	Floating Rate Pmt at End of Quarter	PV Floating Rate Pmt
Q1 2021	90	2.00%	0.50%	0.995025	– 500,000	497,512
Q2 2021	90	5.00%	1.25%	0.982741	1,250,000	1,228,426
Q3 2021	90	8.00%	2.00%	0.963471	2,000,000	1,926,942
Q4 2021	90	11.00%	2.75%	0.937685	2,750,000	2,578,633
						6,231,514

(iii) Swap Rate = $\frac{\Sigma \text{ PV Floating Rate Payments}}{\Sigma \text{ Notional Amount} * (\text{days in quarter} / 360) * \text{FDF}}$

	Notional Amount * (90 / 360) * FDF
Q1 2021	24,875,622
Q2 2021	24,568,515
Q3 2021	24,086,780
Q4 2021	23,442,122
	96,973,039

Swap Rate = 6,231,514 / 96,973,039

Swap Rate = **6.43%**

(b) Explain key factors that would increase the value of a pay fixed interest rate swaption.

Commentary on Question:

Most candidates correctly identified and explained why an increase in interest rates increases the value of a pay fixed interest rate swaption and many also received credit for interest volatility. Few candidates identified and explained the impact of strike rate and time to expiration.

A pay-fixed interest swaption gives the buyer a right to establish a position in an interest rate swap where they would pay at a fixed rate and receive floating rate payments.

Yield curve – An increase to the level of slope of the yield curve will increase the value of a pay-fixed swaption, given the floating rate payments would become more valuable.

Interest volatility – There is a positive relationship between swaption values and the assumed interest rate volatility. An increase to the volatility of interest rates increases the likelihood of favorable movements of the underlying, thus increasing the value of the pay-fixed swaption.

Strike rate – The value of a swaption is essentially the difference between the prevailing swap rate and the strike rate. Thus, a decrease to the strike rate, all else equal, will increase the value of a pay-fixed swaption.

Time to expiration – Effects are ambiguous, depending on other factors such as the current yield curve, volatility, and the strike rate. Increasing the swaptions time to expiration can either increase or decrease its value.

(c) Recommend two other potential derivative strategies that address risks not covered by XYZ's interest rate swap; include an assessment of the cash flow

~~needs.~~

~~**Commentary on Question**:~~
~~*Many candidates recommended credit default swaps to address default risk arising from lower rated Bullet bonds and currency swaps to address foreign exchange risk from euro-denominated Bullet bonds. Only partial credit was awarded if the strategies were not fully explained or assessed in terms of XYZ's needs. Almost all candidates failed to assess the impact of the above derivative strategies on XYZ's cash flows.*~~

~~Credit default swaps (CDS) are recommended to mitigate the default risk arising from lower rated Bullet bonds. Purchasing CDS' can hedge XYZ's portfolio against these lower rated securities, transferring credit risk off XYZ's balance sheet. XYZ may have to pay an upfront premium, which may be positive or negative, and then during the premium leg XYZ would need to pay a regular coupon to the protection seller.~~

~~Currency swaps are recommended to provide protection against the foreign exchange risk stemming from XYZ's euro-denominated Bullet bonds. XYZ would want to receive dollars, and pay Euros, to hedge the risk of the US subsidiary's exposure to fluctuating Euro to USD exchange rates. XYZ's cash flow needs will depend on the relationship between the reference rates for euro and dollar-denominated debt. After entering the swap, if the dollar declines relative to the euro, then XYZ will pay to the counterparty.~~

(d) Propose a reinsurance structure to address XYZ's policyholder persistency risk and optimize its capital position. Justify your proposal.

Commentary on Question:
Most candidates received partial credit by recommending a modified coinsurance arrangement and providing rationale supporting the appropriateness of this structure. To receive full credit, commentary on mitigating persistency risk and capital implications was required. Credit was also given for funds withheld coinsurance if properly justified.

Since XYZ seeks reinsurance to optimize its capital position but does not wish to sell or transfer any assets, they should use a modified coinsurance ("modco") reinsurance agreement that will allow them to continue controlling and investing their own assets to benefit from strong asset performance.

Yearly renewable term (YRT) reinsurance isn't appropriate since it only transfers mortality risk which isn't a primary concern for XYZ given their stringent underwriting performance. Modco reinsurance will transfer a quota share of all risks, including persistency risk, thereby reducing XYZ's exposure to surrender benefits.

Entering into a modco reinsurance agreement will also provide capital and surplus relief to XYZ, thereby allowing XYZ to release some of its capital for other business opportunities.

6. Spring 2022 LPM Exam (LO 1d, 1g)

Learning Objectives:

1. The candidate will understand different types of traditional and advanced reinsurance transactions for life insurance.

Learning Outcomes:

1d) Explain reasons for using inforce reinsurance, approaches used for inforce reinsurance, and advantages and disadvantages of each approach

1g) Describe and evaluate types of reinsurance transactions for annuity contracts

Sources:

Life, Health & Annuity Reinsurance, Tiller, John E. and Tiller, Denise, 4th Edition, 2015

- Ch. 4: Basic Methods of Reinsurance
- Ch. 5: Advanced Methods of Structures of Reinsurance
- Ch. 7: Reinsurance of Inforce Risks
- Ch. 19: Annuity Reinsurance

Exam Question:

(*8 points*) XYZ Life is a life and annuity insurer that has never reinsured any business. Their current business plan includes the following objectives:

- Stop new sales of fixed annuities because of falling interest rates
- Switch from selling universal life with a lifetime secondary guarantee to participating whole life
- Increase available capital for future growth

(a) (*3 points*) Describe three types of strategic or customized reinsurance solutions which could help XYZ Life achieve its business plan objectives.

ANSWER:

~~(b) (*2 points*) Assess how XYZ Life may need to update its corporate governance to prepare for issuing participating whole life policies.~~

~~ANSWER:~~

(c) (*3 points*) Critique each of the following product design proposals for the new participating whole life product:

A. To help promote the launch of the product, XYZ Life's illustration software will reflect a special one-time dividend paid out of retained earnings from its non-participating term business.

ANSWER:

B. The cost to migrate to a new policy administration system will be borne by newly issued policies by embedding it in acquisition expenses.

ANSWER:

C. Because of low fixed income yields, the investment strategy includes a greater amount of equities than other asset classes; realized gains are paid to the policyholders through the investment component of the dividend scale, once the stock is sold.

ANSWER:

Commentary on Question:
This question tests the candidate's knowledge of reinsurance and participating business. The backdrop is a simple business plan with the objective of entering the par business, and all the considerations required such as governance related to nonguaranteed elements (such as dividends), and dividend best practices. The candidate will understand the various forms of traditional reinsurance, will be able to assess how and when they are effectively used.

Solution:
(a) Describe three types of strategic or customized reinsurance solutions which could help XYZ Life achieve its business plan objectives.

Commentary on Question:
Most candidates performed well on this part.

Full credit was given to candidates who described 3 strategic solutions and explained how each solution applied to one or more of XYS business objectives. Partial credit was given if a correct reinsurance solution was provided but did not describe how the solution applied to one of XYZs business objectives.

Monetization of inforce business can be used. As XYZ plans to stop new sales of fixed annuities and it might want to obtain the capital or profits of the inforce fixed annuities. Reinsurance can be used to monetization profits with reinsurer paying ceding commission in exchange for rights to future cashflows under the contract.

Reinsurance solutions for developing a new product which enables strategy and growth can be used to help XYZ switch from selling universal life with lifetime secondary guarantee to participating whole life. XYZ could gain experience in developing and launching participating whole life products. or might gain information about the market, reinsurers can provide capital as a funding for the new product, as well as the underwriting expertise to help developing the product.

Reinsurance solutions of surplus relief and risk transfer can reduce the required capital can help to increase available capital for future growth. Reinsurance can be used to transfer risks to reinsurers and reduce the required capital so that the capital that is freed up can be invested in other more profitable areas and in other projects for future growth.

Alternative solution:

100% Coinsurance of the fixed annuities: Under such agreement, the risk embedded in the fixed annuities is shared proportionally with reinsurer, which minimize the related risks. Also, XYZ could gain reserve credit and available capital released for further growth.

Assumption reinsurance. This reinsurance agreement is like the sale of whole block of business to the reinsurer. Given the low interest rate environment, the sales of the ULSG business could help XYZ gain capital for its business development.

Modified coinsurance for Participating Whole Life product. With the Mod-co, the Par whole life product's risk is split proportionally with the reinsurer. This agreement allows XYZ gain reserve credit and release of capital for its business plan.

~~(b) Assess how XYZ Life may need to update its corporate governance to prepare for issuing participating whole life policies.~~

~~**Commentary on Question:**~~
~~*Most candidates received only partial credit on this part.*~~

~~*The objective of this question is to test the candidate's ability to identify key considerations for establishing a dividend policy. Full credit was given for 4 reasonable considerations identified by the candidate. The candidate did not need*~~

to explain what sort of approach the company should take for each consideration since there can be multiple valid approaches for some.

Solution (any 4 reasonable considerations such as):

XYZ's corporate governance may need to be updated to establish the level of aggregate dividends to be distributed as approved by the board. This includes how the dividend scale will be managed.

Establish methodology for managing pattern of scale over time such as relying on pegging or substitution ("dividend stabilization")

Establish how different groups/classes will be determined based on experience or how investments are tracked/managed Dividend strategy

Determine how investment income will be allocated / credited, such as the treatment of unrealized gains/losses for certain asset classes or if returns are measured using portfolio earned rates vs new money (investment year) rates

Ensure that expenses are fairly allocated between classes based on factors such as inflation and higher maintenance costs later in a policy's lifespan

The participating account surplus should be managed to avoid excessive terminal dividends to avoid creating tontines

Ensure there is clear guidance on how surplus flows between participating and non-participating accounts/funds (e.g. if surplus needs to be borrowed and repaid)

(c) Critique each of the following product design proposals for the new participating whole life product:

D. To help promote the launch of the product, XYZ Life's illustration software will reflect a special one-time dividend paid out of retained earnings from its non-participating term business.

E. The cost to migrate to a new policy administration system will be borne by newly issued policies by embedding it in acquisition expenses.

F. Because of low fixed income yields, the investment strategy includes a greater amount of equities than other asset classes; realized gains are paid to the policyholders through the investment component of the dividend scale, once the stock is sold.

Commentary on Question:
Most candidates did well on this part.

Full credit was given for each part stating whether the statement is appropriate or not and justifying the answer.

A. This is an inappropriate initiative: Exceptional one-time dividends should not be illustrated to new business

B. This may be appropriate: In general, expense allocations should not favor new business at the cost of older in force policies; consideration would need to be made in terms of how expense savings are measured, and if the decision to invest in the system was driven by new business (e.g. would not have been done if the in force was being run off).

Alternately
This is inappropriate: Assuming the new admin system will support inforce business as well new business, the cost should not be considered an acquisition expense.

C. This is not appropriate: Capital gains (realized or unrealized) is an intergenerational equity issue. If the equity is material, the earnings should be paid to the block of business producing the cash flow before most of the policies terminate. So, if there is no guarantee the assets will be sold over that timeframe, the company might impute some form of bond-type return to common stock or real estate and monitor against the actual underlying assets.

7. Spring 2022 LPM Exam (LO 1c, 1d, 1e, 2b)

Learning Objectives:

1. The candidate will understand different types of traditional and advanced reinsurance transactions for life insurance.
2. The candidate will understand the fundamentals of risk transfer between two counterparties.
3. The candidate will understand regulatory frameworks for reinsurance transactions across US, Canadian, and global jurisdictions.

Learning Outcomes:

1c) Explain various methods and perform financial statement calculations of reinsurance transactions, including yearly renewable term, coinsurance, modified coinsurance, and funds withheld arrangements

1d) Explain reasons for using inforce reinsurance, approaches used for inforce reinsurance, and advantages and disadvantages of each approach

1e) Demonstrate knowledge of different forms of reinsurance for different products; specifically, PRTs/longevity swaps, annuity coinsurance, and life insurance yearly renewable term

2b) Describe the elements and considerations of risk transfer between counterparties, and evaluate their impact on reinsurance agreement provisions

3a) Describe and evaluate elements of reinsurance requirements within the US regulatory framework

Sources:

Life, Health & Annuity Reinsurance, Tiller, John E. and Tiller, Denise, 4th Edition, 2015

- Ch. 4: Basic Methods of Reinsurance
- Ch. 7: Reinsurance of Inforce Risks
- Ch. 9: Risk Transfer Considerations (pp. 269-280)
- Ch. 11: U.S. Regulation of Reinsurance

Exam Question:

7. (*11 points*) AWL Life would like to improve its capital position through a reinsurance transaction of a certain block of business. The block of business generates gains over the long term and incurs little upfront costs. AWL Life has an existing agency force selling similar products and intends to recapture this block of business at a future date.

AWL Life identified ONA Re as a reinsurance partner and a contract is currently under negotiation. Both parties are open to explore different reinsurance methods, however, both parties also possess specific post-transaction capital requirements.

You are given:

- Investment income and interest are paid at the beginning of the year
- No claims or surrenders during the year
- There are no income taxes

Assumptions for the Block of Business	
Face amount	5,000
Premium tax	2.5%
Direct premium per thousand	0.95
Commissions	80%
Terminal reserve	250
Reserve at time 0	100
Reserve at time 1	850
Proposed Reinsurance Transaction Assumptions	
Yearly Renewable Term retention	10%
Yearly Renewable Term mean reserve per thousand	0.14
Modified Coinsurance interest rate	5%
Modified Coinsurance expense allowance	90%
Modified Coinsurance premium per thousand	0.80
AWL Life	
Initial surplus	1,500
Investment return	17%
Underwriting expenses	300
Maintenance costs	50
ONA Re	
Initial surplus	3,000
Investment return	20%
Underwriting expenses	270
Maintenance costs	10

Solution:

(a) Propose an appropriate type of reinsurance for AWL Life. Justify your answer.

Indemnity reinsurance is an appropriate option for AWL Life.

- If the subject business generates gains over the long term and incurs little upfront costs, under indemnity reinsurance, gains can be amortized over future years

while losses can be recognized immediately, this type of reinsurance can lock in some level of future profits and may therefore be more favorable for AWL Life.

- Since AWL Life has an existing agency force selling similar products, indemnity reinsurance is preferred; it allows AWL Life to continue utilizing existing agency forces to sell similar products.
- Indemnity reinsurance is a quicker process and allows recapture with relative ease; if AWL Life is looking to recapture the block of business at a future date, indemnity reinsurance is preferred.

(b) For the proposed reinsurance transaction.

(i) Calculate the premium per thousand on a Yearly Renewable Term basis, if AWL Life expects to increase total capital by at least 20%. Show all work, using the financial statements in Excel.

(ii) Calculate the ceding percentage on a Modified Coinsurance basis if ONA Re is unwilling to accept a reduction in capital of more than 20%. Show all work, using the financial statements in Excel.

Commentary on Question:
The question asked candidates to construct financial statements to evaluate and analyze two basic reinsurance methods – YRT and Mod-co. Candidates generally did not perform well on this question. Many candidates could not demonstrate how YRT or Mod-co work. Some of the common mistakes included the following:

- *Not using Terminal reserve in the NAR calculation under YRT transaction*
- *Not calculating reinsurance allowance for premium under Mod-co transaction*
- *Not applying ceding% on Mod-co premium*
- *Treat Mod-co ceded reserve as a liability for ONR Re*

Candidates that got incorrect value for early steps were still given full credit for later steps as long as the methodology in later steps was correct. Candidates also received full credit for the correct calculation whether they assumed the face amount was denominated in units or thousands of units.

Full Income Statement and Balance Sheet are shown in the Excel. Only major steps are listed below. All numbers are in thousands

(i) AWL Life

Without Reinsurance

Gross Premium = face amount × direct premium per thousand
=5,000 × 0.95= 4,750
Investment Income from Surplus = initial Surplus × investment return
= 1,500 × 17% = 255
Total Revenue = Premium + Investment Income = 4,750 + 255= 5,005
Reserve Increase = time 1 reserve – time 0 reserve = 850 – 100 =750
Commission = Gross premium × commission%=4,750 × 80%= 3,800
Premium tax = Gross Premium × Premium tax% = 4,750 × 2.5%=119
Expense = Commission + Underwriting expenses + maintenance + premium tax
= 3,800 + 300 + 50 + 119 = 4,269

Net Income = Revenue – Reserve Increase – Expense
= 5,005 – 750 – 4,269 = (14)
Total capital = Initial Surplus + Net Income = 1,500 – 14 = 1,486

With YRT Reinsurance

NAR for YRT =(Face amount-Terminal Reserve) × (1-Retention%)
=($5,000-$250) × (1-10%)=$4,275
Ceded Premium = YRT NAR × YRT Premium per thousand
Ceded reserve = YRT NAR × Yearly Renewable Term mean reserve per thousand
= 4,275 × 0.14= 599
Reinsurance allowance = Ceded Premium × Premium tax
= ceded premium × 2.5%

To allow AWL life to meet its post-transaction capital requirement: minimum of 20% increase in capital, the total capital has to increase from $1,486 to $1,784 (1,486 × 120% = 1,784)

Use goal seeker to solve for YRT premium per thousand to be 7.2%

(ii) ONA Re

Without Reinsurance
Investment Income from Surplus = Initial Surplus × investment return
= 3,000 × 20% = 600
Total Revenue = Investment Income = 600
Net Income = 600
Total capital = Initial Surplus + Net Income = 3,000 + 600 = 3,600

With Mod-co Reinsurance
ModCo premium = Face amount × Mod-Co Premium × Mod-Co Ceding%
=5,000 × 0.8 × Mod-Co Ceding%

Reinsurance allowance for Premium tax= Modco Premium × Premium tax

= ModCo premium × 2.5%

Reinsurance allowance for expense allowance= Modco Premium × expense allowance% = Modco premium × 90%

ModCo Adjustment = Reserve Increase × Mod-Co Ceding%

ModCo adjustment is a "benefit" item, not a "revenue" item or an "expense" item for ONA Re; there is no interest on prior period reserve in the ModCo adjustment because this is a new transaction, interest is paid at the beginning of the year, and prior period reserve is 0 for ONA Re

Unlike YRT or Coinsurance, the ceded reserve is not a liability item for ONA Re's, AWL Life maintains the entire reserve balance, instead, the reserve increase is funded by the ModCo adjustment

To allow ONA Re life to meet its post-transaction capital requirement: maximum of 20% decrease in capital, the total capital has to decrease from $3,600 to $2,880 (3,600 × 80% = 2,880)

Use goal seeker to solve for Mod-Co Ceding% to be 97.8%

(c) Critique the following statement:

The block of business contains flexible premium universal life products. After examining the significant risks of the business, ONA Re agreed to provide surplus relief to AWL Life for the next year. Under the surplus relief treaty, all underlying assets backing the liabilities will be transferred from AWL Life to ONA Re, and the appropriate amount of reserve credit will be provided to AWL Life.

Commentary on Question:
This question tests candidates' understanding of the Life & Health Reinsurance Agreement Model Regulation and identify all risks that are significant for flexible premium universal life products. Most candidates understood that in order to receive reserve credit, all significant risks have to be transferred, but they failed to identify that the treaty cannot be on temporary basis just for next year.

- Under the Life & Health Reinsurance Agreement Model Regulation, the treaty does not appear to transfer adequate amount of risk, and is short-term in nature, hence reserve credit may be denied.
- It is appropriate for ONA Re to examine all significant risks of the subject block of business, however, flexible premium universal life products possess more than asset risk, mortality and lapse are also significant risks that need to be considered.

- Transferring the assets backing the liabilities only partially legitimates the treaty, in order for AWL Life to receive the desired amount of reserve credit, mortality and lapse risks must also be transferred.
- Surplus relief treaties that are short-term in nature may be viewed as illegitimate under Life & Health Reinsurance Agreement Model Regulation.

8. Fall 2022 LPM Exam (LO 1c, 1d, 1f, 2b)

Learning Objectives:

1. The candidate will understand different types of traditional and advanced reinsurance transactions for life insurance.
2. The candidate will understand the fundamentals of risk transfer between two counterparties.

Learning Outcomes:

1c) Explain various methods and perform financial statement calculations of reinsurance transactions, including yearly renewable term, coinsurance, modified coinsurance, and funds withheld arrangements

1d) Explain reasons for using inforce reinsurance, approaches used for inforce reinsurance, and advantages and disadvantages of each approach

1f) Describe and evaluate types of non-proportional reinsurance transactions

2b) Describe the elements and considerations of risk transfer between counterparties, and evaluate their impact on reinsurance agreement provisions

Sources:

Life, Health & Annuity Reinsurance, Tiller, John E. and Tiller, Denise, 4th Edition, 2015,

- Ch. 5: Advanced Methods of Structures of Reinsurance
- Ch. 7: Reinsurance of Inforce Risks
- Ch. 17: Nonproportional Reinsurance

Exam Question and Solution:

(a) Explain the benefits and/or limitations of the following types of reinsurance for a ceding company:

(i) Stop Loss

(ii) Catastrophe Coverage

(iii) Spread Loss

Commentary on Question:

Candidates answered consistently on this question, however, most only provided about half of the solution. There seemed to be some confusion on exactly what response the question was looking for as there were several sources of information that could have been used as an answer to this question.

Stop Loss

- Provides protection against an excessive amount of claims, above an attachment point
- Ceding company can increase its retention limit
- Not guaranteed to be available in the future and therefore not a long term tool

Catastrophe Coverage

- Protects the ceding company against multiple individual claims from a single catastrophic event
- Unlikely it will replace proportional insurance
- Risk concentration is also a consideration

Spread Loss

- Similar to stop loss but payments are spread out over several years
- Not considered reinsurance
- Does not qualify for statutory reserve credit
- Rarely used in the US and Canada
- Risks to the reinsurer are similar to the risks of a loan rather than mortality, morbidity, etc

(b) An insurance company is considering the use of a Stop Loss agreement for a block of life insurance policies to provide protection from a future pandemic.

A reinsurer has provided two options with the same price of 100,000 for one year.

Assume that the specific individual life limit has been applied when calculating total claims for both options.

	Option A	Option B
Maximum Retention	100,000 per life	100,000 per life
Expected Claims	10,000,000	10,000,000
Attachment Point	105% of expected claims, subject to a minimum of 10,500,000	115% of expected claims, subject to a minimum of 11,500,000
Limits	90% of all covered claims in excess of the attachment point amount, up to a total maximum of 1,000,000, with a maximum on any single life of 100,000	90% of all covered claims in excess of the attachment point amount, up to a total maximum of 3,000,000, with a maximum on any single life of 100,000

(i) Calculate the net claims paid by the company under both options assuming actual claims for the year are 12,000,000.

(ii) Recommend which option the company should proceed with in preparing for a future pandemic. Justify your answer.

Commentary on Question:
Almost all candidates answered part (i) of this question in Excel even though it wasn't stated explicitly.
Most candidates demonstrated an understanding of Part (i) and received full credit. For Part (ii), credit was given for choosing an option and justifying the choice. Either option got credit.

Part (i)

- Option A
  - pays 90% of $1.5M = $1.35M
  - capped at $1M
  - Total claims paid by the company = $12M - $1M = $11M
- Option B
  - Pays 90% of $0.5M = $0.45M
  - Capped at $3M
  - Total claims paid by the company = $12M - $0.45M = $11.55M

Part (ii)

- Option A would cover higher claims at a lower amount but is limited to $1M
- Option B would provide greater coverage if pandemic claims are much higher but coverage doesn't kick in until the company has paid claims up to the higher attachment point of $11.5M but does provide up to $3M in coverage
- Option B would be preferred if the company is worried about a major increase in claims

(c) Explain the issues and concerns a reinsurer will have with writing Stop Loss coverages for life insurance.

Commentary on Question:
Very few candidates received full credit for this question. Most got about 50% or less. As stated above, it looks like the candidates were not sure which set of answered were correct for which section so if they provided the answer if Part A above, they wouldn't repeat it here, even though if they did, they would have done better on this section.

From a reinsurer's perspective, Stop Loss coverage in the U.S. and Canada:

- Has very little market demand
- Must be renegotiated each year
- Future expected claims will be higher, driving up premium cost
- Administration can be difficult and gathering of the necessary data
- There is also correlation risk in that claims may occur in multiple companies at the same time
- Difficult to write enough stop loss coverage to provide an adequate spread of risk
- Reinsurers may only write to accommodate existing client relationships
- Reinsurer may be concerned that insurer will not do due diligence

(d) Rather than proceeding with the Stop Loss options, the ceding company would like to use a coinsurance solution for an inforce block of Universal Life insurance policies.

Explain the disadvantages that a ceding company would have in coinsuring an inforce block of interest sensitive life insurance policies.

Commentary on Question:
Candidates did fairly well on this question and demonstrated an understanding of what the question was looking for even if they didn't provide all the details needed for full credit.

The chief disadvantage of coinsurance is:

- The need to transfer assets
- For Interest sensitive products, the reinsurer may want control or veto power
- Both parties need to agree on asset management and crediting approaches
- Ceding company may be unable to take credit for reserves
- Ceding company may be subject to additional credit risk
- If the reinsurer becomes insolvent, the ceding company may be unable to get full reimbursement

(e) Explain how selling the block would be advantageous or disadvantageous over reinsurance.

Commentary on Question:
Based on the responses from the candidates, this question was not clearly worded. Most candidates provided an answer on either reinsuring the closed block or selling the block altogether. Credit was given if candidate provided an answer on one or the other, but they didn't have to answer for both reinsuring and selling to get full credit.

Reinsuring the closed block

Advantages:

- Limits exposure to future losses
- Provides capital relief
- Frees up management attention to focus more on other blocks of business
- Administration can be held either inhouse or outsourced

Disadvantages:

- Does not achieve finality for the ceding company
- There are always two parties in control
- Introduces counterparty risk and reputation risk if reinsurer defaults
- May need policyholder approval

Selling the block

Advantages:

- Quick and effective way to exit the business
- No long-term dependence on external providers or any additional fees
- Capital may be redeployed to support new business
- Migration to another system could create operational, capital and tax efficiencies

Disadvantages:

- High upfront losses for the seller
- May need policyholder or regulator approval