

# RET DAU Model Solutions

## Fall 2023

### 1. Learning Objectives:

1. The candidate will be able to analyze different types of registered/qualified retirement plans and retiree health plans.
3. Candidate will be able to analyze the risks faced by retirees and the participants of retirement plans and retiree health plans.

### Learning Outcomes:

Describe the structure of the following plans:

- (a) Traditional defined benefit plans
  - (b) Defined contribution and savings plans
  - (c) Hybrid Plans
  - (d) Retiree Health plans
  - (e) Other alternative retirement plans such as share risk plans, target benefit plans, etc.
- (3a) Identify risks faced by retirees and the elderly.
- (3b) Describe and contrast the risks face by participants of:
- (i) Government sponsored retirement plans
  - (ii) Single employer sponsored retirement plans
  - (iii) Multiemployer retirement plans, and
  - (iv) Social insurance plans
- (3d) Propose ways in which retirement plans and retiree health plans can manage the range of risks faced by plan participants and retirees.

### Sources:

Hybrid Pensions: Risk Sharing Arrangements for Pension Plan Sponsors and Participants

### Commentary on Question:

*Commentary listed underneath question component.*

# 1. Continued

## **Solution:**

- (a) Describe the differences in risks faced by the plan participants of a traditional defined benefit pension plan to the risks faced by plan participants in the following types of plans:
- (i) Traditional defined contribution pension plans
  - (ii) Flexible pension plans
  - (iii) Variable annuity plans
  - (iv) Target benefit plans

## **Commentary on Question:**

*To obtain full credit, candidates had to appropriately identify risks applicable before and after retirement for the 4 plans listed in the question vs DB plans from a participant's perspective (not plan sponsor). Candidates did very well when describing risks associated with DC plans as it is one of the most common arrangements offered in the industry, but not as well for other plans, in particular for the flexible pension plans.*

*The model solution below is an example of an answer that would receive full credit; it does not include all possible answers. Other reasonable answers also received credit.*

## **(i) Traditional defined contribution (DC) plans:**

- (a) In a DC plan, participants bear the investment risk both before and after retirement (vs the sponsor bearing that risk under a defined benefit (DB) plan). Participants bear the investment risk on their individual accounts and are responsible for directing their investment decisions.
- (b) As DC plans result in an accumulation of a balance at retirement which a participant must carefully invest and drawdown on their own during the decumulation phase, they are exposed to the risk of outliving their assets (longevity risk) and inflation risk (which can be eliminated if an annuity is purchased at retirement or diminished if their decumulation investments are selected to keep pace with inflation).

## 1. Continued

### (ii) Flexible pension plans:

- (a) Risk is shifted to participants prior to retirement as they are subject to investment risk on the amount that they contribute to the tax-sheltered account (for e.g. a DC component) that will be used to purchase additional benefits to enhance their DB benefits at retirement. There is no longevity risk post-retirement as members receive benefits in the form of a lifetime pension. Note that participants also bear the risk of excess assets in their DC account if the amount exceeds the value of purchased ancillary benefits, which if not used will be forfeited.
- (b) Participants are also subject to inflation risk at retirement which can be mitigated by the participant if they purchase automatic inflation indexing.

### (iii) Variable annuity plans:

- (a) The risk is shifted to participants during the accumulation phase, but not during the decumulation phase, as benefits are paid as a lifetime benefit. Investment risk is borne by the participants prior to retirement – a hurdle rate is defined, with the goal to capture the long-term expected real return of the assets backing the variable annuity liabilities. The adjustment between the actual fund return and the hurdle rate is applied to the pensions in payment (which can result in a decrease or an increase), effectively reflecting inflation and any returns different from expectation.
- (b) If pension increases do not keep pace with at least CPI, then participants are subject to inflation risk.

### (iv) Target benefit plans:

- (a) The risk is shifted to participants during both the accumulation and decumulation phase. Contributions are set at a fixed level or within a fixed range base on a target benefit level, as such benefits are only a target. Since the sponsor's contributions are fixed, it transfers all plan risks to the participants as participants' contributions (if any) and benefits can either be increased or decreased.
  - (b) Investment and longevity risks are however pooled (unlike a traditional DC plan) which is better for the participant than bearing the risks individually.
  - (c) Participants also bear inflation risk if no post-retirement indexation is provided.
- (b) Recommend three risk sharing plan design features that can help mitigate economic risks faced by Company ABC's plan participants.

## 1. Continued

### **Commentary on Question:**

*To obtain full credit, candidates had to clearly identify 3 risks from a participant's perspective (not plan sponsor) based on the 3 DB design features indicated in the question and suggest an appropriate risk sharing plan design feature that would help mitigate each identified risk. In general, candidates did better in part b) compared to part a) and were able to clearly identify risks and provide plausible options to address the risks.*

**Option 1:** With a fixed benefit accrual of \$50 per month per year of service, participants are subject to pre-retirement inflation risk. A proposed design change that could help mitigate this risk is changing to a benefit formula based on final average earnings so that the benefit accrual can keep pace with pre-retirement inflation.

**Option 2:** The plan currently offers no post-retirement indexation, as such participants are subject to post-retirement inflation risk. A feature offered under a flexible pension plan could help mitigate this risk is providing the option for the participant to purchase indexing. The indexing formula could be based on a % CPI and be subject to a pre-determined cap or floor and be conditional on the plan funded status.

**Option 3:** The early retirement reduction is subject to market interest rates, as such participants are exposed to interest rate risk. A feature that could help mitigate this risk is an early retirement subsidy that is based on a fixed early retirement formula that is not tied to market rates.

## 2. Learning Objectives:

6. The candidate will be able to analyze/synthesize the factors that go into selection of actuarial assumptions.

### Learning Outcomes:

- (6a) Evaluate appropriateness of current assumptions.
- (6b) Describe and explain the different perspectives on the selection of assumptions.
- (6c) Describe and apply the techniques used in the development of economic assumptions.
- (6d) Recommend appropriate assumptions for a particular type of valuation and defend the selection.

### Sources:

DA-146-15: ASOP 6 - Measuring Retiree Group Benefit Obligations and Determining Retiree Group Benefits Program Periodic Costs or Actuarially Determined Contributions

Fundamentals of Retiree Group Benefits, Yamamoto, Dale H., 2nd Edition, 2015. Ch. 9 (pp.308-339 & 350-357)

### Commentary on Question:

*Commentary listed underneath question component.*

### Solution:

- (a) Critique the use of the assumptions noted above for the post-employment health plan valuation.

### Commentary on Question:

*To receive full credit, candidates had to critique all assumptions. Most candidates were generally strong in critiquing the discount rate, retirement, and disability assumptions, but not a lot of candidates were able to provide enough valid answers for the termination and mortality assumptions.*

*The model solution below is an example of an answer that would receive full credit; it does not include all possible answers. Other reasonable answers also received credit.*

## 2. Continued

### **Discount rate**

- Discount rate seems reasonable
- To develop the discount rate, the actuary should consider the cash flows and duration of the plan's obligations

### **Retirement**

- Single retirement age is generally not appropriate for a post-employment health plan as compared to a pension plan valuation
- A graded age or service-based retirement scale would better capture actual experience
- The present value of post-employment health benefits increases dramatically the younger the person is at retirement due to government benefits starting at age 65 in both US and Canada

### **Termination**

- Since members who terminate before retirement do not qualify for post-employment health benefits, it is important the assumption closely represents actual experience
- A liability-weighted age-based termination scale may not be appropriate for post-employment health valuations
- The high turnover during a member's early years may not be properly reflected for post-employment health purposes. The liability weighting should be higher for low service employees under a post-employment health plan than a pension plan

### **Disability**

- Disability may or may not be significant under post-employment health plans; therefore assuming no decrements may be reasonable depending on the plan provisions
- If the disabled person is covered under the post-employment health plan, then the actuary should consider additional costs in the valuation from impaired health

### **Mortality**

- The UP94 mortality table with static projection to 2024 may be dated to predict future mortality experience and improvements compared to recently published mortality tables using generational projection
- Company ABC could perform an experience study to assess the credibility of the current mortality assumption or use a more recent published table and improvement scale

## 2. Continued

- Post-retirement mortality is more critical for a post-employment health plan than a pension plan since pension plans do not have a “cost of living” adjustment as do health benefits
  - i.e. The value of \$1 benefit 30 years from now under a pension plan may be worth \$0.25 (or less) in today’s dollars versus the full \$1 in a post-employment health valuation (assuming health costs increase at the same rate as the discount rate)
  
- (b) Describe considerations when setting the following assumptions for the post-employment health plan valuation:
  - (i) Health care trend rate
  
  - (ii) Plan participation rate

### **Commentary on Question:**

*In general, candidates did not do very well on Part (b). Successful candidates described factors to consider when setting both assumptions for post-employment health plan valuation. Many candidates struggled with describing considerations related to the health care trend rate. The solution shown below would have received full credit, but it is not an exhaustive list of acceptable answers.*

### **(i) Health care trend rate**

- The health care trend rate assumption generally begins at current levels and grades down over a period of years to a lower level equal to some real rate plus inflation (length of the select or grade-down period)
- Current trend rates used for the short-term typically include the effect of inflation, utilization, advancements in technology, plan design effects and cost shifting
- The trend rate should represent the underlying trends of the services provided by the plan; it may be appropriate to use different trend rates for different categories such as hospital, drugs, etc.
- Consider the relationship between health care expenditures and GDP. Over the long-term, historical increases in health care expenditures have exceeded the increase in GDP, which experts believe is not sustainable

### **(ii) Plan participation**

- Since the plan requires retiree contributions, not all retirees may elect coverage. Therefore a participation assumption should be considered
- A separate assumption of retiree versus dependent coverage may be appropriate if there are different employer subsidy levels
- The more retirees are required to contribute, the less likely they are to participate in the plan

## 2. Continued

- Due to anti-selection, the average claim cost may increase and the actuary should consider reflecting that in the cost per claim or implicitly in the participation percentage
- (c) Describe how the following can affect the projected net per-capita health care claims costs:
- (i) Fixed co-pay
  - (ii) Lifetime maximum

### **Commentary on Question:**

*Part (c) was not answered well. Most candidates were able to describe the cost-sharing features but struggled to illustrate how they impact the projected net per-capita health care claims costs.*

#### **(i) Fixed co-pay**

- Fixed co-payments require an individual to pay a fixed dollar amount fee for certain services
- Co-payments can help offset the employer's projected net per-capita health care costs
- The health care trend rate over time can erode the relative value of a fixed co-payment, increasing the employer's projected net per-capita health care costs
- The employer from time to time may need to increase the fixed co-pay amounts to restore the comparative value of the fees eroded by inflation

#### **(ii) Lifetime Maximum**

- Lifetime maximum is the maximum dollar amount a post-employment health plan will pay in benefits to an individual during their lifetime
- Lifetime maximums help mitigate employers' projected net per-capita health care costs as it places a cap on their total expenditures to limit losses
- The relative value of the lifetime maximums may be eroded over time due to the health care trend rate decreasing the employer's projected net per-capita health care costs
- The employer from time to time may need to increase the lifetime maximums to restore the value of the benefit to the individual that has been eroded by inflation

### 3. Learning Objectives:

1. The candidate will be able to analyze different types of registered/qualified retirement plans and retiree health plans.

#### Learning Outcomes:

Describe the structure of the following plans:

- (a) Traditional defined benefit plans
- (b) Defined contribution and savings plans
- (c) Hybrid Plans
- (d) Retiree Health plans
- (e) Other alternative retirement plans such as share risk plans, target benefit plans, etc.

Given a plan type, explain the relevance, risks and range of plan features including the following:

- (a) Plan eligibility requirements
- (b) Benefit eligibility requirements, accrual, vesting
- (c) Benefit/contribution formula, including the methods of integration with government-provided benefits
- (d) Payment options and associated adjustments to the amount of benefit
- (e) Ancillary benefits
- (f) Benefit subsidies and their value, vest or non-vested
- (g) Participant investment options
- (h) Required and optional employee contributions
- (i) Phased retirement and DROP plans

#### Sources:

Retirement Plans - 401(k)s, IRAs and Other Deferred Compensation Approaches, Allen et al., 12th Edition, 2018

- Ch. 14

#### Commentary on Question:

*This question was intended to test whether a candidate understands how SERP plans are used to achieve the goals of the employer. The question proved to be more challenging than expected for most candidates.*

*Many candidates' responses were limited to plan design features only available to qualified defined benefit plans. Few candidates provided responses that considered the differences between the two groups of executives or how 75% of "income" should be determined.*

*The model solution shown is not an exhaustive list of all possible answers. Other reasonable answers would also receive credit.*

### 3. Continued

#### **Solution:**

Company XYZ employs six executives.

- Three have over twenty years of service and participate in both the company's defined benefit pension plan and defined contribution pension plan.
- The other three have less than five years of service and participate only in the defined contribution pension plan.

The company is considering implementing a Supplemental Executive Retirement Plan (SERP) and has the following objectives:

- Provide internal equity
- Minimize impact on company financials
- Target 75% income replacement

Describe plan design features for the SERP that should be considered in order to achieve these objectives.

#### Internal Equity

- Objective is to provide the same level of benefit for all executives
- Consider designing a supplemental umbrella plan where the qualified plan benefits serve as offsets for the SERP benefit. The total benefit earned by all executives will be based on same formula but the piece from the SERP could be lower for the longer-service executives.
  - To appease and retain longer service executives, could provide additional accruals at a lower rate for service that exceeds some threshold (ex. 25 years). For example, if the target total benefit were achieved at 25 years of service and a 25 year cap were applied in the formula, then executives who have worked longer may not consider this plan equitable or fair

#### Minimize impact on company financials

- Consider the benefit payment options which will be provided by SERP: for example, lump sum payouts could lead to volatility and settlement accounting (if in a DB plan)
- Consider what pay elements (ex. bonus) will be included in benefit formula: including bonuses (which could vary widely from year to year) could lead to more volatility
- Consider whether SERP will be a DB, DC, or hybrid plan. A DB design will create much more volatility in P&L than a DC plan

### 3. Continued

75% Income replacement target

- Consider which pay elements will be used to determine “income” and if pay used for the SERP formula should be the same
- Determine accrual rate/period
  - o How will benefit service be measured?
    - Total service at Company XYZ?
    - Executive service only?
    - Grant any past service with a former employer (to attract mid-career executives)?
  - o Are accruals front-loaded, back-loaded, or level?
  - o Consider capping the service that is included for the formula

Determine at what age the 75% income replacement should be met (ex. age 62 or 65).

Determine what other sources of income will be used to judge if objective met.

These could be offsets to the total benefit formula:

- o Social Security
- o Broad-based benefits from XYZ’s defined benefit and defined contribution pension plans
- o Vested benefits from prior employer
  - Helps facilitate mid-career recruiting

#### 4. Learning Objectives:

4. The candidate will be able to evaluate plan design risks faced by sponsors of retirement plans and retiree health plans.

#### Learning Outcomes:

- (4a) Identify how plan features, temporary or permanent, can adversely affect the plans sponsor.
- (4b) Assess the risk from options offered, including:
  - (i) Phased retirement
  - (ii) Postponed retirement
  - (iii) Early Retirement
  - (iv) Option factors
  - (v) Embedded options
  - (vi) Portability options

#### Sources:

DA-154-15: Implementing Early Retirement Incentive Programs: A Step-by-Step Guide

DA-139-21: ASOP 35 – Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations

#### Commentary on Question:

*Commentary listed underneath question component.*

#### Solution:

- (a) Evaluate the potential effects of the ERIP on NOC.

#### Commentary on Question:

*To receive full credit, the response needed to include commentary on the operational, legal, and financial considerations of an Early Retirement Incentive Program. While most candidates identified certain financial and operational considerations, few candidates recognized the legal considerations.*

*The model solution below is an example of an answer that would receive full credit; it does not include all possible answers. Other reasonable answers also received credit.*

- Operational considerations:
  - NOC must consider how operations will be impacted if everyone offered the program accepts
    - 720 participants eligible for program (over age 55 and 5 years of service).
    - Will NOC be able to fill all vacancies with internal promotions, or will additional hiring need to be done? For reference, there were 140 retirements in the prior year and 230 new entrants.

## 4. Continued

- Anti selection: NOC will not be able to control which of the 720 participants retire; NOC is potentially at risk of losing key positions that have specialized knowledge.
- Eligibility for post-retirement health care begins at age 55 with 10 years of service. The window may not effectively target the 140 eligible participants with less than 10 years of service.
- Legal considerations
  - The program targets participants over age 55 with 5 years of experience. This may be viewed as employment discrimination
  - NOC should consult with legal counsel to ensure applicable laws in Gevrey are being followed in conjunction with this window
- Financial impact
  - The plan offers a lump sum termination benefit, which will require the plan to have liquidity. NOC must consider its cash position and its ability to pay-out 720 participants. For reference, there were 50 lump sum cash-outs in the prior year.
  - Unreduced early retirements and an enhanced benefit will further drive the plan into a deficit, increase the Net Periodic Pension Cost and increase the required employer contributions. NOC should work with its actuary to fully understand the financial implications.

(b) Describe the steps NOC should take to implement the ERIP.

### **Commentary on Question:**

*Candidates generally did well on this question, with many receiving full credit for this part.*

#### Step 1: Finalize the eligibility group

NOC has indicated it will target participants currently eligible for early retirement. NOC should carefully consider the goals of the program when defining the eligibility parameters and the operational, legal and financial impacts of the selected group.

#### Step 2: Determine the Retirement Effective Date of the window

NOC must define the window during which the employees are eligible for the enhanced retirement and the lump sum options.

#### Step 3: Determine when the participants need to make a decision

NOC should carefully consider the window of time necessary to consider the options and make a decision from the participants' perspective

## 4. Continued

### Step 4: Program offerings

Define the program objectives and consider how the benefits interact with the defined contribution plan and the post-retirement health plan

### Step 5: Program costs

Analyze the cost / savings of the program in both the short and long term. Determine what happens if every targeted participant elects to participate from an operational and financial perspective.

### Step 6: Prepare the Announcement

The announcement should explain the eligibility requirements, the program benefits, the interaction with other benefits, and a statement that NOC has no future expectations for a similar program. Prepare calculation statements for all participants.

- (c) Describe the considerations for setting the retirement assumption.

#### **Commentary on Question:**

*To receive full credit, candidates needed to speak to the retirement assumption in general rather than focusing in on the ERIP. Some candidates struggled to identify the potential impact of the eligibility for the retiree health care plan and the lack of government health care in Gevrey on the assumption. This part of the question was generally not well answered by candidates.*

Per ASOP 35, the actuary should consider the reasonableness of each demographic assumption at each measurement date.

The current retirement assumption is age 62 with 10 years of service. It is unclear when this assumption was set and if it was based on credible NOC experience.

When reviewing the retirement experience, the actuary should consider:

1. The materiality of the assumption and the gains or losses year over year
2. The plan design and any early retirement incentives (such as the ERIP)
3. The availability of any employer or government sponsored postretirement health coverage
4. Whether the experience is sufficiently credible

#### **4. Continued**

Employees become eligible for NOC's retiree health benefit program at age 55 with 10 years of service. Government sponsored health plans do not exist in Gevrey. Both factors need to be considered when setting the assumption. Regarding the ERIP, the actuary should reflect specific experience of the covered group; however, the actuary should not give undue weight to the experience that is not sufficiently credible.

## 5. Learning Objectives:

7. The candidate will be able to recommend and advise on the financial effects of funding policy and accounting standards in line with the sponsor's goals, given constraints.

### Learning Outcomes:

- (7a) Perform valuations for special purposes, including:
  - (i) Plan termination/windup
  - (ii) Accounting valuations
  - (iii) Plan mergers, acquisitions and spinoffs
- (7d) Advise plan sponsors on accounting costs and disclosures for their retirement plans under various standards and interpretations.
- (7e) Demonstrate the sensitivity of financial measures to given changes in plan design.
- (7g) Perform and interpret the results of projections for short and long range planning including the effect of proposed plan changes.

### Sources:

Duration and Convexity for Pension Liabilities, Pension Section News, Sep 2013

DA-168-19: IFRS and US GAAP: Similarities and Differences, Ch. 5 only

DA-170-17: Accounting for Buy-ins

DA-179-19: Introduction (A58), IFRS1 (paragraphs 1-40 & Appendix A), IAS19, IFRIC14

Pension Risk Transfer: Evaluating Impact and Barriers for De-Risking Strategies, 2014, pp. 16, 17 & 20-27

### Commentary on Question:

*Parts (a) and (b) of this question were designed to test candidates' knowledge of liability sensitivity to interest rate change and application of such sensitivity. Part (c) of this question was designed to test candidates' knowledge of settlement accounting under the various accounting standards. Part (d) of this question was designed to test candidates' knowledge of an annuity buy-in.*

### Solution:

- (a) Calculate the following for the retiree DBO:
  - (i) Effective Duration
  - (ii) Convexity

Show all work.

## 5. Continued

**Commentary on Question:**

*Candidates generally did not understand how to calculate duration or convexity. Candidates who provided commentary about the calculations received partial credit.*

The model solution for this part is in the Excel spreadsheet.

- (b) Determine the settlement credit/(cost) of the annuity buy-out under International Accounting Standard IAS 19, Rev. 2011 (IAS 19).

Show all work.

**Commentary on Question:**

*Successful candidates applied the duration of a rate increase to determine the settled obligations and the settlement cost.*

The model solution for this part is in the Excel spreadsheet.

- (c) Compare and contrast the accounting implications of an annuity buy-out under IAS 19 versus U.S. Accounting Standard ASC 715.

No calculations required.

**Commentary on Question:**

*Successful candidates who provided a full comparison between the two accounting standards when settlement accounting is triggered received full credit.*

<b>US GAAP</b>	<b>IAS 19</b>
An annuity buy-out triggers settlement accounting. However, an employer may elect an accounting policy whereby settlement gain or loss recognition is not required if the cost of all settlements within a plan year does not exceed the sum of the service and interest cost components of net benefit cost for that period.	An annuity buy-out always triggers settlement accounting.
Under US GAAP, a settlement gain/loss reflects the pro-rata recognition of previously unamortized gains or losses on the entire plan.	Under IFRS, a settlement gain or loss generally reflects the difference between the settlement price and the actuarial valuation liability of the obligation that has been settled.

The proration is based on the ratio of the obligation settled to the total obligation of the plan.	
The unrecognized gain/loss subject to recognition includes the effect of the remeasurement.	Gain/loss with respect to the effect of the remeasurement is recognized immediately through OCI.

(d) Critique an annuity buy-in as an alternative de-risking strategy.

No calculations required.

**Commentary on Question:**

*Successful candidates who provided an exhaustive list of both the strengths and weakness of an annuity buy-in as a de-risking solution received full credit. Candidates did not generally do as well on this part of the question.*

<b>Strengths</b>	<b>Weakness</b>
Protects against longevity risk.	Pension obligations of affected annuitants remain on Company balance sheet.
Protects against market and interest rate risk.	Administration responsibilities remain with the Plan Administrator.
A buy-in annuity purchase does not trigger settlement accounting.	Cost (premium) of buy-in is comparable to that of a buy-out without the settlement charge.
A buy-in annuity policy may be converted to a buy-out. Therefore, the policyholder has the ability to control timing of the settlement charge if later desired.	PBGC premiums on the buy-in liabilities continue to be required.

## 6. Learning Objectives:

4. The candidate will be able to evaluate plan design risks faced by sponsors of retirement plans and retiree health plans.

### Learning Outcomes:

- (4a) Identify how plan features, temporary or permanent, can adversely affect the plans sponsor.
- (4b) Assess the risk from options offered, including:
  - (i) Phased retirement
  - (ii) Postponed retirement
  - (iii) Early Retirement
  - (iv) Option factors
  - (v) Embedded options
  - (vi) Portability options
- (4c) Recommend ways to mitigate the risks identified with a particular plan feature

### Sources:

Pension Risk Transfer: Evaluating Impact and Barriers for De-Risking Strategies, 2014, pp. 16, 17 & 20-27

Managing Post Retirement Risks: Strategies for Secure Retirement, 2020

Embedded Options in Pension Plans: Catalogue of Embedded Options Survey of Prevalence of Embedded Options, pp. 1-17

DA-102-13: Evaluating the Design of Private Pension Plans: Costs and Benefits of Risk Sharing

### Commentary on Question:

*This question requires candidates to demonstrate their ability to evaluate the risks of each plan design feature from the employer's perspective. Successful candidates were able to recognize that the plan features were generous. These candidates were also able to articulate their rationale and tie it back to the plan terms.*

*Generally, part (a) and part (b) were done well. Most candidates did attempt both part (a) and part (b). The answers in Part (c) were adequate but relative to part (a) and part (b), part (c) answers were weaker.*

*The model solution below is an example of an answer that would receive full credit; it does not include all possible answers. Other reasonable answers also received credit.*

### Solution:

- (a) Assess the risks of these plan provisions from the employer's perspective.

## 6. Continued

### **Commentary on Question:**

*In part (a), a lot of candidates were able to grasp that the plan provisions were generous and thus costly to the employer. Candidates also recognized that there was volatility in that cost from the employer perspective.*

*The majority of candidates did very well on part (a)*

### Normal Retirement Benefit

- The 2% average formula is generous and is a source of high cost in the pension plan.
- The averaging period of 3 years is a source of volatility in the retirement benefit compared to longer averaging periods (e.g. 5 years).

### Pensionable Earnings

- Including the bonus will increase pensionable earnings and the retirement benefit, therefore increasing the cost.
- Also, bonuses create higher volatility in the cost as bonuses are less certain and can fluctuate year to year.

### Form of Pension

- Life with guaranteed 15 years is highly generous and very costly.
- The 15-year guarantee does not add to volatility to the cost but it does in effect lengthen the duration of the liabilities and adds to the longevity risk to the employer.

### Early Retirement Benefit (including Unreduced Pension availability)

- Early retirement subsidies permit employees to retire prior to their normal retirement age with a more generous benefit than actuarial equivalence. The 3% reduction per annum is very generous and adds to the cost of funding the pension plan.
- A part of the early retirement subsidies are service related which again adds to cost.
- Both early retirement provisions (i.e. the 3% per annum and the 60/10 provision) increase the risk for the employer and can introduce volatility depending on the uptake of the provision.

### CPI Indexation

- Indexation is very expensive and highly unpredictable. This will cause fluctuations in funding requirements and increase funding risk
- There is no cap in the indexation provision which can be costly during periods of high inflation.

## 6. Continued

- (b) Recommend changes to four of the plan provisions to reduce the risks identified in part (a) other than freezing future service or salary accruals.

Justify your response.

### **Commentary on Question:**

*Part (b) was also done well by the majority of candidates. They were able to recommend changes to the plan provisions to reduce both cost and volatility.*

### Normal Retirement Benefit

- Amend the plan to use Career Average earnings. This change would decrease the volatility and cost of the retirement benefit due to the much longer averaging period.

### Pensionable Earnings

- Amend the definition of pensionable earnings to exclude bonuses. This will decrease both cost and volatility.

### Early Retirement Benefit

- Remove the early retirement subsidies from the plan provisions; change to actuarial equivalent reductions. This change would decrease cost due to lower benefits.

### CPI Indexation

- Indexation could be amended to introduce a cap. This change would reduce cost and also decrease volatility.

- (c) Describe barriers to de-risking the pension plan through a pension risk transfer to an insurance company.

### **Commentary on Question:**

*Part (c) was the least well-done of the parts. Candidates were not able to go beyond the high cost of annuitization. Some were able to tie it back to settlement accounting and insurer declining quotations.*

### Barriers

There is a cost of annuitizing the plan that needs to be considered.

The insurer pricing basis for the discount rate includes credit risks, profit margins, investment management expenses, etc. as compared to the pension liability under US GAAP which can be overly optimistic when setting the assumed discount rate. Leads to a higher cost to annuitize.

## **6. Continued**

Settlement accounting requires the immediate recognition of a portion of the accumulated unrecognized gains or losses in the fiscal year's pension expense, in proportion to the amount of obligation settled.

The cost of the buy-out premium may be prohibitive compared to what the company is budgeting or holding on their balance sheet as the PBO.

Insurers may also decline if their annual quota is exceeded and surplus cannot be allocated to the business line.

## 7. Learning Objectives:

6. The candidate will be able to analyze/synthesize the factors that go into selection of actuarial assumptions.
8. The candidate will understand how to apply the relevant standards of practice.

### Learning Outcomes:

- (6a) Evaluate appropriateness of current assumptions.
- (6b) Describe and explain the different perspectives on the selection of assumptions.
- (6c) Describe and apply the techniques used in the development of economic assumptions.
- (6d) Recommend appropriate assumptions for a particular type of valuation and defend the selection.
- (8a) Apply the standards related to communications to plan sponsors and others with an interest in an actuary's results (i.e., participants, auditors, etc.)
- (8b) Demonstrate compliance with requirements regarding the actuary's responsibilities to the participants, plan sponsors, etc.

### Sources:

DA-139-21: ASOP 35 - Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations

DA-140-21: ASOP 27 – Selection of Economic Assumptions for Measuring Pension Obligations

### Commentary on Question:

*This question was trying to test concepts on the selection of economic and demographic assumptions. Candidates in general did well on part (a), and more poorly in part (b).*

*Candidates who obtained the highest points in part (a) provided more details on each type of assumption. Candidates who did more poorly often omitted mentioning one or more proposed formats for the assumptions, e.g., was the termination assumption based on rates that vary by age, service or age and service. Poor answers also were those that had no comment on one or more assumptions or provided only a few keywords without further explanation.*

*Comments that related to more than one assumption received credit, whether mentioned at the beginning of the answer, or under a specific assumption. For example, mentioning that plan sponsor experience is relevant to selecting a disability assumption got credit whether mentioned as a general comment or a comment specific to disability.*

## 7. Continued

*The model solution below is an example of an answer that would receive full credit; it does not include all possible answers. Other reasonable answers also received credit.*

*In part (b) many candidates were unable to relay the concepts of ASOP 35 with clarity or sufficient level of detail. Many wrote generic comments such as "Assumptions are reasonable" without providing the context that the actuary needs to disclose: the information and analysis to support their determination that the assumptions are reasonable.*

### **Solution:**

- (a) Describe considerations for setting the following long-term assumptions for a defined benefit pension plan:
- (i) Termination
  - (ii) Retirement
  - (iii) Disability
  - (iv) Election of optional forms of benefits
  - (v) Salary merit scale

Considerations applicable for all demographic assumptions:

- characteristics of the obligation to be measured. pattern of future payments
- materiality of changes in the assumptions to the measurement
- Knowledge of upcoming changes: plan changes (plant closures, benefit changes), economic condition (recession)

#### **(i) Termination**

- Assumption format: single termination rate? By age? By service? Gender? Ends at retirement age?
- job related factors: occupation, work environment/conditions, unionization, location – how do these factors affect termination patterns?
- plan design and incentives offered (vesting, payout availability)

#### **(ii) Retirement**

- Assumption format: single assumption at Normal Retirement Date (NRD)? Consider Early Unreduced Retirement Date (EURD)? By age or service, or points? Differ by gender?
- plan design and incentives (ERD, EURD)
- link to social insurance programs or other employer sponsored programs

## 7. Continued

### (iii) Disability

- Assumption format: differ by age? Gender?
- definition of disability: 'own' job vs. 'any' job?
- the potential for recovery

### (iv) Election of optional forms of benefits

- optional forms of benefits and commencement dates available to members (i.e., payout after reaching retirement age)
- historical experience of elections under the plan being valued (and experience of similar plans).
- degree to which particular optional forms may be subsidized.

### (v) Salary merit scale

- Assumption format: single rate? Vary by age or service? Vary over future years?
- historical compensation increases and practices of the plan sponsor, and other plan sponsors in the same industry

- (b) Identify the disclosures required to document demographic assumptions based on Actuarial Standard of Practice No. 35, Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations.

The actuary is required to disclose:

- The **assumptions used**: whether the assumption represents an estimate of future experience, an observation of the estimates inherent in market data, or combination
- Any **explicit adjustments** made for adverse deviations
- **Rationale** for assumptions: disclose the information and analysis used to support the actuary's determination that the assumption is reasonable
- The disclosure should be based on the assumption as of the **measurement date**, without regard to changes planned for future dates
- **Change in assumptions**: compared to those previously used for the same type of measurement.
- **Change in circumstances**: that occur after the measurement date that would affect the demographic assumptions

## 8. Learning Objectives:

7. The candidate will be able to recommend and advise on the financial effects of funding policy and accounting standards in line with the sponsor's goals, given constraints.

### Learning Outcomes:

- (7a) Perform valuations for special purposes, including:
  - (i) Plan termination/windup
  - (ii) Accounting valuations
  - (iii) Plan mergers, acquisitions and spinoffs

### Sources:

DA-168-19: IFRS and US GAAP: Similarities and Differences, Ch. 5 only

DA-179-19: Introduction (A58), IFRS1 (paragraphs 1-40 & Appendix A), IAS19, IFRIC14

DA-185-20: Plan Curtailments & Settlements Under FASB ASC Topic 715 Relating to Plan Terminations, Part 1

DA-804-19: FASB Accounting Standards Codification Topic 715

### Commentary on Question:

*This question was trying to test the candidates' ability to calculate the NPPC and AOCI for year-end purposes and also their understanding of the accounting treatment of a plan freeze. Candidates who performed well generally provided all their calculations in detail, understood how to roll forward the plan's obligations/assets, and the consistency of those underlying components with the NPPC (e.g. service cost, interest cost, EROA).*

### Solution:

- (a) Calculate the following under ASC 715:
  - (i) 2023 Net Periodic Pension Cost
  - (ii) AOCI as of December 31, 2023

Show all work.

### Commentary on Question:

*Candidates understood the components of the NPPC generally well, but the majority did not subtract the employee contributions from the service cost to only represent the employer portion.*

The model solution for this part is in the excel spreadsheet. Simple interest is used in this model solution; answers that used compound interest also received credit.

## 8. Continued

- (b) Calculate the 2023 Net Periodic Pension Cost under ASC 715.

Show all work.

**Commentary on Question:**

*Candidates were generally able to determine the NPPC for the first half of the year and recognize the service cost is \$0 effective July 1<sup>st</sup> due to the plan freeze. However, some candidates did not properly account for the impact of the plan freeze on the NPPC (i.e. curtailment).*

The model solution for this part is in the excel spreadsheet. Simple interest is used in this model solution; answers that used compound interest also received credit.

## 9. Learning Objectives:

3. Candidate will be able to analyze the risks faced by retirees and the participants of retirement plans and retiree health plans.
4. The candidate will be able to evaluate plan design risks faced by sponsors of retirement plans and retiree health plans.

### Learning Outcomes:

- (3a) Identify risks faced by retirees and the elderly.
- (4a) Identify how plan features, temporary or permanent, can adversely affect the plans sponsor.
- (4b) Assess the risk from options offered, including:
  - (i) Phased retirement
  - (ii) Postponed retirement
  - (iii) Early Retirement
  - (iv) Option factors
  - (v) Embedded options
  - (vi) Portability options
- (4c) Recommend ways to mitigate the risks identified with a particular plan feature.
- (4d) Assess the impact of possible changes in plan design due to changes in legislation.

### Sources:

Managing Post Retirement Risks: Strategies for Secure Retirement, 2020

Embedded Options in Pension Plans: Catalogue of Embedded Options Survey of Prevalence of Embedded Options, pp. 1-17

### Commentary on Question:

*The question tested candidates' knowledge of plan features and plan design risks faced by retirees and employers of retirement plans.*

### Solution:

- (a) Describe the two categories of embedded options in defined benefit pension plans.

### Commentary on Question:

*This part of the question was poorly answered by candidates in general. Many candidates did not properly describe what embedded options are in a defined benefit plan, gave incomplete responses, or skipped this part.*

## 9. Continued

“Embedded Option” is a financial term to mean an inseparable part of a contract or financial instrument that provides a benefit to plan participants based on:

- 1) Choice by member; or
- 2) Underlying economic/financial factors

### **Category 1: Choice by member**

These options are provided to the plan member through the plan provisions and the value is mainly based on the plan members’ behavior or election.

For examples, subsidized early retirement provisions or subsidized option forms of payment.

Category 1 embedded options can be influenced by economic factors like interest rates, equity market performance, and inflation rates but these are generally viewed as secondary factors to the plan members’ behavior and choice.

### **Category 2: Underlying economic or financial factors**

Options provided to the plan member through the plan provisions, but the value is mainly based on the underlying economic factor or benchmark where the plan members’ behavior does not come into play.

For examples, “greater of” benefits where the lump sum is the greater of a variable rate and a fixed rate, COLAs with caps and floors, excess return COLAs, cash balance plans with caps and floors on the crediting rate, or flat dollar minimum/maximum benefits.

Category 2 embedded options are asymmetric in the sense that their value may be nil if a singular point estimate is used.

- (b) Describe the risks of the COLA provision from the perspectives of the following:
- (i) The employer
  - (ii) The retirees

### **Commentary on Question:**

*Many candidates only covered 1 or 2 risks from the employer perspective, so they only receive partial credit. Also, since the question asked the candidate to describe the risk faced by the employer and the retirees, a list of risks without a description only earned partial credit.*

*The model solution below is an example of an answer that would receive full credit; it does not include all possible answers. Other reasonable answers also received credit.*

## 9. Continued

### (i) The employer

#### Investment Risk

The pension plan is currently underfunded at 70%. These COLA provisions, sometimes referred to as “gain-sharing” provisions, are not linked to the funded status of the plan. As such, the plan cannot at this time afford to share any investment gains it may have with the pensioners that have the COLA provision

#### Funding Risk

The investment gains diverted to fund the COLA would leave the employer with the responsibility of funding the remaining deficit in the plan.

Funding risk would occur if this embedded option (100% CPI over 3% hurdle) is not valued correctly either because of the asymmetry or because the actuarial assumption is a singular point estimate. The employer is exposed to the funding risk of this provision as it is triggered (as it becomes an “in the money” option).

#### Inflation Risk

The prevailing CPI could be higher than the investment returns, even accounting for the 3% hurdle rate. The employer bears the risk of higher inflation.

#### Asset Liability Mismatch risk

Not only is the employer generally exposed to the risk that the assets and liabilities are not matched correctly, the employer is also exposed to the mismatch of their indexed linked investments, if any, and the CPI linked liabilities.

### (ii) The retirees

#### Inflation Risk

Although the plan provisions give 100% CPI increases, the pensioners still have inflation risk if this “embedded option” does not get triggered because of the fund rate of return (e.g. if the fund RoR is 2% but inflation is at 5%).

#### Investment Risk

The pensioners have investment risk because the fund rate of return needs to exceed the 3% hurdle rate in order for the CPI embedded option to pay 100% CPI.

- (c) Propose changes to the COLA provision to mitigate the employer risks.

#### **Commentary on Question:**

*Most candidates were able to identify 2-3 proposed changes to the COLA provision to mitigate the employer risk. 4 proposed changes were needed for full credit.*

## **9. Continued**

- Remove or grandfather the indexation provision
- Increase the hurdle rate (e.g. 7% hurdle)
- Amend the indexation provision to be a function of CPI instead of the fund RoR (e.g. 75% CPI)
- Amend the indexation provision to account for the Funded Status of the plan

## 10. Learning Objectives:

7. The candidate will be able to recommend and advise on the financial effects of funding policy and accounting standards in line with the sponsor's goals, given constraints.

### Learning Outcomes:

- (7d) Advise plan sponsors on accounting costs and disclosures for their retirement plans under various standards and interpretations.

### Sources:

DA-168-19 IFRS and US GAAP: Similarities and Differences, Ch. 5 only

### Commentary on Question:

*This question tested knowledge of the differences in accounting implications between IAS 19 and ASC 715 for this plan freeze scenario. Candidates generally had good knowledge of the material.*

### Solution:

- (a) Describe the accounting implications of the freeze under the following:
  - (i) International Accounting Standard IAS 19, Rev. 2011 (IAS 19)
  - (ii) U.S Accounting Standard ASC 715 (ASC 715)

### Commentary on Question:

*To receive full credit, candidates needed to demonstrate sound knowledge of the accounting treatment under both IAS 19 and ASC 715 and justify their response. Many candidates focused their answer on the specific impact to each of the expense components without providing overall justification for any special accounting implications (eg curtailment) in this scenario. Other valid responses not shown below also received credit, including justification for selecting the measurement dates.*

### IAS 19:

- Under IAS 19, a curtailment takes place when there is a significant reduction in the number of employees covered by the plan.
- Although all active participants are impacted and future accruals are frozen, this scenario is not considered a curtailment because it does not significantly reduce the number of employees covered by the plan.
- Under IAS 19, plan amendments are recognized when realized, in this case December 31.
- Deferral of any gains/losses is not permitted under IAS 19.
- Pension expense will be impacted including decreased liability and service cost.

## 10. Continued

ASC 715:

- Under ASC 715, an event that eliminates the accrual of defined benefits for some or all future service and for a significant number of employees qualifies as a curtailment.
- This event is a curtailment given all employees will have their future accruals eliminated.
- Curtailments resulting from plan amendments are recognized when realized, in this case December 31.
- Under ASC 715, must consider certain offsets of any unamortized gains/losses in a curtailment as does not permit pro rata recognition of the remaining unamortized gains/losses.
- Pension expense will be impacted including decreased liability and service cost.

(b) Explain how to determine whether settlement accounting applies under the following:

(i) IAS 19

(ii) ASC 715

**Commentary on Question:**

*This question was well understood with most candidates reflecting on the difference in applying settlement accounting between IAS 19 and ASC 715.*

IAS 19:

- Under IAS 19, if settlements are due to lump sum elections by employees as part of the normal operations of the plan, settlement accounting does not apply.
- In this case, given that lump sums are permitted under plan rules, this would not be a settlement event under IAS 19.

ASC 715:

- Under ASC 715, lump sum settlements are considered a form of settlement. However, an employer may elect an accounting policy whereby the settlement recognition is not required if the cost of all settlements within a plan year does not exceed the sum of the service cost and interest cost components of the net benefit cost for that period.
- If the total lump sums paid exceed this sum, settlement accounting is required under ASC 715. If the total lump sums are less than the sum of service cost and interest cost, settlement accounting is only required if the above policy was not elected.

## 11. Learning Objectives:

8. The candidate will understand how to apply the relevant standards of practice.

### Learning Outcomes:

- (8a) Apply the standards related to communications to plan sponsors and others with an interest in an actuary's results (i.e., participants, auditors, etc.)
- (8b) Demonstrate compliance with requirements regarding the actuary's responsibilities to the participants, plan sponsors, etc.
- (8c) Explain and apply relevant standards of practice related to valuing retirement obligations.
- (8d) Recognize situations and actions that violate or compromise Standards.

### Sources:

DA-142-15: ASOP 4 – Measuring Pension Obligations and Determining Pension Plan Costs or Contributions

DA-146-15: ASOP 6 – Measuring Retiree Group Benefit Obligations and Determining Group Benefits Program Periodic Costs or Actuarially Determined Contributions

DA-192-22: ASOP 56 – Modeling

DA-140-21: ASOP 27 – Selection of Economic Assumptions for Measuring Pension Obligations

### Commentary on Question:

*Commentary listed underneath question component.*

### Solution:

- (a) Compare and contrast the recommended practices for measuring obligations as described in the following:
  - (i) Actuarial Standard of Practice No. 4, Measuring Pension Obligations and Determining Pension Plan Costs or Contributions
  - (ii) Actuarial Standard of Practice No. 6, Measuring Retiree Group Benefit Obligations and Determining Retiree Group Benefits Program Periodic Costs or Actuarially Determined Contributions

### Commentary on Question:

*In Part (a) most candidates were able to identify common elements between ASOP 4 and ASOP 6. However, fewer candidates were able to accurately describe how they contrast. Candidates needed to list at least 6 items in common and 3 contrasts to receive full credit.*

## 11. Continued

*The model solution below is an example of an answer that would receive full credit; it does not include all possible answers. Other reasonable answers also received credit.*

There are many procedures that are common in both ASOP No. 4 and ASOP No. 6 which include but are not limited to:

- identifying the purpose of the measurement
- identifying the measurement date
- selecting reasonable actuarial assumptions
- selecting an appropriate actuarial cost method to measure liabilities
- considering the use of approximations and estimates
- considering how plan sponsor assets or retiree group benefit assets are measured

In addition to the above, ASOP 6 includes additional considerations such as:

- the current plan provisions and anticipated changes in the measurement period
- details on modeling the provisions of the retiree group benefits program like covered benefits, eligibility, participant contributions, limits/exclusions/cost-sharing and impact of historical practices
- the current population covered by the benefits

- (b) Identify the information an actuary should disclose about using third-party actuarial valuation software as described in Actuarial Standard of Practice No. 56, Modeling.

**Commentary on Question:**

*Part (b) was well answered by most candidates. To receive full credit, candidates needed to demonstrate an understanding of how to validate the appropriateness of third-party software and the related disclosures.*

An actuary should disclose the following about using third-party valuation software:

- the extent of their reliance on a third-party software
- the intended purpose of the model
- material limitations and known weaknesses
- material inconsistencies, if any, among assumptions and known reasons for such inconsistencies

- (c) Describe the considerations when selecting the inflation assumption for the upcoming valuation as described in Actuarial Standard of Practice No. 27, Selection of Economic Assumptions for Measuring Pension Obligations.

## 11. Continued

### **Commentary on Question:**

*For Part (c), successful candidates were able to list at least 4 considerations when setting the inflation assumption. Most candidates were able to identify considerations for materiality, appropriateness, and the use of select and ultimate rates. However, many did not address that the cost of determining a refined economic assumption in relation to the liabilities is important.*

Considerations for setting the inflation assumption should include:

- expectations of appropriate inflation data that could impact actual inflation rates in the future (ex. consumer price index, yield on government securities, forecasts of inflation from government sources, etc.)
- if current inflation rates are expected to be temporary, it would be appropriate to use select and ultimate inflation assumption
- the impact of the inflation assumption on other economic assumptions such as wage increases, discount rate and cost of living adjustments (if the plan has indexation provisions)
- the cost of determining the refined economic assumptions as they relate to the impact on the liabilities (ex. stochastic modelling may not add value if benefit is a non-indexed flat benefit plan)