

RET DAU Model Solutions

Fall 2022

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.
4. The candidate will be able to evaluate plan design risks faced by sponsors of retirement plans and retiree health plans.
5. The candidate will be able to evaluate sponsor's goals for the retirement plan, evaluate alternative plan types and features, and recommend a plan design appropriate for the sponsor's goals.

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
- (j) Risk-sharing provisions

- (3a) Identify risks faced by retirees and the elderly.

1. Continued

- (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
- (5a) Describe ways to identify and prioritize the sponsor's goals related to the design of the retirement plan.
- (5b) Assess the tradeoffs between different goals.
- (5c) Assess the feasibility of achieving the sponsor's goals for their retirement plan.
- (5d) State relationships or recognize contradictions between a sponsor's plan design goals and the retirement risks faced by retirees.
- (5f) Design retirement programs that manage retirement risk and are consistent with sponsor objectives.

Sources:

DA-191-22: Design Matters: Plan Distribution Options

Commentary on Question:

This question contemplates DC distribution options and was designed to ensure candidates have a good understanding of the similarities and differences from a strategic perspective. Most candidates were able to provide valid points, though a lot of the discussions centered around the different types of risks (and who holds the risk for each option), whereas the question was looking for a more well-rounded analysis.

Solution:

- (a) Compare and contrast the single lump sum and partial withdrawal distribution options from a defined contribution plan from the perspective of:
 - (i) Plan sponsor
 - (ii) Plan participants

1. Continued

(i) From a Plan sponsor perspective:

For both distribution options:

- Risks are primarily passed on to participants (in that employers are not guaranteeing payments for life)

For single lump sum option:

- Aligns with desire for separated participants to completely exit the plan
- Little control of potential unexpected large payouts will affect investment design/liquidity

For partial withdrawal option:

- Can set limitations on min/max withdrawal amounts each year to control expected distribution (and investment horizon considerations)
- Allows terminated/retired employees to take advantage of group investment benefits (lower fees, better access to investment managers and options)
- Need to consider fiduciary duties, and associated risks

(ii) From a Plan participant perspective:

For both distribution options:

- Offers a lot of flexibility for retirees: have access and control of retirement funds
- Easy to understand
- Can also be risky for retirement security if retirees do not have sufficient financial awareness, and overspend early on in retirement

For single lump sum option:

- Options of where to move the funds: roll over to another employer's plan, purchase own annuity, other retirement funds
- Have control over investment of own retirement asset

For partial withdrawal option:

- Have access to funds if need it, but still can take advantage of benefits of group investment (lower fees, better access to investment manager and options)

(b) Compare and contrast the installment payment program and annuity distribution options from a defined contribution plan from the perspective of:

(i) Plan sponsor

(ii) Plan participants

1. Continued

(i) From a Plan sponsor perspective:

For both distribution options:

- Both great options in supporting retirees' financial security, by taking on (all or part of) the longevity risk (away from retiree)
- Additional effort required for long-term management/administration of employees' retirement funds, or the need to administer and purchase group annuities

For installment option:

- May be more attractive to employees (for recruitment) as an option which offers more flexibility
- Fiduciary responsibility for proper investment management

For annuity option:

- If purchased with insurer, then risk passed on to insurer

(ii) From a Plan participant perspective:

For both distribution options:

- Reduced longevity risk and better financial security in retirement
- Lack of control, and more complex; harder to understand

For installment option:

- Can take advantage of economies of scale of large asset pool investment (and typically lower per unit fees)
- Need to make proper decision on withdrawal intervals, and amount (it may not last for the retiree's lifetime (only until funds are depleted))

For annuity option:

- Guaranteed income for life; mimics a DB plan
- Can take advantage of better group annuity rates than if purchased by self

(c) Describe considerations for a plan sponsor's evaluation of defined contribution plan distribution options.

- Plan sponsor should determine if their objective is to maintain the assets of retired/separated participants in the DC plan
- Plan sponsor should determine if the DC plan currently has or should have overall retirement objectives – eg income replacement goal
- Plan sponsor should determine if the goal is to provide solutions based on how participants separate from service – eg retirement or termination
- Plan sponsor should determine what guidance, education or advice to be offered or made available to participants about their choices and options

2. Learning Objectives:

7. The candidate will be able to analyze/synthesize the factors that go into selection of actuarial assumptions.
8. 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) Evaluate appropriateness of current assumptions.
- (7c) Describe and apply the techniques used in the development of economic assumptions.
- (7d) Recommend appropriate assumptions for a particular type of valuation and defend the selection.
- (8a) Perform valuations for special purposes, including:
 - (i) Plan termination/windup
 - (ii) Accounting valuations
 - (iii) Open group valuations
 - (iv) Plan mergers, acquisitions and spinoffs
- (8d) Advise plan sponsors on accounting costs and disclosures for their retirement plans under various standards and interpretations.

Sources:

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

DA-136-17: Selection of Actuarial Assumptions, Consultant Resource Manual, SOA Version, Mercer, pp. 5-69

Getzen Model of Long-Run Medical Cost Trends

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

Commentary on Question:

This question encourages candidates to think both deeply and broadly about a situation with wide-ranging impacts. While the premise of the question may mimic real-world events, specific knowledge of the COVID-19 pandemic is not required. Successful responses recognized the unknown aspects of this pandemic and its future effects.

2. Continued

Solution:

- (a) Describe two ways the pandemic may affect expected trend in future medical costs for the National Oil Retiree Health Benefit Program (RHBP).

Commentary on Question:

To receive full credit, the response should describe how the aspects of the pandemic described in the question would affect the plan's costs for medical care in the future. Life insurance benefits should not be considered, as the question deals with medical trend only. The response should also include supporting details, such as the impacts over the short- and long-term, or effects that may offset each other.

1. The retiree population of the RHBP is likely to include a significant number of older participants who develop severe illness due to the pandemic. These participants are then likely to undergo expensive medical treatment, including emergency room visits, stays in intensive care units, and treatment with expensive medication. This treatment would not be reflected in the current assumptions for per capita medical claims or the medical trend assumption. This would be expected to cause an increase in medical cost trend in the short-term.
 2. Many plan participants are delaying non-emergency medical care, which likely includes routine check-ups, screening tests, and treatment for chronic conditions. Because these non-emergency treatments were included in the current per capita cost assumption, this would be expected to cause a decrease in medical cost trend in the short term. However, if the pandemic is brought under control in the future, this could cause a spike in costs as participants catch up with care that was previously delayed. Further, the delay of routine care could result in higher medical costs to treat conditions that could have been treated earlier for lower cost. These effects would be expected to increase the medical cost trend in the medium- or long-term.
- (b) Recommend two other RHBP valuation assumptions to consider adjusting due to the pandemic.

Justify your response.

Commentary on Question:

To receive full credit, full recommendations with justification were required. Candidates with the strongest responses included supporting details describing why certain assumptions should be adjusted, or multiple aspects of an assumption that should be considered. Other valid answers not shown below also received credit if they had sufficient justification.

2. Continued

1. Mortality assumption
 - a. If the pandemic causes additional deaths, then it should result in an increase in mortality rates. This may be a short-term effect if the virus is brought under control and treatments improve, or it may be a long-term effect if the virus cannot be effectively treated and controlled.
 - b. The virus appears to cause long-term health problems, which could increase future mortality rates.
 - c. People with pre-existing respiratory or immune conditions are most vulnerable to dying from the virus. This could mean that the remaining population in the long-term will be healthier than the pre-pandemic population, reducing future mortality rates.
 - d. NOC should consider a future mortality improvement assumption which reflects the likely increase in mortality rates in the short-term, and potential long-term effects.
 2. Retirement assumption
 - a. Some retirement-eligible participants may temporarily delay retirement because of the economic disruption and resulting uncertainty around their retirement security.
 - b. Other participants may retire earlier than expected to avoid exposure to the virus at work, or because they are unable to continue working after being afflicted by the virus.
 - c. NOC should consider an age-graded retirement assumption, rather than the current single-age assumption. They could also consider a select-and-ultimate assumption if they expect that the pandemic's effects on employment will be short-lived.
- (c) Calculate the revised 2022 Net Periodic Postretirement Benefit Cost under U.S. Accounting Standard ASC 715.

Show all work.

Commentary on Question:

Candidates should recognize the following to receive full credit:

- *The plan change is effective on July 1, 2022, which will trigger a remeasurement as of that date*
- *Both the liability and service cost should be reduced by 30% to reflect the new premiums charged and life insurance reduction*
- *The liability and service cost should then be further reduced by 20% to reflect the assumed reduction in participation rates.*
- *Note that both of these reductions apply to the liability for active and retired participants.*

2. Continued

- *Because the participation assumption change is a direct result of the plan change, the entire change in obligation should be accounted for as a prior service credit (rather than the change due to participation being accounted for as a gain/loss)*

The model solution for this part is in the Excel spreadsheet

3. Learning Objectives:

5. The candidate will be able to evaluate sponsor's goals for the retirement plan, evaluate alternative plan types and features, and recommend a plan design appropriate for the sponsor's goals.

Learning Outcomes:

- (5e) Identify the ways that regulation impacts the sponsor's plan design goals.
- (5k) Evaluate and incorporate, as appropriate, different social insurance and employer sponsored plan types and features that occur internationally in providing recommendations.
- (5l) Give examples of plans that are appropriate for multinational companies and their employees including third country nationals and expatriates.

Sources:

DA-181-20: International Pension Plans: Dispelling the Myths

DA-182-20: International Pension Plans: A Good Fit for Mobile Workers

Commentary on Question:

Commentary listed underneath question component.

Solution:

- (a) Describe the advantages and disadvantages of continuing to participate in the home country pension plan in lieu of the host country plan from the perspective of an employee on the following assignments:
 - (i) Short Term
 - (ii) Permanent

Commentary on Question:

This part was not particularly well answered. Candidates generally did not frame their answers as advantages and disadvantages and generally did not provide enough valid points to receive full credit. Other valid responses not shown below also received credit.

3. Continued

Short Term Assignment:

An advantage of participating in the home country pension plan is that they get continuity of membership in the home country plan.

The host country plan may be more generous than the home country plan, which would be a disadvantage of participating in the home country plan during the assignment

Long Term Assignment:

An advantage of participating in the home country plan is that their pension would be in the home country currency and thus they wouldn't have to deal with currency volatility, assuming they plan on retiring in the home country.

A disadvantage is that there may be regulatory restrictions in the home country on the number of years of foreign service that can be counted towards the home country pension plan.

- (b) Explain the rationale behind establishing an International Pension Plan (IPP) under a Trust.

Commentary on Question:

This part was generally well answered by candidates. Some candidates did not understand that the question was referring to managing an IPP through a trust specifically and did not receive credit for providing general considerations around an IPP.

One would set up an international pension plan under a trust rather than via a contract for many reasons including:

Tax advantages as the assets in a trust are able to grow tax-free

A company cannot access the money in a trust and neither can creditors, increasing benefit security

Trusts can be set up such that professional firms manage the investments of the assets and risk management, as well as assist in the administration of the plan.

- (c) Critique the option of providing cash in lieu of an IPP for employees on Temporary Assignment from the perspective of the employer.

3. Continued

Commentary on Question:

To receive full credit, candidates needed to critique this option. A critique should include an analysis that covers both strengths and weaknesses. Some candidates answered this question from perspective of employee instead of employer so did not receive credit.

The illustrative solution below provides an answer that would receive full credit. Other valid answers not shown below also received credit.

Benefits of Cash relative to IPP:

Easier to administer

Predictable cost as no solvency payments

Employer may prefer cash as they won't have investment, longevity nor inflation risks

Downsides of Cash relative to IPP:

Less tax effective as cash would be taxed immediately

Cash may be spent rather than used for retirement

Cash may be less effective with employee retention/lifecycle management

4. 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.
4. The candidate will be able to evaluate plan design risks faced by sponsors of retirement plans and retiree health plans.
9. The candidate will be able to apply the standards of practice and guides to professional conduct.

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.
- (3c) Evaluate benefit adequacy and measure replacement income for members of a particular plan given other sources of retirement income.
- (4a) Identify how plan features, temporary or permanent, can adversely affect the plans sponsor.
- (9g) Recommend a course of action to repair a violation of the Standards or the Guides to Professional Conduct.

Sources:

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

DA-189-22: The Hybrid Handbook: Not All Hybrids are Created Equal

Commentary on Question:

Candidates did not do well on part a; they struggled with the concept of redistributions. Many did not understand that the question was asking about generational inequities provided by the plan. In part b, many candidates struggled with adequately describing cash balance plans and collective defined contribution plans. Part c was answered well by most candidates.

4. Continued

Solution:

- (a) Describe how redistributions occur among defined benefit pension plan participants with employee contributions and accrual rates which:
- (i) Do not vary with age
 - (ii) Vary with age
 - (i) Do not vary with age
 - From the young to the old: younger workers overpay to acquire pension benefits while older ones underpay.
 - From those who join the plan early in their lives to those who join it late; early joiners overpay
 - From those who leave the plan early to those who leave it later.
 - From those who have flat earnings profiles to those with steeper earnings profiles towards the end of their career.
 - (ii) Vary with age:
 - When deferred benefits are not revalued like accrued benefits, early leavers lose out at the expense of those who stay in the plan;
 - In final pay plans, workers with steeper earnings profiles profit at the expense of workers with flatter profiles;
 - Partnered members profit at the expense of single members as their partners obtain survivor pensions;
 - Women on average get more value from equal contributions than men because of their longer average life expectancy
- (b) Describe how the characteristics of the following pension arrangements affect risk sharing between the plan participants and plan sponsor:
- (i) Traditional defined benefit plan
 - (ii) Cash balance plan
 - (iii) Collective defined contribution plan

4. Continued

(i) Traditional DB plans:

- In these plans, a formula links benefits to wages and the length of the service period.
- The replacement rate is fixed as a percentage of the worker's final or career average wage.
- To the extent that benefits are paid as inflation-indexed annuities, inflation risk is mitigated for pensioners
- These types of plans shift all risks related to benefit provisions to the sponsoring employer, and hence to current and future workers.

(ii) Cash balance plans:

- Benefits are calculated on the basis of individual accounts that are credited with a fixed investment return until retirement.
- At retirement, benefits may be paid as lump-sums or annuities.
- It protects employees against investment risk, but not longevity risk before retirement.
- It may also fail to protect against inflation risk if the investment return guarantee is set at too low a level (or a nominal level only).

(iii) Collective DC plans:

- In a collective DC plan, contribution rates are fixed.
- Benefits are calculated as in traditional DB plans but both the extent of indexation and nominal benefits are linked to the plan's funded status.
- Nominal accrued benefits and even nominal pensions in payment can be cut if the funding ratio falls below a certain level.
- Pensioners therefore face greater benefit risks than under the pension arrangements in (i) and (ii).

(c) List the criteria used to assess the effectiveness of hybrid plans.

To provide a general assessment of the various types of hybrid plans, the criteria listed below are used:

- Adequacy and provision of lifetime income to those who retire from the plan
- Purchasing power preservation in retirement
- Adequacy of retirement income for those terminating before retirement
- Funding predictability
- Funding flexibility
- Benefit predictability and transparency
- Workforce management effectiveness

5. Learning Objectives:

7. The candidate will be able to analyze/synthesize the factors that go into selection of actuarial assumptions.
8. 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:

- (7c) Describe and apply the techniques used in the development of economic assumptions.
- (8a) Perform valuations for special purposes, including:
 - (v) Plan termination/windup
 - (vi) Accounting valuations
 - (vii) Open group valuations
 - (viii) Plan mergers, acquisitions and spinoffs
- (8d) Advise plan sponsors on accounting costs and disclosures for their retirement plans under various standards and interpretations.

Sources:

DA-180-18: Alternative Approaches to Calculating Service and Interest Cost under FASB ASC Topic 715, KPMG

DA-136-17: Selection of Actuarial Assumptions, Consultant Resource Manual, SOA Version, Mercer, pp. 5-69

Commentary on Question:

This question tested the candidates' knowledge of how the shape of the yield curve affects the Net Periodic Pension cost under both approaches and required candidates to calculate the Projected Benefit Obligation, Interest Cost and discount rates that would be disclosed in the ASC 715 report. Candidates generally did well on this question, and most were able to correctly calculate the disclosure items in part b under both approaches.

Solution:

- (a) Describe the short-term impact of an upward sloping and downward sloping yield curve on the Net Periodic Pension Cost under U.S. Accounting Standard ASC 715 (ASC 715) using the following:
 - (i) Traditional Approach
 - (ii) Spot Rate Approach
- No calculations required.

5. Continued

- (i) Under the traditional approach, a single weighted average discount rate is used to determine the Service Cost and Interest Cost. It will be the same as the PBO discount rate and will not vary depending on the shape of the yield curve.
- (ii) If the spot rate approach is adopted and the yield curve is upward sloping, the discount rate will be lower than the traditional approach discount rate, which produces a lower Interest Cost. This will increase the Net Gain/Loss and the resulting Net Gain/Loss amortization component of the Net Periodic Benefit Cost.

If the yield curve is downward sloping, the discount rate will be higher than the traditional approach discount rate, which produces a higher Interest Cost. This will decrease the Net Gain/Loss and the resulting Net Gain/Loss amortization component of the Net Periodic Benefit Cost.

- (b) Calculate the following using both the Traditional and Spot Rate Approaches:
 - (i) Projected Benefit Obligation under ASC 715
 - (ii) Interest Cost under ASC 715
 - (iii) Equivalent discount rates that would be disclosed in the ASC 715 report

Show all work.

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

6. Learning Objectives:

6. The candidate will be able to analyze, synthesize and evaluate plans designed for executives or the highly paid.

Learning Outcomes:

- (6a) Given a specific context, synthesize, evaluate and apply principles and features of executive deferred compensation retirement plans.
- (6b) Given a specific context, apply principles and features of supplemental retirement plans.

Sources:

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

- o Ch. 14

Morneau Shepell, Handbook of Canadian Pension and Benefit Plans, 17th Edition, 2020

- o Ch. 13 (p 402-410)

DA-802-13: Internal Revenue Code 409A and Non-Qualified Plan Design Considerations

Commentary on Question:

This question relates to the concepts of supplemental retirement plans. Successful candidates were able to fully describe plan features that can help a company with its strategy in attracting and retaining executives.

Solution:

- (a) Describe how the following SERP plan provisions can be designed to improve executive recruitment and retention:
 - (i) Eligibility
 - (ii) Vesting
 - (iii) Benefit formula
 - (iv) Service

Commentary on Question:

Successful candidates were able to identify plan provisions that could help in attracting and/or retaining executives.

6. Continued

(i) Eligibility

- Company could provide for automatic enrollment when affected by tax limits if want to attract executives
- Depending on level of executives the company wants to hire, the SERP could be set up so that certain job titles are eligible (ex: eligible if VP and up)
- If the company wants to attract, better to have less stringent eligibility requirements

(ii) Benefit formula

To attract and retain executives:

- Could set up formula that restores lost benefit due to tax limits
- Could provide larger accruals than base plan
- Could provide a salary definition more generous than qualified plan (ex: include bonuses, commissions, overtime, etc.)

(iii) Vesting

- Could provide immediate vesting if goal is to attract
- If the company wants to retain the executives, better to vest benefit later on in career
 - Vesting could be based on a number of years of credited service with the company (ex: 100 % vested after 10 years)
 - Could be vested only if the executive retires with company
 - Could set up progressive vesting (ex: 50 % vested after 3 years; 75 % vested after 5 years and 100 % vested after 10 years)

(iv) Service

- Could recognize service after becoming eligible to participate in plan
- Could recognize service since employment with the company, effectively recognizing past service at eligibility
- Could recognize service from prior employer to make sure the executives don't lose benefits by changing jobs

(b) Describe timing requirements under Internal Revenue Code section 409A for the following:

(i) Contributions

(ii) Benefit distribution

6. Continued

Commentary on Question:

This section was the toughest part for candidates. Many did not fully understand IRC section 409A's timing requirements.

- (i) Timing requirements for contributions
 - Initial contribution deferral election:
 - Election must generally be made before compensation is earned
 - If first year in which an employee is eligible to participate, elections may be made within 30 days after eligibility, but only as to compensation earned after the election is made (“new participant rule”)
 - If becomes automatically eligible to participate due to Code limits, then could make election before January 30 of year following automatic eligibility (“excess plan rule”)

- (ii) Timing requirements for benefit distribution
 - Time/form of payment elections follow the same requirement as the initial contribution deferral election described in (i)
 - If the following are satisfied, the date on which distributions commence may be postponed and/or the form of benefit payment may be changed from the original election
 - Election must be made at least 12 months before original scheduled payment
 - Election may be effective not less than 12 months after it is made; and
 - The payment must be delayed for a period of at least 5 years from the date of the original payment
 - If the plan designates installment payments as a series of separate payments; 409A applies separately to each payment
 - Benefit Commencement Date for separation from service – 6-month delay for a specified employee

- (c) List four events that could trigger a SERP payment under Internal Revenue Code section 409A.

Commentary on Question:

Candidates did very well on this part of the question.

- 1) Separation from service
- 2) Disability
- 3) Death
- 4) Termination of the plan

7. Learning Objectives:

1. The candidate will be able to analyze different types of registered/qualified retirement plans and retiree health plans.
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5. The candidate will be able to evaluate sponsor's goals for the retirement plan, evaluate alternative plan types and features, and recommend a plan design appropriate for the sponsor's goals.

Learning Outcomes:

Describe the structure of the following plans:

- (a) Traditional defined benefit plans
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- (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
 - (j) Risk-sharing provisions
- (4a) Identify how plan features, temporary or permanent, can adversely affect the plans sponsor.
- (4c) Recommend ways to mitigate the risks identified with a particular plan feature

7. Continued

- (5a) Describe ways to identify and prioritize the sponsor's goals related to the design of the retirement plan.
- (5f) Design retirement programs that manage retirement risk and are consistent with sponsor objectives.

Sources:

CIA Educational Note: Financial Risks Inherent in Multi-Employer Pension Plans and Target Benefit Pension Plans, CIA Task Force on MEPP/TBPP Funding, May 2011

Commentary on Question:

Commentary listed underneath question component.

Solution:

- (a) Compare and contrast the plan provisions to those of a traditional MEPP.

Commentary on Question:

The below table provides an answer that would receive full credit, but it is not an exhaustive list of valid responses. Additional valid responses received credit if sufficient justification was provided. Candidates did okay on this question, but many did not fully answer it. Some candidates confused MEPPs with public plans.

7. Continued

Provision	
Normal Retirement Age	Normal retirement age (NRA) is usually 65 but some industries with shorter careers may have an earlier NRA.
Benefit Formula	<ul style="list-style-type: none"> • 1.5% of final average earnings is not a typical MEPP formula. <p>Traditional MEPP benefit is based on a formula that gives the employee a fixed dollar amount per month for every year of service or for every hour worked (\$/month/year)</p> <p>Another popular benefit formula is the “percent of contributions” (contributions made on behalf of workers are tracked and percentage (typically 0.5% to 2.0%) multiplied by accumulated contribution amount)</p> <p>Traditional MEPP benefit formula is typically based on a flat benefit or career average structure rather than final average</p>
Contribution	<p>Employer contribution rate based on a \$/hour is a common contribution structure for a Traditional MEPP</p> <p>Typically, employees do not contribute in a traditional MEPP</p>
Early Retirement Benefit	<p>Unreduced benefits can begin no later than the Normal Retirement Age under the plan. The early retirement benefit satisfies this requirement.</p> <p>The reduction is aligned with traditional MEPPs</p> <p>Traditional MEPPs can provide for early retirement provisions that are fully subsidized, partially subsidized, or actuarially equivalent</p>
Form of Benefit	<p>Traditional MEPPs provide a variety of pension forms</p> <p>Single life normal form (including Life guaranteed for 10-years) is appropriate when compared to traditional MEPPs</p>
Optional Forms of Benefit	<p>Lump sum option at retirement is not common in Traditional MEPPs</p> <p>Lump sum option reduces the assets and removes possibility of future asset returns.</p>
Post-Retirement Indexing	<p>Annual indexation of 2/3 inflation is not a typical benefit in a traditional MEPP</p> <p>Post-retirement indexation is typically provided on an ad hoc basis</p>

7. Continued

- (b) Recommend four changes to the plan provisions to meet the Board's objectives.

Justify your response.

Commentary on Question:

To receive full credit, candidates needed to both recommend changes and justify why those changes would meet the objectives. The illustrative solution below provides an answer that would receive full credit. Other valid answers not shown below also received credit.

1) Change the Benefit Formula:

- Change the benefit formula to a flat benefit per hours worked or a \$ times years of service
- This reduces cost and risk under the MEPP, as prior year accruals are not increased due to an increase in earnings.
- This reduces risk of losses due to salary increase experience being greater than the salary increase assumption used by the MEPP's actuary

2) Change the early retirement benefit:

- Change the early retirement benefit to be actuarially equivalent to the Normal Retirement Age (Age 62)
- This reduces cost in the MEPP, as employees are no longer able to receive a subsidized benefit prior to age 62
- This reduces the risk of retirement experience being different than the actuary's assumption. Employees may retire earlier than expected in certain circumstances, such as a downturn in the market or a reduction of hours worked in the industry, resulting in early retirement losses

3) Change Normal Retirement Age:

- Change the Normal Retirement Age to 65
- This reduces the cost under the MEPP, as the benefit will now be reduced from age 65 as opposed to age 62
- This reduces the risk of retirement experience being different than the actuary's assumption.

4) Remove Post-Retirement Indexing:

- Change the contractual indexing benefit of 2/3 of inflation to an ad hoc basis
- This reduces the cost under the MEPP, as the Board of Trustees can now provide indexing when there is adequate surplus
- This reduces the risk of inflation being higher than the actuary's assumption, which would result in losses under the MEPP

7. Continued

- (c) Propose four adverse scenarios to measure risks inherent in MEPPs.

Justify your response.

Commentary on Question:

Candidates struggled with the concept of adverse scenarios and did not answer this part well. Justification was required for each scenario in order to receive full credit. The illustrative solution below provides an answer that would receive full credit. Other valid answers not shown below also received credit.

- **Scenario 1: Interest rates will be lower than expected**
 - Stress testing on interest rate can be done by decreasing discount rate by 1%
 - This scenario will measure the inherent risk in the MEPP associated with asset liability mismatch
 - MEPP's liabilities will increase given decrease in discount rate. This will be partially/fully offset by increase in fixed income asset allocation depending on difference in duration
 - This scenario will provide Board with valuable information regarding risk of assets & liabilities moving in opposite directions with adverse effect on MEPP's financial position

- **Scenario 2: Deterioration of Assets**
 - Stress testing on equity asset allocation can be done by decreasing market value of equities by 20%
 - This scenario will measure the inherent risk in the MEPP associated with a difference between contribution rate and cost of accruals
 - If the difference between the contribution rate and normal actuarial cost is small, then the MEPP has only limited ability to absorb experience losses, such as a market correction
 - This risk is particularly great for mature plans

- **Scenario 3: Potential that employees live longer than expected**
 - Stress testing can be done on the mortality/longevity risk in the MEPP by assuming that everyone will live longer (eg. by making everyone in the plan 1 year younger)
 - This scenario will measure the inherent risk in the MEPP associated with mortality/longevity risk

7. Continued

- This risk manifests itself when the longevity improvements reflected in the liabilities are not sufficient for plan members and their spouses
- This scenario will test whether the level of surplus in the plan, if any, is adequate to offset mortality experience losses in the future

- **Scenario 4: Potential that contribution base will be lower than expected**
 - Stress testing can be done on contribution margin in MEPP by decreasing the hours worked or removing a significant participating employer
 - This scenario will measure the inherent risk in the MEPP associated with a decline in hours worked
 - Where a portion of the contribution is used to cover a deficit, a reduction in the hours works leads to lower contributions to finance the deficit
 - This provides insight into the MEPP's ability to absorb variances in the contributions being remitted to the plan

8. 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
- (j) Risk-sharing provisions

Sources:

DA-189-22: The Hybrid Handbook – Not All Hybrids Are Created Equal

DA-821-20: In-Depth: Risk Sharing in Public Retirement Plans

Commentary on Question:

Commentary listed underneath question component.

Solution:

- (a) Describe the following types of pension plans for government employees that combine elements of defined contribution and defined benefit plans:
 - (i) Vertical Hybrid
 - (ii) Horizontal Hybrid
 - (iii) Choice Scheme

8. Continued

Commentary on Question:

To receive full credit, candidates needed to describe all three types of Hybrid Pension Plans – Vertical, Horizontal, and Choice. The responses should go beyond defining a hybrid plan. Candidates generally did not perform well in part a) since the majority of candidates did not demonstrate that they could identify and articulate the differences between the Vertical Hybrid and Horizontal Hybrid designs. Candidates were most successful describing the Choice Hybrid Plan.

Vertical hybrid

The first portion of an employee's salary is subject to a contribution rate of the Defined Benefit component of the Plan

The remaining portion of salary is subject to contribution rate of Defined Contribution component.

The Integration Point and indexing of integration point are significant to the plan design: employer risk varies based on integration point and annuitization provided

The DB component provides Longevity and Investment risk protection, especially for lower-paid employees.

Horizontal hybrid

The entire salary is subject to respective contribution rates of DB and DC components.

Horizontal Hybrids plans provide greater portability of benefits and preserve retirement security for members who terminate before retirement.

Integration point can either be fixed level, so relative role of DB in total benefits declines over time, or can be indexed.

DB-type risks for sponsor, primarily investment and mortality risk, reduced (compared to full DB plan).

Choice Scheme

Members are provided a choice between DB only or DC only option
There is a Default Option if no choice made by the member.

Retirement security tied to member making the best choice given their situation.

8. Continued

If members made optimal choices, this would likely cause adverse selection problems for employers.

- (b) Assess which option is the most advantageous for a new hire age 45 based on the assumptions provided.

Show all work and justify your response.

Commentary on Question:

Candidates generally did well in calculating each option – DB only, DC only, and Hybrid. The majority of candidates assumed that the test of which option was best was made at age 65. However, the test should be applied on a range of ages since the most advantageous choice differs based on how long the employee works at the company.

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

9. Learning Objectives:

8. 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:

- (8a) Perform valuations for special purposes, including:
- (i) Plan termination/windup
 - (ii) Accounting valuations
 - (iii) Open group valuations
 - (iv) Plan mergers, acquisitions and spinoffs

Sources:

DA-169-17: Mergers and Acquisitions: Key considerations for retirement plan conversion

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

DA-814-16: Accounting for Plan Splits & Mergers Under U.S. GAAP

Commentary on Question:

Commentary listed underneath question component.

Solution:

- (a) Describe three advantages and three disadvantages of merging the two plans from the perspective of Company ABC.

Commentary on Question:

Many candidates did not provide three distinct advantages and three distinct disadvantages. Most candidates were able to identify there would be a reduction in cost, but credit was only provided for this answer once. If candidates identified reductions in three separate costs, that was not credited as being three separate advantages.

Also, many candidates indicated that the benefit formula would have to be changed to be the same for both groups after the merger or that the same demographic assumptions would need to be used for each covered group after the merger. Neither of these suppositions is true.

Advantages

- Merging the two plans can minimize costs associated with maintaining multiple plans (plan audit costs, plan filing costs, actuarial valuation costs).
- The overall benefit structure will not change, which should minimize any potential plan disruption.
- Assets from both predecessor plans can be used to satisfy previously existing obligations of the other.

9. Continued

Disadvantages

- Company ABC should consider how plan participants will be impacted, including what communications are required.
- Agreements reached through collective bargaining considerations with unions must be considered as certain levels of funding may be required in the contract.
- Objectives of the plans may be different. For example, the union benefit may be collectively bargained, and the salaried plan may be used for attraction and retention. May not be able to meet both objectives with a merged plan.

- (b) Calculate the 2023 Net Periodic Pension Cost under U.S. Accounting Standard ASC 715 (ASC 715) for the merged plan.

Show all work.

Commentary on Question:

Most candidates did well on this part. To receive full credit, candidates needed to show all work, which included the total merged net gain/loss and prior service cost at 1/1/2023.

The model solution for this part is in the Excel spreadsheet

- (c) Calculate the settlement charge/(credit) under ASC 715 due to the retiree annuity buy-out as of March 31, 2023.

Show all work.

Commentary on Question:

Many candidates did not correctly calculate the gain/loss at the remeasurement date or include the \$20,000 loss from the annuity buyout in gain/loss.

The model solution for this part is in the Excel spreadsheet

10. 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
- (j) Risk-sharing provisions

Sources:

CIA Report of the Task Force on Target Benefit Plans

Commentary on Question:

This question relates to the concepts of a Target Benefit Plan. Successful candidates were able to describe the risk-sharing features and describe the various concepts related to risk sharing/pooling and how these plans compare to the traditional plans. Most candidates did well on parts a and b, but many struggled with part c.

Solution:

- (a) Describe the risk-sharing features of the Association of Canadian Pension Management Target Benefit Plan concept (TBP).

A TBP pools both economic and demographic risks

It has a predefined retirement income goal (the “target benefit”), where the employer’s financial liability is limited to predefined contributions

10. Continued

Members' benefits may periodically be adjusted upwards or downwards relative to the original target.

A direct result of limiting the employer's liability is that members become the ultimate bearers of the plan's risks.

Such risks are not borne by each member individually, but pooled among the members.

- (b) Describe the shortcomings of traditional defined contribution plans and traditional defined benefit plans when compared to TBP.

DC plans have significant shortcomings, including:

- Members often have insufficient knowledge and/or level of engagement to effectively manage retirement assets
- High management expense ratios can erode value

TBPs can retain the stability of costs associated with DC plans while allowing members to benefit from improved pension outcomes by pooling assets in a common fund and by pooling certain risks.

For DB plans, the combination of volatile markets and a low-interest-rate environment resulted in a pattern of plan costs that was no longer acceptable to many plan sponsors: cost is too volatile and expensive to continue to maintain

Traditional DB plan sponsors bear all investment risk and longevity risk

TBPs can retain the stability of costs associated with DB plans by adjusting the members' benefits based on how markets perform. Plan sponsors would be able to share the investment risk and longevity risk with participants under this arrangement.

- (c) Explain how the different components of mortality risk are shared between plan participants and the plan sponsor in the following:
- (i) Traditional defined contribution plans
 - (ii) Traditional defined benefit plans
 - (iii) TBP

10. Continued

Mortality risk can be split into two components: idiosyncratic and residual.

Idiosyncratic mortality risk refers to individual variations in mortality among members with similar risk characteristics.

Residual mortality risk is what is left and also arises from uncertainty about the “true” mortality rates applicable to a particular cohort (compared to assumption about current mortality rates and potential future mortality improvements).

In a DC plan all mortality risks are borne individually by plan participants.

In a DB plan and in a TBP, all mortality risk is pooled: individual mortality risks are offset against each other, thereby reducing the overall mortality risk.

A large DB plan or TBP with a homogeneous membership will have minimal residual mortality risk. Smaller plans will have less diversification and may be left with more residual mortality risk.

11. Learning Objectives:

1. The candidate will be able to analyze different types of registered/qualified 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.
7. The candidate will be able to analyze/synthesize the factors that go into selection of actuarial assumptions.

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
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 - (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
 - (j) Risk-sharing provisions
- (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
- (7d) Recommend appropriate assumptions for a particular type of valuation and defend the selection.

11. Continued

Sources:

Embedded Options in Pension Plans: Valuation of Guarantees in Cash Balance Plans, sections 1, 2, 3, 4, 6, 7 & Appendix II

Commentary on Question:

This question was testing a candidate's knowledge and understanding of cash balance plans and underlying embedded options of some cash balance plan designs.

Solution:

- (a) Compare and contrast the advantages of a cash balance plan and a defined contribution plan from the following perspectives:
- (i) Plan sponsor
 - (ii) Plan participant

Commentary on Question:

To receive full credit in part (a), candidates needed to compare and contrast the advantages of a cash balance plan and a defined contribution plan from the different perspectives. Many candidates only provided similarities; both similarities and differences of the plans needed to be articulated. The illustrative solution below provides an answer that would receive full credit. Other valid answers not shown below also received credit.

(i) **Plan Sponsor perspective**

Compare

- Employer contributions to both plans on behalf of employees are tax deductible
- Both Plans are viewed as a benefit package for employee retention purposes

Contrast

- Cash Balance (CB) Plan offers the Plan sponsor funding flexibility whereas a Defined Contribution (DC) Plan is generally not flexible
- DC Plans shift the investment risk to the Plan Participant, whereas under a CB Plan, the investment risk is generally with the Plan Sponsor
- A DC Plan shifts the longevity risk to the Plan Participant, whereas under a CB Plan, the Sponsor must offer a lifetime annuity from the plan
- A Plan Sponsor can use a CB Plan as a mechanism to encourage retirement through early retirement offerings

11. Continued

(ii) Plan Participant perspective

Compare

- Both plans act as a capital accumulation benefit that is easy to understand
- Both plans offer lump sum portability upon termination or retirement providing employee flexibility

Contrast

- Under a DC Plan, employees generally make the investment decisions whereas under a CB Plan the Sponsor is responsible
- Participants' CB benefits are protected under the PBGC whereas their DC benefits are not
- A CB Plan can offer a guaranteed investment return (embedded option) to the plan participants, whereas a DC plan cannot
- DC Plans offer the ability for participant to take loans or withdrawals, but DB plans do not

(b) Calculate the value at the sample participant's retirement of the following:

- Enhanced money-back guarantee based on a minimum annual rate of 1%
- Enhanced money-back guarantee based on a cumulative floor of 3% per year

Commentary on Question:

Part (b) tested candidates' comprehension of embedded options and understanding of how to value a guarantee provision within the cash balance plan. Many candidates struggled with calculating the cumulative floor, but some candidates did very well with this part.

The model solution for this part is in the Excel spreadsheet

(c) Describe considerations for setting assumptions to value embedded options in a cash balance plan for actuarial valuation purposes.

Commentary on Question:

Part (c) tested candidates' knowledge of the valuation methods for embedded options and the corresponding valuation assumptions. This was the most difficult part of the question for many candidates.

The actuary needs to understand that much of the risk is undiversifiable. With investment guarantees, an unfavorable market will affect all participants at once

11. Continued

Therefore, traditional deterministic approaches would not be appropriate to set assumptions due to this type of low frequency, high severity, asymmetric payoff of the embedded option. The assumptions need to cover the full distribution of the guarantee liability. This can be accomplished via stochastic modeling or an option-valuation based approach.

Another approach for valuing guarantees in cash balance plans can be viewed as equivalent to derivative securities based on some underlying asset or economic phenomenon and thus can be valued using option pricing theory.

Recommended approaches are as follows:

- (i) Find an equivalent option trading in the market and use that option price as the price of the guarantee.
- (ii) Closed Form Solution: Option price can be derived from a formula. The best-known application for option pricing is the Black-Scholes equation for valuing options.
- (iii) Numerical methods: these methods are used when a closed-form solution does not exist. Two basic numerical methods are used (e.g., trees or Monte Carlo simulations)

12. Learning Objectives:

9. The candidate will be able to apply the standards of practice and guides to professional conduct.

Learning Outcomes:

- (9c) Explain and apply relevant qualification standards.
- (9e) Explain and apply all of the applicable standards of practice related to valuing retirement obligations.

Sources:

DA-192-22: ASOP 56 - Modeling

Commentary on Question:

The question tested understanding of ASOP 56. The question was looking for candidates to describe considerations rather than simply listing the steps or topics from the ASOP. Candidates generally did better on part c than on part a or b. Many candidates repeated themselves in the different parts of the question rather than answering what was asked.

Solution:

- (a) Describe considerations when determining if a model meets its intended purpose under Actuarial Standard of Practice No. 56, Modeling (ASOP 56).

Commentary on Question:

To receive full credit, candidates needed to provide more than just a list. They needed to also provide a brief description of the recommended practices from ASOP 56.

When designing or developing a model, the actuary should confirm that the capability of the model is consistent with the intended purpose. Consider the level of detail built into the model, if a particular level of detail is required, and any limitations or dependencies of the model. The actuary should consider the model's ability to identify possible variability of output (volatility).

When selecting, reviewing or evaluating a model, the actuary should confirm that the model reasonably represents its intended purpose.

When using the model, the actuary should confirm that data, assumptions, model testing and output validation are consistent with the intended purpose.

Assess whether the structure of the model is appropriate for the intended purpose – for example, whether a deterministic or stochastic model is appropriate for this purpose, or whether there is a material risk of the model overfitting the data. The actuary should also consider which specific provisions or risks to a particular business segment or plan that may rely on the model are material and should be reflected in the model.

12. Continued

The actuary should ensure that the data used is appropriate for the model's intended purpose. The actuary should use assumptions that are appropriate for the model's intended purpose.

- (b) Identify the guidance for setting assumptions for models under ASOP 56.

The actuary should consider a range of assumptions.

Consistency – the assumptions should be reasonably consistent with each other for a given model run. If the actuary is aware of material inconsistencies, then the actuary should disclose the reason for the inconsistencies.

The assumptions should be appropriate for the current model run.

The assumptions should be reasonable in aggregate, and the model output should be reasonable when considering the assumptions in aggregate.

Disclose any assumptions prescribed by law, and whether any of these prescribed assumptions may be inconsistent with any other assumptions used in the model.

The data used to develop the assumptions should be based on actual experience to the extent it is available, relevant and sufficiently reliable. Alternatively, the actuary could use future expectations or estimates, or other relevant sources of data, to develop the assumptions as long as the data is relevant and sufficiently reliable.

- (c) Describe how an actuary can mitigate model risk under ASOP 56.

Commentary on Question:

The question was looking for candidates to describe ways to mitigate model risks. Many candidates' answers did not address this topic.

In order to mitigate model risk, the actuary should:

- Understand the model's intended purpose
- Understand the complexity of the model, and any sensitivities or dependencies within the model
- Perform sufficient testing of the model. Examples of testing include:
 - Reviewing the data and other inputs for errors
 - Checking formulas and calculations in the model
 - Running different sets of assumptions as inputs for sensitivity testing
 - Reconciling outputs from the current model run to prior model runs and confirm the outputs are what the actuary would expect
- Validate that model outputs are reasonable given the input assumptions
- Compare the model output with output from other models

12. Continued

The actuary could have the model peer reviewed by another actuary.

The actuary should also prepare documentation that outlines the intended use of the model, potential risks as well as processes and controls in place to mitigate those risks.

The actuary should understand when there have been changes to the model, and any revisions to the model should be clearly documented.