RET FRC Model Solutions
Fall 2024

1. **Learning Objectives:**
1.   The candidate will understand how to analyze data for quality and appropriateness.

Learning Outcomes:
(1a)   Identify data needed.

(1b)   Assess data quality.

(1c)   Make and/or recommend appropriate assumptions where data cannot be provided.

(1d)   Comply with regulatory and professional standards pertaining to data quality.

Sources:
FR-149-21: Does Your Pension Data Need a Refresh

ASOP 23: Data Quality

Experience Data Quality: How to Clean and Validate Your Data

CIA Consolidated Standards of Practice sections 1440, 1510 & 1530

Commentary on Question:
The question is trying to test whether candidates were able to locate potential data issues and the considerations that needed to be taken into account given the limitation of data when performing actuarial valuation. Candidates performed quite well for Part A, except that some candidates were not able to point out the data for the deferred vested group was missing. Candidates performed fair for Part B. Most candidates did not write enough points and were not able to provide examples as to which data issues may be immaterial and which data issues may be material, that may have different impact to the liability.

Solution:
(a)   Identify potential incorrect, missing, or incomplete data required for the actuarial valuation.

1. Continued

(a)
- Missing 12.31.2023 valuation data in order to perform G&L

Active
- ID 2 - Date of birth is after Date of Participation; or member is too young to join plan
- ID 3 - Date of Participation not aligned with Service
- ID 5 - Invalid Date of Participation which does not align with credited service

Pensioner
- ID 12 - Missing J&S %
- ID 12 - Missing spouse date of birth
- ID 13 - Member age is under early retirement age of 55
- ID 13 - Missing guaranteed period end date
- ID 15 - Non-spousal beneficiary should not be offered J&S option, maybe G5, G10 or G15?
      If so, need remaining guaranteed period
- Missing Date of Retirement, this data is needed to know the group of pensioners with pension in pay as at January 1, 2024 and pension amount in pay as at December 31, 2023 to check 5% pension increase and for G&L

Deferred vested
- no deferred vested information provided, need to confirm whether there is any

Benefit payment
Pension
- pension payout in financial statement do not align with pensioner data, i.e. total pensions paid in year larger than total of all pensions from the member data
- need information for new pensioners in 2024 and those whose payments ended in 2024 to know number of payments in 2024 and for G&L

Lump sum
- lump sum payout in financial statement do not align with lump sum data
- need data information for terminated and paid out members and Date of payout for G&L

- Plan assets at the valuation dates are missing to perform an asset reconciliation

1.   Continued

(b)   Describe the considerations for performing the actuarial valuation given the limitations on the data, taking into consideration the Canadian Institute of Actuaries' Standards of Practice.

(b)

Potential issues:
- Have administrator or client provide previous valuation data, and perform data consistency checks.
- Have administrator or client provide financial statements of pension plan showing asset reconciliation and pension register showing individual pension payments.
- For retirees and terminated members with data errors, have administrator or client provide termination / retirement benefit election forms or review historical records to confirm information needed for valuation (e.g. monthly pension amounts, forms of pensions, spouse information, lump sum paid, etc.)
- If needed, have administrator consider contacting members directly to confirm their personal information relevant for valuation data purposes.
- Confirm there are no deferred vested members against last valuation data and option forms for new terminations.

- If some data issues cannot be resolved, consider making assumptions but need to disclose these assumptions.

    Possible immaterial data assumptions that can be made:

    - e.g. for missing J&S %, can we assume standard JS% for married member?
    - e.g. for missing spouse DoB, can we assume female younger than male by average age difference?
    - e.g. use pension amounts by individual in pension register rather than monthly pension amounts in data

    Data issues where data assumptions may cause material pension liability errors and that will need to be confirmed with client or administrator:

    - e.g. DoB of active member & current age of pensioner (may cause a big difference for liability)
    - e.g. no deferred vested group information (may cause a big difference for liability)
    - e.g. members with years of service not aligned with date of participation (may cause a big difference for liability)

- After data validation is completed, determine if the data deficiency is material to the valuation results as at December 31, 2024.
    - If the errors are not material, no further action is necessary and the errors can be corrected in the next valuation.
    - If unable to make assumptions due to materiality or unable to get reliable data, decline to perform the work.

- If valuation is filed and material data errors are later found, correct the data and revise the valuation report and/or communicate the impact to users of the reports.

    Any non-compliance should be reported to the Professional Conduct Board (Rule 13)

2. **Learning Objectives:**
5. The candidate will understand how to evaluate and apply regulatory policies and restrictions for registered retirement plans.

Learning Outcomes:
(5a) The candidate will be able to describe and apply regulation pertaining to plan design.

(5b) The candidate will be able to describe and apply regulation pertaining to plan establishment.

(5c) The candidate will be able to describe and apply regulation pertaining to plan amendment.

(5d) The candidate will be able to describe and apply regulation pertaining to plan termination/wind-up.

(5f) The candidate will be able to describe and apply regulation pertaining to plan merger or spin-off.

(5g) The candidate will be able to describe and apply regulation pertaining to reporting requirements.

(5h) The candidate will be able to describe and apply regulation pertaining to members' rights.

(5i) The candidate will be able to describe and apply regulation pertaining to contributions and benefits.

Sources:
FR-123-19: Pension Benefits Act–Ontario Regulation 310/13

FR-129-16: Pension Asset Transfers made easier, Pension Benefits and Executive Compensation, February 2014

FSRA – Supervisory Approach to Defined Benefit Asset Transfers under the PBA

Commentary on Question:
Commentary listed underneath question component.

Solution:
(a) Describe the requirements and considerations for merging the Unionized Pension Plan into the Hourly Pension Plan.

2. Continued

Commentary on Question:
Generally, candidates did not perform well on this part of the question. Most candidates did not provide enough answers to obtain full credit.

a. Both pension plans must file valuation reports as of the effective date of the asset transfer where
   i. The successor DB plan has a solvency ratio of 0.85; or
   ii. The solvency ratio of the successor DB plan is not reduced by more than 0.05 below the solvency ratio of each of the original plan and the successor plan before the transfer.

b. Notices must be issued to the impacted parties within 6 months of March 1, 2024.
   i. Union standard notice:
   ii. Current members, former members and retired members of the successor and original pension plan.

c. Preparing and filing amendments to both plans to allow for the merger of the Unionized plan provisions into the Hourly Pension Plan.

d. Submitting application to FSRA within 9 months of the effective date
   i. Application Summary signed by the plan administration, including certified copies of the notices distributed
   ii. Actuary's Certification signed by the plan actuary

(b) Calculate the contribution that must be made in order to satisfy the asset transfer funding conditions.

Commentary on Question:
Candidates performed well on this part of the question. Most candidates were able to calculate the solvency ratios for all plans, but only some candidates correctly calculated the contribution.

As at March 1, 2024	Hourly Pension Plan	Unionized Pension Plan	Merged Pension Plan
Solvency Assets	800,000	90,000	890,000
Solvency Liabilities	1,000,000	100,000	1,100,000
Solvency Ratio	0.80	0.90	0.81

2. Continued

The merged plan must have a solvency ratio of at least 85% (applicable for asset transfers upon the sale of a business) or no more than 5% less than the solvency ratio of each plan pre-merger [max (90%, 80%) -5%].
Therefore, contributions as follows will be required to be remitted to the merged plan as a result of the merger: $1,100,000 *0.85 – 890,000 = \$45,000$

(c) Describe the contribution and filing requirements for your client in respect of the two pension plans while waiting for the asset transfer application to be approved.

Commentary on Question:
Many candidates struggled with this part of the question, specifically failing to identify the question relates to the period during which the application is pending approval.

While application is pending review, original and successor plans must continue to operate as separate plans, including:

a. Funding on a separate basis: Hourly Plan special payments required is under 85% funded. Solvency special payments not required for the Unionized plan. Merged plan under 85% funded at the merger date and special payments does not apply until merger is approved.

b. Make all separate required filings (including filings, fees, assessments for fiscal year if after the deadline)

3. **Learning Objectives:**

3. The candidate will understand how to apply/synthesize the methods used to value pension benefits for various purposes.

6. The candidate will understand how to apply the regulatory framework in the context of plan funding.

Learning Outcomes:

(3a) Differentiate between the various purposes for valuing pension plans:
   (i)   Funding
   (ii) Solvency
   (iii) Termination/wind-up/conversion

(3b) Perform periodic valuations of ongoing plans, calculating normal cost and actuarial liability, using a variety of cost methods.

(3f) Calculate actuarially equivalent benefits.

(6b) Evaluate funding restrictions imposed by regulations.

Sources:
Canadian Pensions and Retirement Income Planning, Willis Towers Watson, 6th Edition, 2017 Ch. 15

Morneau Shepell Handbook of Canadian Pension and Benefit Plans, 17th Edition, 2020 Ch. 3 and 6

Pension Mathematics for Actuaries, Anderson, Arthur W., 3rd Edition, 2006 Ch. 1, 2, 3, 4, 7

FR-108-13: Pension Funding Exercises

FR-114-23: R.R.O. 1990, Reg 909: General Regulations under Ontario Pension Benefits Act

FR-115-23: R.S.O. 1990, Ch. P.8 under Ontario Pension Benefits Act

Commentary on Question:
This question was designed to test the candidate's knowledge of valuation of liabilities on different bases and the funding requirements in Ontario. See comments on each part below for further details.

Solution:
(a) Calculate the funded status of the plan on going concern, solvency, and hypothetical wind-up bases.

3. Continued

Commentary on Question:
Most candidates performed well on this part with some common errors:
- *Member ID2 is not eligible to receive early retirement subsidy from the plan due to member's service.*
- *Calculated actuarial reduction and/or the present value factor incorrectly*
- *Missed to calculate non-indexed liabilities*
- *PfAD should be calculated based on non-indexed liabilities*
- *Solvency and transfer ratios were calculated using wrong assets (termination expense should not be included).*

Please see Excel spreadsheet for solution.

(b) Calculate the available actuarial surplus and minimum required and maximum permissible employer contributions for 2024.

Commentary on Question:
Many candidates did not well understand the definition of available actuarial surplus. Common errors include:
- *The available surplus is determined based on the minimum of going concern excess and assets in excess of 105% of windup liabilities (not on solvency liabilities).*
- *Many candidates did not get that the maximum is determined based on assets in excess of 125% of going concern liabilities.*
- *Candidates must show all work to get full points.*

Please see Excel spreadsheet for solution.

(c) Describe the regulatory requirements and process for determining the minimum required and maximum permissible funding requirements in 2025.

Commentary on Question:
The question asked about the <u>process</u> for determining the minimum and maximum funding requirement. However, many candidates misinterpreted the question and described the thresholds rather than the process in determining the minimum and maximum funding requirement.

Since the plan has an available actuarial surplus in 2024, in order to determine if the plan continues to have excess surplus and whether contributions are permitted in 2025, the plan is required to file an actuarial cost certificate.

3. Continued

Such actuarial cost certificate is determined based on extrapolation of liabilities from the last filed valuation using the applicable assumptions in effect at the date of determination and asset information as of the date of determination.

The actuarial cost certificate must be filed with the regulator (FSRA) within 90 days of the plan's fiscal year end.

(d) Calculate the extrapolated going concern and hypothetical wind-up funded positions as at December 31, 2024.

Commentary on Question:
Many candidates performed relatively well on this part. Common errors include:
- *Candidates did not calculate the roll forward of non-indexed liabilities for the PfAD calculation.*
- *The blended discount rate for wind-up liability calculations was not calculated properly or many candidates did not calculate the blended rate.*
- *Some candidates did not factor in the incremental cost in the wind-up liability roll forward calculation.*

Please see Excel spreadsheet for solution.

(e) Calculate the minimum required and maximum permissible employer contributions for 2025 assuming you are not filing a complete actuarial valuation as at December 31, 2024.

Commentary on Question:
Same as (b)

Please see Excel spreadsheet for solution.

4. **Learning Objectives:**

3. The candidate will understand how to apply/synthesize the methods used to value pension benefits for various purposes.

Learning Outcomes:

(3b) Perform periodic valuations of ongoing plans, calculating normal cost and actuarial liability, using a variety of cost methods.

(3c) Analyze and communicate the pattern of cost recognition that arises under a variety of funding methods

Sources:

Pension Mathematics for Actuaries, Anderson, Arthur W., 3rd Edition, 2006

Commentary on Question:

The question was designed to test candidates' ability to calculate liabilities and normal cost under the Projected Unit Credit and Individual Level Premium cost methods.

Solution:

(a) Calculate the accrued liability and normal cost as at January 1, 2024 using the projected unit credit, prorated on service actuarial cost method.

Commentary on Question:

For part(a), majority of candidates were familiar with the PUC method and were able to get most marks. One common mistake in the calculation of the NC for Member A was to include the termination NC.

- Please see attached Excel Workbook

(b) Calculate the accrued liability and normal cost as at January 1, 2024 using the Individual Level Premium cost method.

Commentary on Question:

For part(b), a lot of candidates were not familiar with the ILP cost method and calculated the ILP NC similarly to the PUC NC.

- Please see attached Excel Workbook

(c) Explain in words, why the results from (a) and (b) above are different.

Commentary on Question:

Most candidates got marks for naming the characteristics of PUC however a lot of candidates were not familiar with the ILP cost method.

- Please see attached Excel Workbook

5. **Learning Objectives:**

3. The candidate will understand how to apply/synthesize the methods used to value pension benefits for various purposes.

5. The candidate will understand how to evaluate and apply regulatory policies and restrictions for registered retirement plans.

6. The candidate will understand how to apply the regulatory framework in the context of plan funding.

Learning Outcomes:

(3a) Differentiate between the various purposes for valuing pension plans:
- (i) Funding
- (ii) Solvency
- (iii) Termination/wind-up/conversion

(3e) Perform valuations for special purposes, including:
- (i) Plan termination/wind-up/conversion valuations
- (ii) Hypothetical wind-up and solvency valuations
- (iii) Shared risk pension plan valuations

(3f) Calculate actuarially equivalent benefits.

(5d) The candidate will be able to describe and apply regulation pertaining to plan termination/wind-up.

(5h) The candidate will be able to describe and apply regulation pertaining to members' rights.

(5i) The candidate will be able to describe and apply regulation pertaining to contributions and benefits.

(6b) Evaluate funding restrictions imposed by regulations.

Sources:

ASOP 4: Measuring Pension Obligations and Determining Pension Plan Costs or Contributions

CIA Consolidated Standards of Practice, section 1400

CIA Consolidated Standards of Practice, sections 3100-3500

CIA Section 3500 of the Practice-Specific Standards for Pension Plans – Pension Commuted Values (Subsection 3570)

5. **Continued**

CIA Section 3500 of the Practice-Specific Standards for Pension Plans – Pension Commuted Values (other than Subsection 3570)

FR-115-21: Ontario Pension Benefits Act, R.S.O. 1990, Ch. P.8 - read PBA – JSPP will not be tested (legislation in this note regarding JSPP and MEPP/SMEPP are background only)

FR-123-19: Pension Benefits Act–Ontario Regulation 310/13

FR-134-17: CIA Revised Educational Note: Transfer Values – Ontario Reporting Requirements

FR-153-21: FSRA - Limitations on Commuted Value Transfers and Annuity Purchases (DB Pension Pl

Commentary on Question:
Commentary listed underneath question component.

Solution:
Please see Excel spreadsheet for solution.

(a)   Calculate the wind-up funded status of the plan as at December 31, 2024 and the contribution requirements for 2025.

Commentary on Question:
During the grading process, an issue was identified with the Excel file used by the candidates. The participant data in the Word file is at December 31, 2024, while in the Excel file, it is dated January 1, 2024.

Some candidates noticed this discrepancy and adjusted the credited service by adding one year. Since this discrepancy was an oversight, we have decided to accept both approaches: those that increased the credited service and those that did not. The final rubric reflects the December 31, 2024, valuation without increasing the credited service.

Overall, candidates performed well in calculating the pension benefits for both members and determined the funded position.

For Member A, candidates know to calculate member's liability and apply the right blending assumption to determine the winding up liability.

5. **Continued**

For Member B, to determine the windup liability, some candidates applied the blending percentage on member's CV and AP liability at each age from 58 to 65 instead of applying the blending at the final CV and AP liability.
Some candidates incorrectly calculated the AP liability by applying 50% to AP liability at EURD and 50% at optimal age.

Most candidates correctly stated that the deficit needs to be funded for windup. However, the plan is also restricted from paying out commuted values or purchasing annuities until the deficit is fully funded, a point mentioned by only two candidates.

(b) Describe the regulatory wind-up process in Ontario.

Commentary on Question:
Most Candidates answered well regarding the implementation and completion of the windup reports well, including sending notice, optional statements, and outlining the details on preparing the windup report and benefit distribution after approval. However, many candidates overlooked the requirements for deficit funding and FSRA approval.

Only a few candidates mentioned key aspects such as de-registration of the plan after the windup is completed, the adoption of a formal resolution for the windup and the surplus notice and distribution.

6.

Learning Objectives:

3.   The candidate will understand how to apply/synthesize the methods used to value pension benefits for various purposes.

Learning Outcomes:

(3b)   Perform periodic valuations of ongoing plans, calculating normal cost and actuarial liability, using a variety of cost methods.

Sources:

Morneau Shepell, Handbook of Canadian Pension And Benefit Plans, 17th Edition 2020 Ch. 3

Pension Mathematics for Actuaries, Anderson, Arthure W. 3rd Edition, 2006 Ch. 2, 4 & 7

Guidance on Asset Valuation Methods

Asset Valuation Methods under ERISA, Pension Forum, Sep 2002, Ch. 1 & 3

FR-108-13: Pension Funding Exercises

Commentary on Question:

This question was meant to test the candidate's knowledge of valuation of liabilities, asset smoothing and measurements of gains/losses. Candidates generally performed well at calculating the expected assets and liabilities as well as recognizing the termination gain for Member B. Most candidates recognized that Member A had gains/losses for retirement, actual salary experience and the salary assumption change but were not able to appropriately attribute the value to each source.

Candidates did not perform well at smoothing of the assets and overall calculation of the gains/losses on assets. Common mistakes were using the full investment return for 2024 instead of the excess above the expected for smoothing or using the 2022 and 2023 investment gains/losses and ignoring the 2024 experience.

Solution:

Calculate the gains and losses by source for 2024.

Please see excel spreadsheet for solution.

7.   **Learning Objectives:**
7.   The candidate will understand how to apply the standards of practice and professional conduct guidelines.

Learning Outcomes:
(7a)   Apply the standards related to communications to plan sponsors and others with an interest in an actuary's results (i.e., participants, auditors, etc.).

(7b)   Demonstrate compliance with requirements regarding the actuary's responsibilities to the participants, plans sponsors, etc.

(7d)   Recognize situations and actions that violate or compromise Standards.

Sources:
CIA Consolidated Standards of Practice, sections 1000 – 1700 and 3100 – 3500

Commentary on Question:
The question was designed to test candidates' ability to assess completeness of information provided by an actuary and whether or not, and how, it met CIA Standards of Practice.

Solution:
(a)   Describe areas of non-compliance with Canadian actuarial professional standards.

   Commentary on Question:
   For part(a), providing the majority of the items below would result in full points. Most candidates were able to identify the items needed in the communication, however, several candidates missed providing the four statements of opinion to be included in an external user report.

   - The communication should include any standard reporting language applicable to the work.
   - The communication includes mention of purpose for the work but not that the work was done in accordance with accepted actuarial practice.
   - The communication should describe the users of the information to avoid unintended use of the work.
   - The communication should disclose any deviation from accepted actuarial practice.
   - The communication is missing disclosures on:
     o The actuarial assumptions;
     o Subsequent events;
     o A description of the membership data and any limitations of the data;
     o Any tests applied to the data and any assumptions for insufficient or unreliable data;

7. **Continued**

- o Sources of the membership data, plan provisions (including any pending or virtually definitive amendments), and the pension assets and the dates at which they were compiled;
- o A description of the assets, the asset valuation method, and a summary of the assets by major category;
- o A description of the terms of the engagement, and any significant terms that are material to the actuary's advice; and
- o A description of the actuarial cost method.
- The communication is not sufficiently detailed to enable another actuary to examine the reasonableness of the valuation.

An external user report should provide the following four statements of opinion, all in the same section of the report:

1) Membership data statement, which should usually be, "In my opinion, the membership data on which the valuation is based are sufficient and reliable for the purpose of the valuation."
2) Assumptions statement, which should usually be, "In my opinion, the assumptions are appropriate for the purpose(s) of the valuation(s)."
3) Methods statement, which should usually be, "In my opinion, the methods employed in the valuation are appropriate for the purpose(s) of the valuation(s)."
4) Confirmation statement, which should be, "This report has been prepared, and my opinions given, in accordance with accepted actuarial practice in Canada."

(b) Recommend a course of action to address the non-compliance. Justify your answer.

- Due to the actuary's adjustment of assumptions used in the analysis without context or rationale, that indicates potentially trying to inappropriately lowering costs, it may be appropriate to follow the CIA Rule of Professional Conduct standards (Rule 13). There is also significant missing information in the actuary's communication.

- Intended for "material" and intentionally misleading cases, which may apply to this situation.

7. Continued

- A potential remediation plan may include the following steps:
  - After becoming aware of the potential material noncompliance, the first course of action would be to reach out to the prior actuary to resolve the situation
  - After this initial conversation, if it is determined that there is rationale for their actions (for example, there is a supporting document with the missing information and the assumptions used are reasonable), no further action is necessary.
  - If the prior actuary admits to the noncompliance and rectifies the problem, the affected work must be corrected, users of the work must be notified, and the consequences of that notification must be resolved.
  - The noncompliance is not resolved if any of the following takes place:
    - The prior actuary in apparent noncompliance did not agree to a discussion;
    - The discussion did not result in an agreement as to whether a noncompliance has taken place; or
    - There was agreement that noncompliance has taken place, but no corrective action was taken as a result.
  - If there is no resolution, the member is obliged to report the noncompliance to the Canadian Institute of Actuaries Committee on Professional Conduct (CPC).
  - A member of the CIA can ask questions to a member of the CIA in confidence if the interpretation or application of the standards is not immediately clear

8. **Learning Objectives:**
1. The candidate will understand how to analyze data for quality and appropriateness.

2. The candidate will understand how to analyze/synthesize the factors that go into selection of actuarial assumptions for funding purposes.

Learning Outcomes:
(1c) Make and/or recommend appropriate assumptions where data cannot be provided.

(2b) Evaluate and recommend appropriate assumptions for funding purposes.

(2c) Evaluate actual experience, including comparisons to assumptions.

Sources:
Selection of Mortality Assumptions for Pension Plan Actuarial Valuations, CIA Educational Note, Dec 2017

Task Force Report on Mortality Improvement, CIA Final Report, Sep 2017

Commentary on Question:
Commentary listed underneath question component.

Solution:
(a) Describe the considerations in setting the base mortality assumption for a going concern valuation of a defined benefit pension plan

Commentary on Question:
This portion was well answered. Candidates were able to identify multiple considerations when setting the base mortality. Most mentioned the importance of assessing the credibility of the experience. However, only a few candidates mentioned that it needs to reflect a best estimate assumptions.

To set a base mortality assumption, the actuary should consider the following:
- The base mortality assumption should reflect best estimate of current mortality level
- Plan experience, if available, should be used if credibility is sufficient
- Without sufficient credibility of the plan experience, published mortality table should be used, and could be adjusted to reflect plan's characteristic and experience such as:
  - collar type
  - industry
  - pension size
  - private vs public sector

8. **Continued**

- When adjusting for multiple factors, caution should be used to not understate or overstate relationship between each factors
- Reasonable approach is to look at it separately

(b) Describe the assumptions needed to establish a mortality improvement scale for a going concern funding valuation of a defined benefit pension plan.

Commentary on Question:
This portion was not well answered. Most candidates did not provide the 3 items (short-term, long-term, transition). Many candidates copied the answer of a) and changed the base table for improvement table. While we were not asking for considerations, most candidates read the question as the same as a)

For mortality improvement scale is composed of 3 elements:
1) A short-term improvement rate
2) An ultimate long-term improvement rate
3) A transition from short-term to the ultimate improvement rates over a certain period and based on particular pattern

The short-term improvement rate should be based on recently observed improvement rates and may be smoothed to reflect historical data set based on ages and date of birth (cohorts)

The ultimate long-term improvement rate is considered largely judgmental and may reflect historical trends, expert opinions or surveys for forward-looking life expectancy.

The transition period represent the length of time until the ultimate long-term improvement rate is attained and may be based on judgment. Historical data should be considered and different transition period could be used by age cohorts

(c) Describe the considerations for adjusting the base mortality assumption for the January 1, 2024 going concern valuation.

Commentary on Question:
In general, candidates mentioned that the experience was lower than the base table and mentioned the credibility in some way. Few candidates mentioned the subtility about being an executive plan, with high earners. Not many candidates mentioned the possibility to look at it by sub-group.

The expected mortality curved in the graph seems to adequately reflect the shape actual mortality curved. A downward scaling adjustment might be appropriate since the actual curve is in general under the expected mortality. A credibility factor should be considered when applying an adjustment.

8. **Continued**

Collar type and pension size also support a lesser mortality than the CPM-2014. When adjusting for collar type and pension size, caution should be used as they may influence each other.

Finally, adjustment by sub-group (age, gender) could also be considered but adjusted for credibility.