PART III / FELLOWSHIP PROGRAM ASSIGNMENT COVER SHEET

THIS FORM MUST BE AT THE FRONT OF EACH ASSIGNMENT

CANDIDATES MUST KEEP A COPY OF THEIR ASSIGNMENT

Candidate to complete the following section (and update details in header and footer):

Candidate Number: 201399	**Course:** LIaRV
Date Due: Monday 2 March 2020 at 9.00am (AEST)	

- **Please ensure that your candidate number and course name is located on the header and footers of each page of the assignment.**
- **By completing and submitting this cover sheet you are confirming that this assignment is your own work, and all material that is used is correctly referenced and cited.**

Assignment Marker to complete and update the following section:

Comments on Questions

Overall Comments

1.

a.

Common Assumptions for both methods	Value	Assumption explanations
Past service definition	N/A	The scheme is a new scheme, benefits will only allow for service from the date when the scheme starts for all the current employees.
Investment return	5% p.a.	In general, assume the financial assumptions, e.g. the return of each asset class, are similar to Australia. Assume the majority of the underlying asset is fixed Interest bonds (e.g. government bond with less amount of growth investments such as shares and high-yield bonds. Assume the performance of the investment portfolio will exceed inflation rate by 5%. Hence, for simplification, the investment rate is 5% p.a., ignoring any inflation.
Withdrawal rate	Grade A: 5% p.a. for all ages Grade B: 6% p.a. for all ages	According to a recent study [1] on labour force turnover rate, the employee turnover rate is assumed to be similar to that of Australia, i.e. 8.5% of the employees will choose to leave the scheme each year. Considering the low interest rate environment worldwide, people become more conservative in terms of resigning from their work. As a result, the withdrawal rate is assumed to be lower than 8.5%. Furthermore for Grade A, they have more incentive to stay as their retirement benefit will increase with further salary increases and continue to accrue for further completed service even after NRA.

[1] https://www.aigrouptalent.com.au/wp-content/uploads/Ai-Group-factsheet-Labour-Turnover-in-2019.pdf

Employee turnover rate	Grade A: 5% p.a. for age 30, 40, 45, 50, 55 Grade B: 6% p.a. for age 30, 40, 45, 50, 55	Assume: • New entrants balance the number of exits (withdrawals). • New entrants only join the scheme at age 30, 40, 45, 50, 55 with the same average salary, same sex as currently defined for those ages. • They only join at the start of each calendar year. • So we assume the turnover rate equals to the withdrawal rate as of age 30, 40, 45, 50, 55.
Expense	$0	The scheme's operating expenses are likely independent of the funding method selected. Given the fact that there is no mortality/morbidity decrements and related benefits that need to be managed by the scheme, it is reasonable to simply assume that administrative/managing expense could be immaterial.
Salary inflation	Grade A 3.65% Grade B 1.13%	Weighted average salary inflation is derived from the internal experience (i.e. opening demographics data). For simplification, the average period is across all ages, although the salary inflation seems to be 0% above age 50 for Grade B employees.
Decrement timing	N/A	Deaths uniform throughout the year. Withdrawals/Retirement at end of year.
Timing of withdrawal benefit	N/A	Assume withdrawal benefit is only paid at the end of year, which may slightly increase the value of existing asset by gaining more interest while holding the withdrawal benefit from being paid.
Retirement rate post-NRA for Grade A	From 25% p.a. for age 49 and increases 5% each to 100% for age 65.	Retirement rate post-NRA for Grade A is assumed to be higher than the normal withdrawal rate and increases with age. All members have retired from the scheme before age 65.

Mortality rate post-NRA for Grade A	RP-2014 Rates-White Collar table[2]	Considering the profile of Grade A employees, (small number with high average salary), their mortality experience is assumed to follow the "White Collar Employee mortality rate". A unisex table will be used which is the average of male and female tables.
Retirement benefit post-NRA for Grade A	N/A	The retirement benefit will increase with further salary increases and continue to accrue for further completed service.
Mortality benefit post-NRA for Grade A	N/A	For Grade A, members who die after normal retirement age will be treated as normal retirement, receiving the normal retirement lump-sum benefit.

Additional Assumptions for EAN	Value	Assumption explanations
Average entry age for the scheme	Grade A 43.50 Grade B 41.83	Given having assumed that new entrants only join the scheme at age 30, 40, 45, 50, 55 with a fixed turnover rate consistently applied to the number of employees at the outset, then the average entry age could be assumed to be the average age at the outset for each grade.

b. Please refer to tab [1.b Flowchart] in the attached spreadsheet.

c. Please refer to tabs under section 1.c: [Decrements], [PUC_Projection] and [EAN_Projection] in the attached spreadsheet.

Initial Contribution Rate

Method	Grade	Initial Contribution Rate
PUC	A	9.43%
	B	2.80%

[2] Source from SOA website: https://mort.soa.org/ViewTable.aspx?&TableIdentity=3127

EAN	A	9.65%
	B	3.55%

2. Please refer to tabs under section "2 Calculation" in the attached spreadsheet.

a. [Recalculate SCR every 3 years under PUC :
See tab [2.a PUC_Projection]

Grade	Funding position - total surplus / deficit in 15 years' time
A	$1,459,848
B	$4,204,563

The SCR% under PUC should increase along with member's age. If SCR% is kept for 3 years, the total contribution would be lower than the case where SCR% is updated each year.

Compared to [1.c PUC_Projection], the total surplus under this scenario is smaller, which is a reasonable result.

b. EAN:
See tab [2.b EAN_Projection]

Grade	Funding position - total surplus / deficit in 15 years' time
A	$2,392,455
B	$12,135,731

c. The scheme closed to new entrants 3 years later under EAN:
See tab [2.c Decrements] and [2.c EAN_Projection]
Changes in assumptions:

- Investment rate reduced to 4% p.a.: for a closed scheme, the fund should be invested in assets with shorter maturity, which may lead to a lower rate of return.
- Withdrawal rate increases by 2%: due to the lower investment rate, members incline to withdraw from the scheme and invest in another asset portfolio with higher investment return.
- The assumption for average entry age increases by 3 years to reflect the reduced value of expected future services and future contributions.

Grade	Funding position - total surplus / deficit in 15 years' time
A	$1,751,505
B	$11,396,339

According to 2b, the scheme will have surplus in 15 years' time. Therefore the surplus will reduce if the number of members decrease.

Due to the decreased investment rate, the surplus will further decrease.

Compared to [2.b EAN_Projection], the total surplus under this scenario is smaller, which is a reasonable result.

d. A large-scale redundancy occurred at the start of year 10:
See tab [2.d Decrements] and [2.d EAN_Projection]
Additional assumptions:
- Redundancy rate at the start of year 10: 70%
- Redundancy benefit: 100% of the actuarial liability at the time that redundancy occurs

Grade	Funding position - total surplus / deficit in 15 years' time
A	$2,064,296
B	$10,068,368

Given there is a sudden drop in active members with extra redundancy benefit being paid, the surplus in 15 years' time is lower than that in scenario 2b.

3. 10 other scenarios that might affect the progression of the scheme and contributions required.

i. The scheme's operating expenses have increased and become material. The surplus will be reduced due the rise of the expenses.

ii. A counterparty the fund has largely invested in has defaulted on repayment. Value of existing asset may be impaired, leading to a write-down on fund values. Hence more contribution may be required as a remedy.

iii. The firm has increased the salary inflation to retain its employees as a result of a lack of professionals in the labor market. More contribution is required into the scheme.

iv. There is a downturn in the equity market which leads to a decrease in the investment rate. The firm has to contribute more to maintain the previous pace of funding.

v. The law mandating benefits on withdrawal has changed that withdrawal benefit should be equal to 100% of the actuarial reserve. As a result, the funding will have less surplus (more deficit).

vi. The retirement benefit is changed to be based on the average ordinary earnings in the past 5 years prior to retirement rather than the final salary alone. It is likely this will decrease the salary amount which is used to determine the retirement benefit, which means less retirement benefit will be made and hence less contribution is needed from the employer.

vii. The firm's new strategy is to hire more experienced people for both Grades. The increase in average entry age will lead to a faster contribution pace, given the employer has a shorter period of time to contribute for members who join at older age.

viii. The firm decides to change its employee structure to have more professional (Grade A) employees and less manual (Grade B) employees. The contribution will have to increase since the Grade A employees have higher average salary and accrual rate.

ix. The normal retirement benefit becomes an annuity instead of a lump-sum. The scheme should invest in assets with longer term to support the future annuity payments. The investment rate may increase as a result.

x. The jurisdiction has postponed the NRA by 5 years for both Grades. More contribution is required to fund the increasing retirement benefit as a result of longer period of service. Also due to the longer accrued period, the pace of funding may be slower.

4. Memo

To: Board of Trustees

From: Scheme actuary

Subject: Pre-launch analysis on different funding methods.

Dear Board of Trustees,

It is necessary to value the new defined benefit scheme and to ensure the firm contribute in a proper way so that its future obligations can be met when they fall due. Hence, selecting a funding method used for this scheme would be crucial to the valuation process.

There are many funding methods in practice. Analysis has been conducted on two of them, which are Projected Unit Credit (PUC) method and Entry Age Normal (EAN) method.

Both of the two methods will determine:

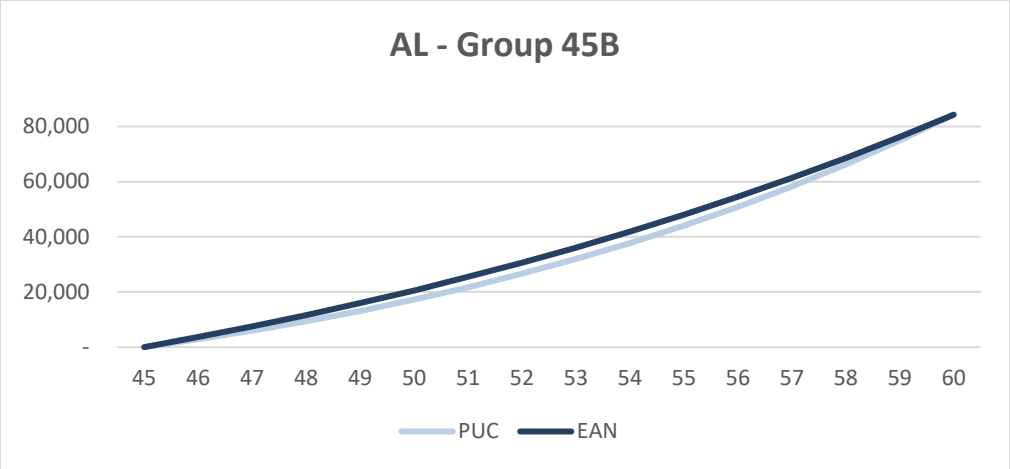
i) Standard Contribution Rate (SCR), which is applied to member's pensionable salary to determine the amount of money that the firm should contribute to fund future benefits.
ii) Actuarial Liability (AL), which is the quantum of assets that should be held in respect of accrued service. This may be different throughout the period under different funding methods.

First of all, the retirement benefit to which each member is entitled is fully determined by number of years of service, pensionable salary before retirement and the predefined accrual rate. Therefore, the retirement benefit at normal retirement age would be the same despite the funding method is used for the scheme valuation. This can be observed in the projection model in 1c.

Below will describe the main differences between the two funding methods regarding the funding speeds for the new scheme.

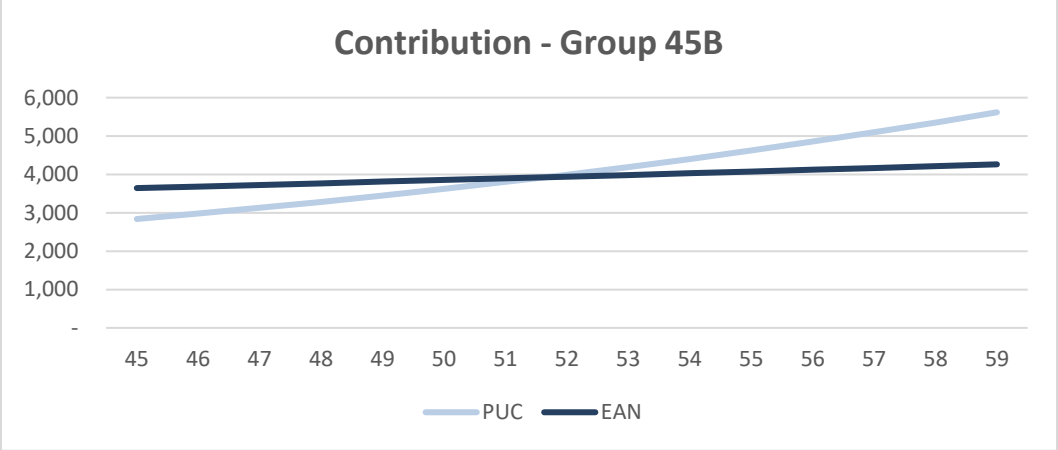
Funding Target

PUC only targets to support the benefit accrued from the past service whereas EAN also take the expected future service into consideration. As a result, EAN always has a higher target level of AL than PUC. As shown in the model in 1c, we can see AL_{EAN} is consistently higher than AL_{PUC} for all projection periods prior to the normal retirement age. The below graph illustrates group 45B as an example.



Contributions

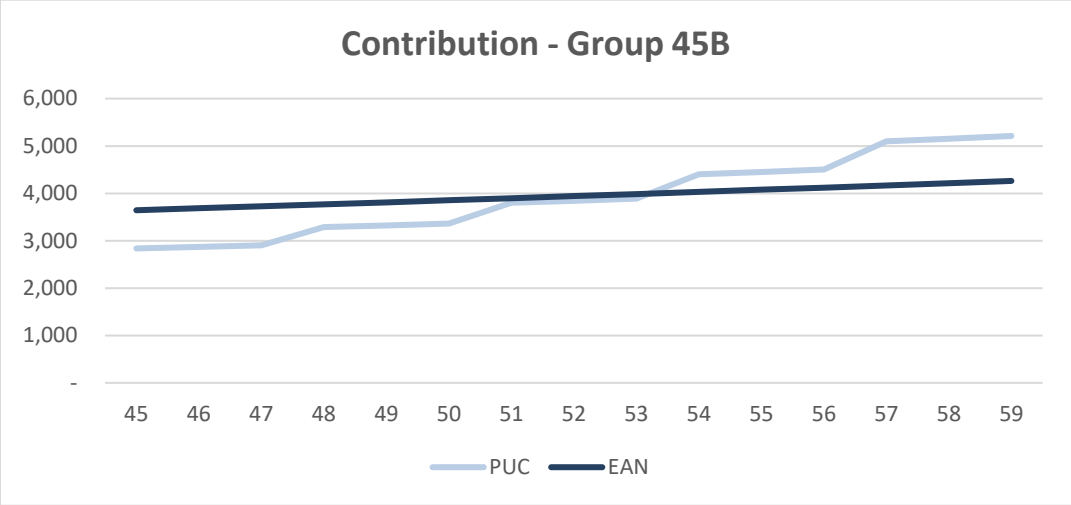
Given our scheme is a new fund, more contribution is required for EAN at early periods to fund the higher target level of AL, while less contribution (compared to PUC) is needed for later periods since the ultimate retirement benefit is the same under EAN and PUC method.



We can conclude that the funding pace under EAN is more quickly than PUC and more fund is being held under EAN method.

The above conclusion is made under the assumption if we determine the SCR each year. However, the funding contribution rate is generally determined every 3 years. PUC SCR is related to members' years of past service. Therefore it would be less accurate if PUC SCR is updated every 3 years. Unlike PUC, SCR for EAN is based on an assumed entry age for the fund and it does not necessarily require update each year as long as the actual entry age is stable. In a scenario where

the PUC SCR is updated less frequently, e.g. triennially, the funding pace of PUC could be even slower according to the previous projection.



Conflicts may arise among different stakeholders when setting funding strategy.

Funding security

One of the conflicts between the firm and scheme members (and regulators) is the desired funding level of the scheme. In general, the firm tends to fund just enough assets to support the benefits. On the contrary, scheme members always seek greater security for their pension plan to reduce the likelihood of occurrence of deficits.

EAN method has higher contributions at front and establish a surplus in the fund, which is in line with members' interest. However, the employer may not wish to maintain such a high level of funding. As a result, the salary inflation could be reduced by the employer in order to recoup the extra cost of having an increased funding security.

To manage this conflict, the different funding strategy and the indications thereof should be well discussed to both the members and the employers so that they could reach an agreement on the trade-off between fund security and future salaries. Setting a reasonable expectation beforehand is crucial.

Investment strategy

The employer may wish to invest in higher risk assets to achieve higher returns so that they could contribute less to the fund. However, regulators may wish the

employer take low investment risk to minimize the likelihood that the employer is not able to meet the obligations.

Therefore, the investment strategy of a scheme should be regularly reviewed by both employer and regulator to ensure a certain level of security is not breached by taking excessive investment risks. The trustee could also advise on the inherent risk in the investment strategy chosen by the employer.

Different groups of members

Different members may have different interests. Older members may put more focus on the financial strength of the scheme while younger members seek value growth over security since they will not receive retirement benefits for decades.

Hence, different funding method and investment strategy could be used for different groups of members. For instance, for older groups who are expected to retire in near future, EAN method may be more in line with their interest since its funding pace is faster, leading to a high level of funding in a short timeframe. Also, less risky assets should be invested to account for the higher level of certainty that they desire.

Please let me know if you have any concerns or questions.

Regards,

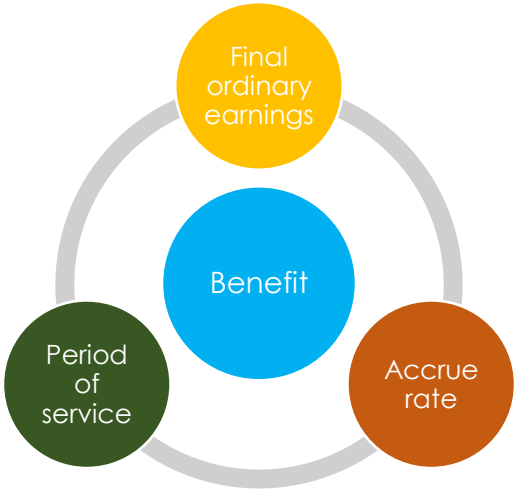
Scheme actuary

5. Aspects of the scheme relevant to the Grade B employees

About the new scheme

The new scheme is a defined benefit fund, where your employer can contribute on behalf of you to save for your retirement. Your benefit is paid as a lump sum based on the following factors:

- *your final ordinary earnings*
- *your period of service*
- *accrue rate defined by employer*



Please note your benefit is NOT impacted by the investment performance of the scheme.

How to join the scheme

Your membership (years of service) with the scheme automatically starts upon the launch of the scheme or the commencement of employment with the employer after the scheme is launched.

Benefit types

A **lump sum** benefit is paid on retirement, voluntary withdrawal (resignation) or redundancy event. Once any type of your lump sum benefit has been paid, there will be no further benefits.

- Retirement benefit

  Your retirement benefit is paid as a lump sum on your retirement date. The amount is based on your years of service with the scheme, final ordinary earnings and the accrue rate, which is 5% for all Grade B members.

  Example:

  Assuming your employment with the employer starts when you were at age 30 and you retire at the normal retirement age 60, your ordinary earnings before retirement is $100,000 p.a., the lump sum retirement benefit you are entitled to at the date of retirement is:

  $$150{,}000 = (60 - 30) * 100{,}000 * 5\%$$

- Withdrawal (resignation) benefit

A withdrawal benefit is paid as a lump sum* if you voluntarily resign before the normal retirement age. Voluntary withdrawal benefit is subject to penalty, which is 25% of the fund[3] value held by the scheme.

**The jurisdiction may have strict rules and you may not have access to your withdrawal benefit until you reach the normal retirement age. The withdrawal benefit may move to the scheme with your new employer or remain as a compulsory deposit with us.*

- Redundancy benefit

  A lump sum redundancy benefit is paid if redundancy occurs and your employment is terminated by your employer prior to the normal retirement age. The amount would be the fund[4] value held by the scheme.

Contributions

Contributions are only made by the employer and these contributions are used to pay all members' benefits.

Management of the scheme

The scheme is managed by the Trustee, whose responsibility is to act in your best interest and to ensure:

- all the members are well administrated in the scheme
- right amount of benefits are paid in a timely manner
- the employer makes contribution to the scheme as required
- the scheme complies with all required legislation at all time

Circumstances under which expected benefits might be affected

Benefit amounts are not guaranteed and they are subject to changes under some scenarios, which include but not limited to the following circumstances:

🙂 Circumstances under which expected benefits might be increased

- The jurisdiction decides to postpone the normal retirement age
- The normal retirement benefit is reformed to annuity rather than lump sum

☹ Circumstances under which expected benefits might be decreased

- Instead of the final salary, the retirement benefit is based on the average ordinary earnings in the past 5 years prior to retirement.
- Your salary has increased slower than expected
- Your final number of years of service is shorter than expected for the reason you become temporary or permanent disabled
- The failure of the employer

[3] & [4]: The fund is set aside by employer in order to finance your future normal retirement benefit.