

# **INSTITUTE AND FACULTY OF ACTUARIES**

## **SUMMARY**

April 2017

**CA2: Model Documentation, Analysis and Reporting**

**Paper 2**

## **Ginger and Pickles Pension Scheme member projections**

### **Objective**

Our client, Mr Potter, is the pensions manager at Ginger and Pickles Ltd (GP Ltd). Employees at GP Ltd can accumulate pension benefits in the company's pension scheme, Ginger and Pickles Pension Scheme (GP PS).

In 2016 the Government introduced a maximum value (the Government's maximum allowance (GMA)) of pension benefits that individuals can accumulate before a penalty charge would be imposed.

In January 2017 Mr Potter asked us to project his and the directors' of GP Ltd benefits forwards to determine whether they are likely to be affected by the GMA by the end of 2018. We also projected Mr Potter's benefits until his expected retirement and compared these to the GMA.

He has now asked us to update these projections to reflect an alternative economic outlook. In addition, Mr Potter would like to know what total flat, annual, DC contributions could be made into his DC pension fund so that the expected value of his pension benefits at his retirement are equal to the GMA.

### **Data**

AC Ltd held active member data, dated 31 December 2016, on file. There was data for 50 members consisting of basic details plus CARE pension and DC pension fund values.

Mr Potter provided details of the DC contribution rates and details of the benefits provided by the GP PS.

The data looks reasonable in so far as:

- the active member data was held on AC Ltd's files hence we assume that checks have already been undertaken on this data. However, further validation should be undertaken.
- the DC contribution rates increase with age, which might be expected as individuals give their pension greater attention the closer they are to retirement.

### **Assumptions**

- The data held on file and provided by Mr Potter is correct.
- Inflation A and inflation B are assumed to remain constant over the course of each set of projections.
- Pensionable salaries are assumed to increase in line with inflation B at the start of each year.

- The directors are assumed to remain employed and are assumed to continue to accumulate pension benefits within the GP PS for the duration of the projections.
- The benefits provided by the GP PS are assumed to remain unchanged for the duration of the projections.
- **Contributions are, on average, payable halfway through the year.**
- **The GMA increases each year over the course of the projections in line with inflation A. It is assumed that the Government do not change this allowance.**
- **Mr Potter can make fixed, level contributions rather than salary related contributions to his DC pension fund.**
- **Restrictions aren't imposed on the accumulation of benefits once their value exceeds the GMA.**
- **The GP PS continues to offer benefits on the same principles to those currently in force over the course of the projections.**
- **Mr Potter remains employed at GP Ltd and within the GP PS until he retires.**
- **Mr Potter retires at the end of the calendar year in which he has his 60th birthday, not earlier or later.**
- **There is no flexibility with how DC pension funds are invested and therefore the investment returns assumed are reasonable for all members.**

## **Method**

### **Director projections**

For the 10 directors and Mr Potter, their pension benefits are projected forward starting from the 31 December 2016 data.

The members' ages at 31 December 2016 were found by taking:

$$\frac{(31 \text{ December } 2016 - \text{date of birth})}{365.25}.$$

Pensionable salaries are projected forward by taking the previous year's salary and multiplying it by  $(1 + \text{infl}_B)$ .

The CARE pension at 31 December 2018 was found by:

- increasing the CARE pension at 31 December 2016 by two years' worth of the inflation A assumption.

- adding the CARE pension accumulated over the intervening period:

Additional pension

$$= 1.5\% \times \text{Pensionable salary 2017} \times (1 + \text{infl}_A)$$

$$+ 1.5\% \times \text{Pensionable salary 2018}$$

The DC pension fund at 31 December 2018 was found by:

- increasing the existing DC pension fund at 31 December 2016 by two years' worth of expected investment returns.
- adding the additional DC funds accumulated over the intervening period:

Additional contributions

$$= \text{age dependent contribution rate} \times \text{pen sal 2017} \times (1 + \text{inv ret})^{1.5}$$

$$+ \text{age dependent contribution rate} \times \text{pen sal 2018} \times (1 + \text{inv ret})^{0.5}$$

The total value of each member's pension is:

$$20 \times \text{total CARE pension at 31 December 2018} \\ + \text{total DC pension fund at 31 December 2018}.$$

This is compared to the expected GMA at 2018, found by increasing the 2016 GMA by two years' worth of inflation A, to determine if the members' pension values had exceeded the GMA.

### **Mr Potter's projections**

Mr Potter's retirement benefits are projected year on year from 2016, to his expected retirement in 2040.

Each year:

- the pensionable salary is increased by one year's assumed salary increase.
- the existing CARE pension is revalued by one year's inflation (A) plus an allowance for an additional year's accrual.
- the existing DC pension fund is increased by one year's investment return plus an allowance for additional contributions.
- the total value is found as  $20 \times \text{CARE pension} + \text{DC pension fund}$ .
- the expected GMA is found by increasing the previous year's GMA by one year's assumed inflation. This is then compared to the total value of Mr Potter's pension.

## Updated director projections

The directors' projections are updated for:

- lower inflation A and B assumptions.
- lower investment return assumption.

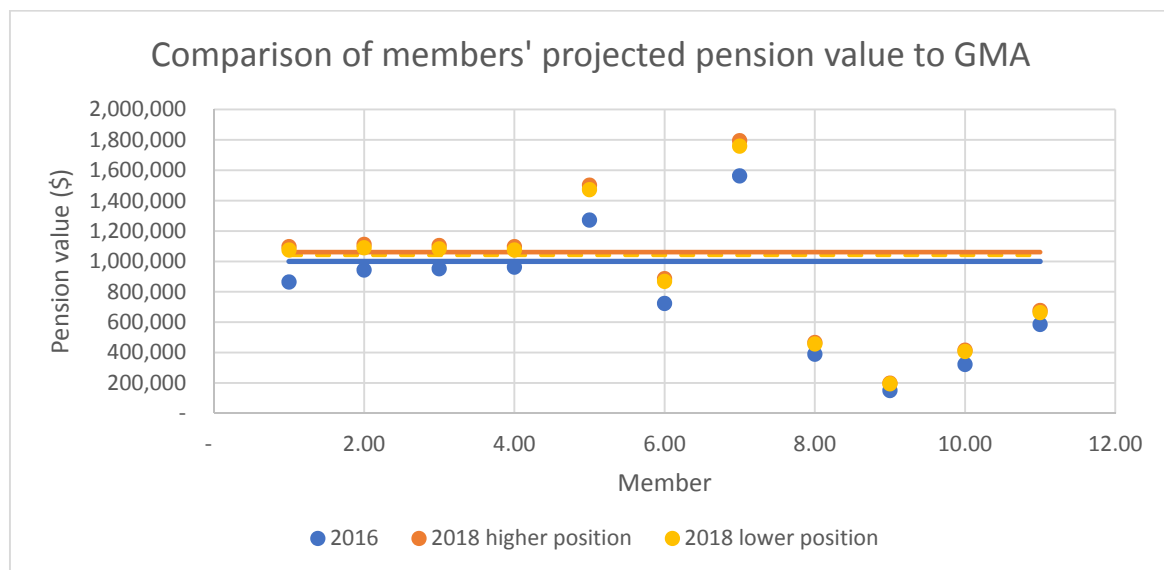
These lower assumptions mean that the increases and additional accrual applied to both the CARE pension and the DC pension funds are lower for all members. It also means that the GMA is assumed to grow at a slower rate.

## Additional projections for Mr Potter

Without changing the assumptions used to project Mr Potter's benefits, we calculate the fixed, level DC contributions Mr Potter can make each year so that at his assumed point of retirement the value of his retirement benefits will be equal to the assumed GMA at that date. This is found using goal seek.

## Results

The following graph compares the value of the member's pensions to the GMA:

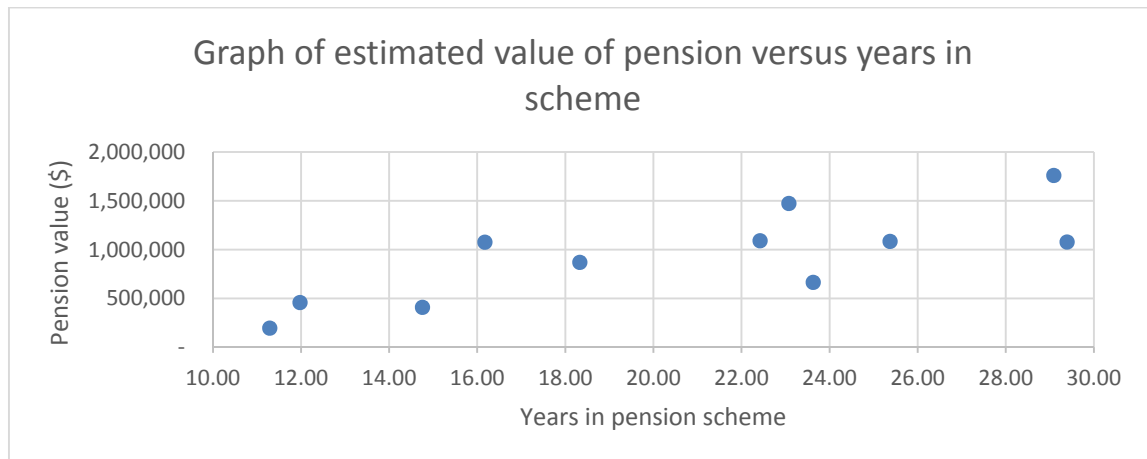


We can see from the graph that:

- at 31 December 2016, 2 of the 11 members exceed the GMA.
- come the end of 2018, 6 of the 11 members exceed the GMA.
- the number of members exceeding the GMA is not impacted by the reduction in the assumed inflation or investment return assumptions.
- the impact of updating the assumptions is to reduce the expected GMA in 2018. This is because we are increasing the GMA by a lower rate of inflation each year.

- all of the members' expected pension values have reduced as a result of the "lower" assumptions, however the magnitude of the reduction varies between the members. This is because the inflation assumptions have fallen by 1% p.a. while the investment returns have fallen by 2% p.a. The members who have larger DC pension funds will experience a larger adverse effect of the reduction in investment returns. Members 5 and 7 had the largest DC funds and their pension values can be seen to have fallen the least.

The following graph shows how the value of the members' pension benefits compares to their service in the GP PS:



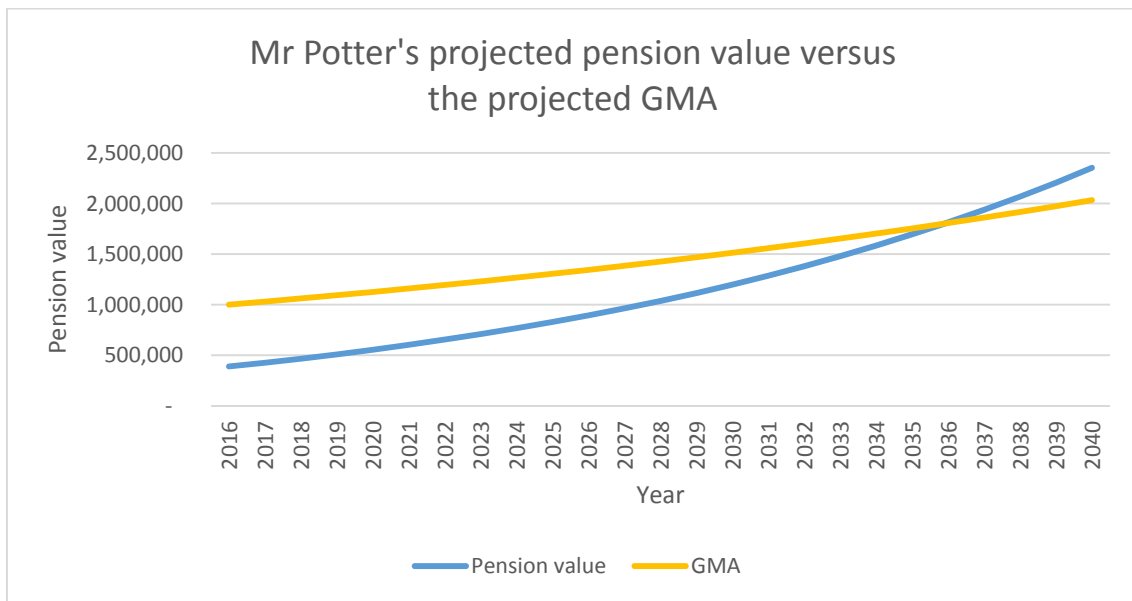
This graph shows that:

- in general, the longer a member has been in the GP PS the higher their pension value is. This is reasonable as:
  - they have had longer to contribute to their DC pension funds and longer for those funds to earn interest.
  - they have more years' worth of CARE pension.

These reasons however do not allow for different individuals to have higher salaries and therefore for the value of the benefits to be accrued each year to be greater, which could be the reason for the variability in results.

At his assumed retirement age Mr Potter's pension is projected to have a value of \$2,352,523 which is in excess of the projected GMA of \$2,032,794.

The following graph shows how the value of Mr Potter's pension benefits are projected to evolve over time:

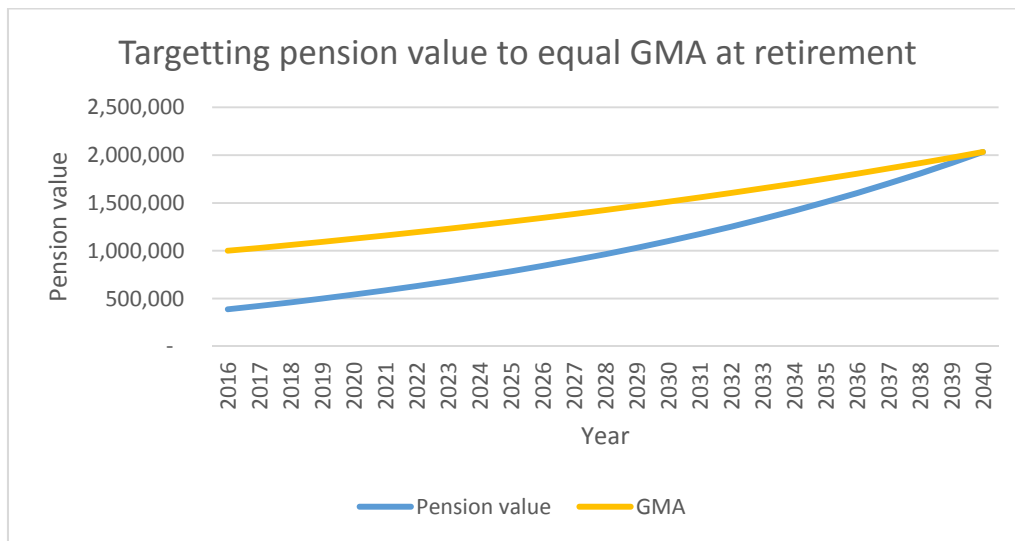


This graph shows that:

- Mr Potter is projected to exceed the GMA from 2036, ahead of his retirement.
- the value of Mr Potter's pension is projected to increase smoothly over time. This is because his salary is assumed to increase smoothly and therefore pension accrues smoothly over time. However pension value grows more quickly in later years due to the compound effect of interest and salary increases.
- Mr Potter's pension is projected to have a value of more than \$300,000 over the GMA at the point of his retirement.

In order to only meet the GMA at his assumed retirement, Mr Potter would need to make a level DC contribution of \$1,423 p.a. This is lower than his current annual contributions (of 5% of ~\$70,000 = \$3,500). This follows as without adjusting contributions Mr Potter is expected to exceed the GMA by c. \$300,000 and therefore contributions would need to reduce significantly over his working lifetime for the total value of his pension to reduce by this amount.

The following graph shows the projection of Mr Potter's pension's value when contributions are adjusted to target the GMA at his retirement:



The graph shows:

- that at Mr Potter's retirement his pension has a value equal to the predicted GMA.
- at no point before Mr Potter's retirement age is his pension predicted to have a value greater than the GMA.

## Conclusions

- Reducing the assumptions only has a small impact on the predicted value of the members' pensions.
- The impact of changing the assumptions differs between members.
- Mr Potter is predicted to exceed the GMA at his expected retirement date and therefore would need to reduce his DC contributions in order to only meet the GMA.
- The results are heavily dependent upon actual experience. Actual inflation, actual investment returns, actual salary increases are all likely to differ from expectations. These could significantly alter the actual values of members' pensions, particularly where these are being projected over the longer term.

## Next steps

- Validate the data provided.
  - Confirm with Mr Potter when he would like to retire.
  - Confirm the current levels of accrual (both DC and CARE).
- Look at historic salary increases for the directors' to determine whether the assumed salary increase rate is realistic.



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- Independently verify the likely impact of the international events on the economic outlook and therefore whether the proposed lower assumptions are realistic.
- Understand how the directors' DC pension funds are invested and more accurately reflect their funds in the assumed investment returns.
- Undertake projections for all members of the GP PS (not just directors) to determine who is likely to exceed the GMA by their retirement age.
- Project all directors' benefits to their point of retirement to assist with retirement planning.
- Allow for the assumed inflation to vary over time i.e. reflect an inflation curve rather than a single assumption.
- Allow for the assumed investment returns to vary over time.
- Model future inflation rates or investment returns stochastically so that a range of values can be provided, giving Mr Potter an idea of the likelihood of him exceeding the GMA at his retirement date.
- Calculate the penalties that would be imposed on those directors who exceed the GMA.
- Calculate the premiums required to target meeting the GMA at retirement for the directors.
- Find out about the actual timing of DC contributions so that investment returns can be more accurately calculated.
- Calculate the contribution rate Mr Potter could make to meet the GMA on retirement instead of a fixed level contribution.
- Allow for Mr Potter's contributions to vary by age or for him to have additional voluntary contributions in excess of those already allowed for.
- Allow for the investment returns to be age dependent. For example, he may want to de-risk his investments as he approaches retirement.
- Update Mr Potter's projections for the lower assumptions.
- Sensitivity test the contribution rates – confirm whether anyone contributes more than the “standard” rates.
- If appropriate, enhance the model to allow for monthly cashflows.
- Undertake a “shock” scenario test – for example what would happen were Mr Potter to stop accruing benefits. Or what would happen if there was a sharp drop in the value of his DC pension fund?

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- Update the projections each year as time passes. This will enable Mr Potter's DC pension funds to be re-derived each year so that at retirement the value of Mr Potter's retirement benefits equals the GMA.
- Obtain a peer review of the work performed.

**END OF SUMMARY**