IAS 221 Group Assignment

I. Instructions

Download the excel template from clickUP. You will do your modelling in this file. Please insert each member's name and student number into the ***Details*** sheet. If a student's details are missing or incomplete, they will not receive a mark for the assignment.

Submission instructions will be communicated on ClickUP.

Each group member is to complete the declaration of originality on clickUP and to indicate the level of participation of each of your group members.

II. Assignment details

Is Covid gone?

In response to the severe impact that Covid-19 had on insurance claims a few years ago, your company implemented a Covid loading on its mortality rates. *A loading is an increase (usually given as a percentage) that is applied to some base value.* In this case the base values are the mortality rates.

This loading made the mortality rates heavier and consequently increased the premiums that we charge. We are worried that our premiums may now be uncompetitive compared to premiums charged by other insurance companies.

The company is reviewing its pricing basis with a particular focus on if, and how, Covid still affects future mortality.

We are considering adjusting our mortality rates under the following two scenarios:

1. We assume that the entire threat has been averted and, therefore, strip away the loadings on the mortality rates.
2. We assume that pre-covid mortality rates apply only those who have been vaccinated, and who have taken the 1st and 2nd booster. Those who have not taken all three shots (vaccination + 1st booster + 2nd booster) are subjected to the post-Covid mortality rates.

You are required to investigate the impact of the Covid loadings on the competitiveness of your company's whole life insurance policies using the following assumptions:

III. Assumptions

- Average customer age: 35 years old
- Terminal age: 120 years old
- Sum assured: R1 000 000
- Mortality rates are provided in the template. Assume that these are the mortality rates applicable to South Africans who can afford insurance. And assume these rates **already include** the Covid loadings.
- Expenses to include in the calculation of the premiums:
    - Current: R250 initial expense thereafter R250 renewal expenses
    - Scenario 1: R250 initial expense thereafter R250 renewal expenses
    - Scenario 2: R300 initial expense thereafter R300 renewal expenses

  Renewal expenses increase at a compounding rate of 5% yearly, with the first increase applied to the second renewal expense payment.
- Interest rates to use for discounting are as found in the template. The rate at time t is the assumed interest rate for the period 0 to t, as is typically given in a yield curve.
- The covid loadings were applied as follows:

Age (x)	Loading
30-39	3%
40-49	5%
50-59	10%
60-69	15%
70-79	20%
80 and above	30%

- Unfortunately, we are unable to obtain the vaccination status of policyholders and we have therefore decided to adjust our mortality rates under scenario 2 according to the following statistics.

Vaccination	Percentage of the South African population
Initial	60%
1st booster	40%
2nd booster	25%

We assume that the percentages are consistent for all ages.

- The above statistics are for all South Africans. However, we expect that South Africans who are able to afford insurance are 8% more likely to have received an initial vaccination, 12.5% more likely to have received the 1st booster and no more likely to receive the 2nd booster compared to the statistics given for all South Africans.

IV. Outcome

The following should be produced for this assignment.

1. In the ***Inputs*** sheet, calculate the probability that a South African, who is able to afford insurance, is fully vaccinated (initial vaccination plus 2 boosters).
2. The revised q_x's (from age 35 onwards) for Scenario 1 and 2, as well as all probabilities and components needed to calculate the premiums, should be shown in the ***Calculations*** sheet.
3. In the ***Results*** sheet, calculate the curtate life expectancy for a life aged 35, using a) the current Covid-loaded mortality rates and b) the pre-Covid mortality rates. Comment on the difference in the expected lifetime between the two sets of mortality rates and the implications that it could have on the insurance company, in the ***Comments*** sheet.
4. In the ***Results*** sheet, calculate the current annual premium (paid in advance) for a life aged 35.
5. In the ***Results*** sheet, calculate the annual premiums (paid in advance) for a life aged 35, for scenario 1 and 2.

6. In the ***Results*** sheet, for a life aged 35, use a suitable graph to show the current premiums, pre-Covid premiums (Scenario 1), as well as the premiums adjusted for vaccinations (Scenario 2), for the following sum assured values:
    - R1 000 000
    - R5 000 000
    - R10 000 000
    - R20 000 000
7. Assume that the pre-covid premiums were competitive in the market. Based on your analysis for point 6, do you think that we should completely remove the loadings (as in scenario 1) or maintain part of the loadings for those who are not fully vaccinated with boosters (as in scenario 2)? Discuss the implications of your recommendation and any alternative action that could be taken. Type your answer in the ***Comments*** sheet.

NB! The use of macros and VBA is prohibited (not allowed).

V. Marks

Marks will be allocated as follows:

• Structure, layout, neatness of your model	10%
• Probability fully-vaccinated calculation	10%
• Revised probabilities of death and survival	15%
• Curtate life expectancy calculation	10%
• Calculation of current premiums	20%
• Calculation of premiums for Scenario 1 & 2	10%
• Graph (including the calculation of graph points)	15%
• Commentary	10%
	100%

• Bonus marks for extra effort	5%
• Negative marks for not following instructions	-5%

If a member of a group did not make a satisfactory contribution to the project, they may be allocated a lower mark than the rest of the group.

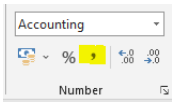
VI. Due date

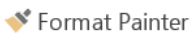
The due dates are as follows:

Excel template: **Friday, 18 October, 12:00**

Declaration of originality and participation levels: **Friday, 18 October, 17:00**

Appendix A: Excel and modelling tips

- Google is your friend when trying to understand Excel.
- Avoid hardcoding any results! Rather place inputs or assumptions on one sheet and link to those values.
- You are to make use of the appropriate formulas in Excel rather than manually typing out calculations. Some of the useful functions are: ***Sum, If, Vlookup, Hlookup, Sumproduct***
- Ensure proper formatting. You want to create a neat model that is easy to follow for the next person.
    - Let thousands be separated by a comma for easier reading (e.g. 1,000,000 rather than 1000000). 

    - The format painter tool can be used to ensure your formatting is similar throughout. 

- Press **F2** to open a cell.
- When you copy formulas across cells, excel automatically updates the references in the formula. You can fix a reference using the **$ sign** (found by pressing F4 in an open cell). If there is a $ sign before a column or row reference, then that column/row will not change when the formula is copied over (e.g. $A1 will not change the reference from column “A” when copying the formula across columns, but the “1” will change when copying the formula down to other rows).
- You can lock your top rows with the headings in it by clicking VIEW/ Freeze Panes.
- Clearly distinguish your inputs, assumptions, calculations and outputs from each other by using the separate sheets in Excel.

- Ensure that your model has a logical flow that can easily be followed by another user.
- Ensure your graph has x-axis and y-axis labels, a legend and a title. Also check that the units on the x- and y-axes are correct.
- You do not need to perform calculations beyond what is needed to obtain the results required from this model.
- Keep the modelling simple. There is no need to use complex formulae or to use VBA.