

INTRODUCTION TO ACTUARIAL MODEL.

ASSIGNMENT-1.

Q.1.

- Review the regulatory guidance.
- Define the scope of the model, for example which factors need to be modelled stochastically.
- Plan the development of the model, including how the model will be tested and validated.
- Consider alternative forms of model, and decide and document the chosen approach. Where appropriate, this may involve discussion with experts on the underlying stochastic processes.
- Collect any data required, for example historic losses or policy data.
- Choose parameters. For economic factors should be able to calibrate to market data. For other factors e.g. expenses, claim distribution need to discuss with staff.
- Existing "worst case" scenarios. Discuss with staff who made the estimates, especially to gauge views on the probability of events occurring.
- Decide on the software to be used for the model.
- Write the computer programs.
- Debug the program, for example by checking the model behaves as expected for simple, defined scenarios.
- Review the reasonableness of the output. May include: median outcomes, what probability is assigned to "worst case" scenarios.
- Test the sensitivity of the model to small changes in parameters.

Q.2. Items to be mentioned include:

- Models will be chosen which it is felt give a reasonable reflection of the underlying real world processes, but this may not turn out to be the case (Model error)
- The model may be very sensitive to parameters are estimates because the true underlying parameters cannot be preserved. (Parameter error).
- Sampling error may result from running insufficient simulations. (It should be possible to give a confidence interval for a error that could result from this course)
- The management actions assumed may not match what would happen in extreme circumstances
- Policyholder behaviour, such as take-up rates for options, may differ in practice.
- There may be future events, such as legislative changes which affect the interpretation of the policy conditions, which have not been anticipated in the modelling.
- There may be errors in coding of the model. The model is likely to be complex and difficult to verify completely.
- The model relies on input data, which may be grouped rather than being able to run every policy. Any errors in the data could cause the output to be inaccurate.

Q.3. The stages you would go through in identifying an appropriate model are:

- The objectives of the modelling exercise
- The validity of the model for the purpose to which it is to be put.
- The validity of the data to be used
- The validity of the assumptions.
- The possible errors associated with the model or parameters used not being a perfect representation of the real-world situation being modelled
- The impact of correlations between the random variables that 'drive' the model.
- The extent of correlations between the various results produced from the model.
- The current relevance of models written and used in the past.
- The credibility of the data input and results output.
- The dangers of spurious accuracy.
- The ease with which the model and its results can be communicated.
- Regulatory requirements.

Q.4. Instructions on how to run the model.

- Tests performed to validate the output of model.
- Definition of input data.
- Any limitations of the model identified (eg. potential unreliability).
- Basis on which the form of the model chosen (eg- deterministic or stochastic).
- References to any research papers or discussions with appropriate experts.
- Summary of model results.
- Name and professional qualification.
- Purpose or objectives of the model.
- Assumptions underlying the model.
- How the model might be adapted or extended.

Q.5. Advantages:

- The model is simple to understand and to communicate.
- The model takes account of one major source of variation in consumption rates, specifically age.
- The model is easy and cheap to implement.
- The past data on consumption rates by age are likely to be fairly accurate.
- The model can be adapted easily to understand different projected population OR takes into account future changes in the population.

Disadvantages:

- Past trends in consumption by age may not be a good guide to future trends.
- Extrapolation of past age-specific consumption rates may be complex or difficult and can be done in different ways.
- Consumption of chocolate may be affected by the state of the economy. e.g. whether there is recession.
- Factors other than age may be important in determining consumption, e.g. expenditure on advertising.
- Consumption may be sensitive to pricing, which may change in the future.

Q.6. One or both of the runs (the original or the new) may have been incorrect as, for example, the second trainee may not have been fully aware of the set-up (for example he or she may not have followed the procedure correctly), or may have used different assumptions). The difference between the two runs may not have only been the parameter change, for example the two runs may have used random seeds, or the second run may have had fewer simulations. The expectation that the model was not sensitive to this parameter could have been incorrect.

Q.7. The appropriateness of the proposed model approach is:-

- We should go for volatility check of the objective and we should highlight the purpose of model.
- For the appropriateness of the proposed model we should put highlight on the objective i.e. number of size of school in the new town.
- We should check the source of data are official legal bodies.
- We shouldn't overpressed.
- We should communicate the result in a simple way so it is easy to understand.
- The We should comply all regulatory legal requirements, that should apply legally in the firm.

Q.8. The nature of the existing sickness data the company possesses. The model can only be as complex as the data will allow it to be. Whether the company has made any previous attempts to model sickness rates among its employees, and how successful they were. The complexity of the model - e.g. whether it should be stochastic or deterministic. More complex models will be costlier to prepare and run, but eventually there may be diminishing returns to additional complexity. General trends in sickness and level of benefits payable under the scheme. Does the company plan to change the characteristics of the employees? For example, does it plan to recruit more mature persons? The ease of communication of the model. The budget and resources available for the construction of the model. Capability of staff. Will outside consultants be required? By whom will the model be used? Will they be capable of understanding and using it? Does the model need to interface with models of other aspects of the company's business (e.g. taking data from other systems)? The independence of sickness rates should be taken into account. e.g. in the event of an epidemic claims cannot be considered independent.