INSTITUTE OF ACTUARIES OF INDIA

EXAMINATIONS

May 2025

CP1B - Actuarial Practice

Time allowed: 3 Hours 15 Minutes

Total Marks: 100

INDICATIVE SOLUTION

Introduction

The indicative solution has been written by the Examiners with the aim of helping candidates. The solutions given are only indicative. It is realized that there could be other points as valid answers and examiner have given credit for any alternative approach or interpretation which they consider to be reasonable.

Q.1)

a) The reasons for entering into the new market could be:

- Developing markets could offer better profits.
- Diversification benefits.
- Early mover advantage/ Lower competition in the new market.
- Political/ economic ties between the countries making doing business there easy.

(2)

b) Some reasons for not meeting goals/ targets in the developing country, with low per capita income:

- Developing/ evolving regulations leading to higher compliance costs.
- Developing investment market - matching liabilities in that country could be costlier.
- Lower per capita income could mean lower affordability and therefore lower uptake.
- Maybe lower financial literacy/ awareness resulting in higher marketing expenses/ lower uptake.
- New market with less available data for setting pricing/ reserving assumptions.

(2)

c) While analysing the experience of the first one year of doing business in the new country, caution needs to be exercised because

- There is not much historical data available to compare this experience against.
- The data collected in one year is very limited to be of much statistical significance for any detailed analysis and decision making.
- This one year could've been an anomaly, either a very good or an exceptionally bad one.
- Since the amount of data collected in a year is likely to be small, dividing this into homogenous groups to study further could lead to very small number of data points in each cell, impacting the credibility of the results.
- Even if we can calculate key KPIs such as frequency, severity, loss ratios, etc, we may not have a benchmark to compare it against for this developing insurance market.
- Results of experience study of the first year may not be valid or applicable to future years, since volume and business mix will develop significantly with time.
- Given it is a nascent insurance market, the understanding about products maybe poor, this could lead to more people withdrawing or not renewing. Assumptions based on more financially aware customer base in a developed country may not hold in this market.

(5)

d) Features of travel insurance that differ from other general insurance products

- Very short-term products, usually only for as long as the trip.
- All policies would not be of the same duration.
- They are mostly non-renewable policies. All business is therefore new business.
- No renewal premiums or discounts. Even if a policyholder repeatedly buys the same

company's travel policies, the trips would be different – destinations and duration.
- Specialised distribution channels – travel agents, tour operators, airlines, etc.
- Policies are sold bundled with travel packages/ airline tickets.
- UW is usually minimal compared to other non-life products such as health/ medical, motor insurance.
- More prone to adverse selection – people who are more likely to experience a loss are likely to buy. Given the ease of buying and minimal underwriting procedure, travel insurance can be prone to adverse selection.
- Purchasing is made easy, simple forms on aggregator or travel websites.
- Packaged products unlike other non-life business, less customizable. They also include non-insurance assistance/ services.
- Smaller premiums – absolute amounts, because of the short duration of trips.
- As a class of business, it is more susceptible to geopolitical and foreign exchange risks. (travel bans, currency fluctuations) compared to domestic property, motor, etc.
- More competition and price sensitivity – easy to shop around for travel policies on various channels and do a quick price comparison.

(10)

e)
- Travel insurance policies are very heterogenous.
- Policies will have different

i. Duration
ii. Destination
iii. Number and profile of travellers
iv. Mode of travel, activities during the trip (leisure/ business/ etc)

- It would lead to an increase in administrative complexity – issuing, underwriting, grouping and pricing as well as claims handling.
- At present, aggregator or travel websites are key distributors and the data input they require from customers is minimum. To have a fully customized policy, much more data would be required, increasing the time to purchase and altering customer experience significantly.
- Premium calculations would also become more complicated, due to the customisation. Allowing customisation would make it incredibly difficult to group policies, since each requirement would be different.

(5)

f) Some of the challenges while pricing for travel insurance would be

- Data quality
    i. Data from policyholders is usually collected from various third parties/ distribution channels.
    ii. Travel policies are usually sold bundled with tickets or tour packages and very little information from buyers is collected.
    iii. The distributors collect and process data in different ways.
- Grouping

i. For pricing, we often need to group data into homogenous cohorts.
ii. In travel policies, forming these homogenous cohorts is very challenging. If we group by destination, the age of travellers and duration of trip would vary widely in such a group. Likewise, if we group by trip duration, the destination or purpose of travel would be different.
iii. For reserving, claims are mostly grouped into loss year cohorts, however within these, all kinds of claims – medical expense, baggage loss, etc are grouped together.

- Exposure/ Nature of Risk

i. Determining the exposure is not straightforward, and depends on destination, number of travellers, their ages and purpose of travel.
ii. Risk varies with purpose of travel – business or leisure. Some trips may include adventure sports, where risk of injury and medical expenses claims could be higher.
iii. Some countries/ destinations could be riskier than others, and this can also change over time.

- Premiums

i. Premium earning patterns can vary greatly depending on the mix of policies of different duration.
ii. It is not easy to determine unearned premium – policies can be purchased well in advance of the actual trip and there is no stipulation of how early this can or can't be.
iii. Since premiums are received from the third parties that sell the product, they may be received with a lag.

- Claims

i. Claims are often handled by the distribution channel through which the policy is sold.
ii. The data received for pricing and reserving would be the data collected from the policyholders for claim processing.
iii. Quality of data received from different channels could vary in level of detail and formats.

(12)

g)

- The product is niche, and the company could benefit from the positive branding that it receives for partnering in a highly publicised event.
- The event is organised in such a way that a hole that normally takes 5 chances should be achieved in one. Since this is a very rare event, the probability of occurrence is small and therefore is insurable.
- With specialised and niche covers, the company maybe getting ahead of competitors.
- Since the number of such events will be small and the cover is bespoke, the complexity in setting up the product may not be much.
- On the other hand, there will be no historical information available on the frequency

of payouts in such cases with the company.
- They may lack the experience to price such covers.

(5)

h) The details required to price this cover would be:

- Difficulty level of the designated hole in the course – how many times this hole was achieved in one shot.
- How many participants do they expect.
- How many of the participants are professionals.
- The details of the prize – the car's value.
- History of such events these organisers have conducted – how many in total and how many had a winner.
- The number of chances each player gets.
- How many of these players have won a similar event.

(4)

i)
- Since the cover is very specific to the event, first understand the terms and conditions of the event and the proposed policy wordings.
- Collect as much information as possible from the organisers about the history of similar hole-in-one contests.
- If the company has had previously sold similar products, the claims experience would be available.
- Past experience may need to be adjusted to reflect the characteristics of the current contest. (Number of players, the distance of the targeted hole, etc, may be different).
- Since golf is a popular sport, publicly available sources such as newspaper articles, websites about the sport would also have statistics. If sufficient data is not available with the event organisers, look for such alternate data sources such as news or sports websites that report about similar events. This could help validate assumptions on frequency of this occurrence.
- Expert opinion can also be sought on the difficulty level, frequency of winning such a contest from golf clubs, coaches and players. However, this may come at a cost which also needs to be factored into the expenses!
- Arrive at frequency assumption based on data from the organisers, past experience and external sources.
- Claim amount is the value of prize is already determined at the start of the event.
- A frequency severity approach to pricing could be used to derive the pure premium.
- This will then be loaded for expenses and profit to arrive at the premium to charge the event organisers.

(10)

j)
- The past contests have had a different target hole which could've been closer or more distant than the current. Closer holes would presumably have been easier to hit in one shot.
- The frequency of wins in previous events with closer targets would therefore be expected to be higher than the current event, while for more distant targets the frequency of wins would have been less.
- If there are events with similar target holes, the frequency of those can be assumed to

be a benchmark.

- The frequency assumption can be derived based on data and adjusted and validated either using external information about contests with 140-yard holes or using expert opinion.
- Likewise, the profile of players in past contests would have been different. If there are more players, the chances of someone winning are higher.
- However, experience level of players also matters.
- We need to ascertain if the number of professional players has increased or decreased to be able to adjust frequency up or down respectively.
- The player's record of hitting a goal in one shot needs to be factored in as well. If there are fewer or more players who have been successful than in previous contests.
- We assume that the players get the same number of chances as previous rounds. If they get more turns, the likelihood of having a winner increases.

(5)

[60 Marks]

Q.2)

a) Issuers:

- National Governments
- State/ local governments
- Corporates
- Supranational authorities – World bank, Asian Development bank, etc

(2)

Investors:

- Banks
- Insurers
- Other financial institutions
- Corporates
- Retail investors
- Asset managers
- Pension funds

(3)

b)

- Diversification
- Maybe geographic if the issue is from a large multinational/ foreign government/ supranational body,
- Companies may have net zero/ ESG targets that can be met through these
- Offsetting their own emissions
- If issuers are governments/ supranational bodies, then there is an additional layer of security
- Companies may want to refinance their existing debts that they may have borrowed for existing green projects.
- Ethical reasons/ genuine concern for the environment
- Regulatory stipulation
- Reputation/ positioning in the market that they support the environmental cause

(5)

c) Green bonds be suitable investments for life insurance companies because

- They are medium to long term instruments that would match the term liabilities of a life insurance company more closely.
- These green bonds are most likely to be issued by governments, large corporates, supranational organisations like the World bank, ADB etc. Hence, they would have the backing of these bodies that make them more secure.
- Returns of these bonds would be linked to the project that they finance. If these are infrastructure projects, then that would be a good match for liabilities as well as come with a certain degree of security.
- The issue in this example is in the local currency, hence that would match the liabilities as well.
- The company needs to comply with the global policies of its corporation/ parent company and green bonds will fit that purpose.
- It helps build reputation as a socially conscious/ aware company that does something for the society.
- Diversification – the company mostly hold investments in equity and debt. This could add the benefit of diversification.

(5)

d) Reasons for the CFO's statement:

- This is a new and evolving market. Not much available history for accurate pricing.
- Regulations in this space are evolving.
- As of now, not many standards exist around green bonds. Hence different issues and issuers may have different features, that makes comparison difficult.
- There is not much clarity in what constitutes "green investments" – so a large number of varied options exist for the money raised in the issue to be invested in.
- There is less transparency about how the funds raised are used compared to wind or solar energy companies or companies that produce this equipment.
- Reporting requirements for issuers have not yet evolved and mostly on a voluntary basis. This makes it difficult to assess how secure or safe the investment is.
- Since it’s a new instrument in the country, there will be no secondary market, hence.
- Determining a spot price may be very difficult.
- Liquidity will be very limited.
- Equities are traded more often and determining price is easier.
- Liquidity in the equity market is higher and exiting maybe less problematic.
- Rating agencies may also not be able to provide a reliable credit rating to every issue because of the lack of information on a relatively new product.
- Investors would need to rely on the credit rating of the issuer as a proxy and this may not be truly reflective of a particular green bond.
- Expertise in the equity trading field is available compared to green bonds.

(5)

e) Opportunities and Risks of the 3 options:

Option A:

- Since the state government is issuing the bonds, credit risk associated would be low.
- If the central government backs the state government with guarantees, then this would further reduce the credit risk
- Revenue from the eco-tourism facility is expected to pay the coupons and capital repayment on this green bond.
- Tourism is increasing in recent years, and revenues may appear promising in a coastal region offering eco-tourism options.
- However, it is a developing country and eco-tourism options are expensive. Therefore, local demand maybe lower and the revenues may depend on foreign demand.
- Tourism can be impacted by other uncertainties such as geopolitical events, natural catastrophes and economic conditions that would determine demand. Over the term of the bond, the levels of tourism expected may not be realised or sustained.
- There is risk that the revenues generated from this venture are not sufficient to meet these payments.
- There could be construction delays, other roadblocks that could delay the project. Until it is operational, no revenues will be received.
- In the event that revenues from the project fall short of expectations, can the state government service this debt with any other income streams?
- Although the tourist resort is being advertised as eco-friendly, tourism generally contributes to pollution, and ecological degradation. Especially in sensitive coastal zones, activities like snorkelling, diving and boat traffic can harm the ecosystem. Therefore, although it is advertised as a green investment, the impacts may not all be protecting the environment. This could lead to lower incomes due to mitigation measures or clean-up costs, lawsuits, and negative publicity in later years.

Option B:

- This option has the lowest level of credit risk among the three, since it is issued by the national government.
- The plan to invest in green energy facilities offers clarity on the purpose that the money raised will be put to.
- Electricity is a basic need and hence demand will never drop to zero!
- A minimum charge will be collected from citizens for electricity even, if it's subsidised by the state, hence there will be some revenue generated.
- There could be construction delays, other roadblocks that could delay the project. Until it is operational, no revenues will be received.
- Cost of setting up these plants may exceed the estimated amounts, which will reduce the profits from the project in the initial years.
- The government may have to pay bond holders from other sources until all plants are operational at full capacity and they generate revenues.
- If the government plans to build plants state by state, and if West state is the first, since the per capita income is lowest here, they may offer the citizens low-cost electricity and hence the revenues collected maybe very small.
- In situations where the revenues are less or received later than estimated, the government needs to identify and earmark other sources to service this debt to green bond holders.

Option C:

- This option is riskier compared to the other two in terms of the issuer being a corporate rather than the government.
- The airline appears to be a prominent international operator and so must be profitable, with a good credit rating.
- There is not much clarity on how much of the money raised will go into infrastructure and how much into research.
- There is also no clarity om what this green infrastructure investment is, where it is located, what would be the revenue it would generate, etc.
- The infrastructure investment is likely to generate a stable income compared to the aviation R&D.
- With R&D, there is no certainty if the invention is likely to be successful, adopted and then produced at scale to generate any significant revenue.
- There is no guarantee that there will a successful invention/ innovation out of the R&D investment and in what time frame this would be achieved. Even if there is a successful invention, it would take many years to establish its safety in a sector such as commercial aviation. There is no certainty that this would be within the term of the bond.
- The airline industry's profits are highly dependent on a number of factors such as oil prices, inflation and general economic conditions, geopolitical events. Since the green bonds are likely to be medium to long term, any of these factors can affect the performance of the company impacting the ability to service this green bond debt.

(20)

[40 Marks]

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