

# Actuarial Practice and Control I (APC 1)

## Notes

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### Contents

Background Knowledge: Insurance Products .....	2
General Insurance .....	2
Personal Cover.....	2
Business Cover.....	4
Life Insurance .....	4
Superannuation.....	6
Health Insurance .....	6
Demographic.....	<b>Error! Bookmark not defined.</b>
General Insurance Notes .....	7
Aim 1: Actuarial Control Cycle.....	7
Aim 2: Professionalism .....	9
Aim 3: Environment.....	11
Aim 4: Regulations.....	<b>Error! Bookmark not defined.</b>
Aim 5 Features and Risks .....	<b>Error! Bookmark not defined.</b>
Aim 7: Risk Assessment Framework.....	<b>Error! Bookmark not defined.</b>
Aim 8: Product Design .....	<b>Error! Bookmark not defined.</b>
Aim 9: Appropriate Models.....	<b>Error! Bookmark not defined.</b>
Life Insurance Notes .....	<b>Error! Bookmark not defined.</b>
Aim 6: Enterprise Risk Management (ERM).....	<b>Error! Bookmark not defined.</b>
APC 1 Miscellaneous LI Questions.....	<b>Error! Bookmark not defined.</b>
Investment Notes.....	<b>Error! Bookmark not defined.</b>
Overview of investment markets .....	<b>Error! Bookmark not defined.</b>
Investment decision making framework .....	<b>Error! Bookmark not defined.</b>
Investment Risk.....	<b>Error! Bookmark not defined.</b>
Asset Classes .....	<b>Error! Bookmark not defined.</b>
Valuation and Security Selection.....	<b>Error! Bookmark not defined.</b>
Investment Products.....	<b>Error! Bookmark not defined.</b>
Asset Allocation Models .....	<b>Error! Bookmark not defined.</b>

## Background Knowledge: Insurance Products

### General Insurance

**Short tail: insurance** policies for which claims tend to be settled quickly between when the policy starts and when it is settled

eg. travel insurance - pay for medical cost, lost property, flight cancellation and temporary accommodation)

**Long tail:** insurance where the claims typically take a long time to settle between the event and the claim or claim and finalise (or may even take a long time to emerge in the first place)

eg. Medical malpractice involving bodily injury which may go through the courts and the injury is chronic and never heals so there is a stream of income.

**Risks:** volatility risk, uncertainty risk, risk of extreme events, and super-imposed inflation (affect long tail), model risk

### Personal Cover

Products	What does it cover	Target Audience
<b>Home and contents Insurance / House owners / Householders</b>	<ul style="list-style-type: none"> <li>Cover the cost associated with rebuilding, repairing, replacing damage (branch drop down) and loss resulting from fire or theft (cash, jewellery), natural disasters such as storm, lightning, earthquake, meteorites, flood, household items, and some public liability</li> <li>Covers you and your family members, but not for friends or visitors unless their names are on the policy.</li> <li>Residual risk: pay excess under policy (first \$1000 you pay), insurer fails, coverage is insufficient, find alternative accommodation – inconvenience, lost of personal photos.</li> <li>May have caps for various items and consider paying extra premiums for jewellery, artworks or other valuable contents. (due to moral hazard)</li> </ul>	<ul style="list-style-type: none"> <li>Lower income householder who cannot afford to replace their contents as house is typically the largest asset where total or near-total loss would be devastating</li> <li>Good for renters or home owners. Renters can have low-cost renter's insurance policies as the possessions are not covered by the landlord's policies.</li> <li>In particular seniors with no further earnings to rebuild and house would be a large part of their wealth.</li> <li>Cover valuable assets in their house.</li> <li>Suburbs with high crime rates, forestry.</li> <li>Retirees who have lost income producing capacity making more difficult to replace their largest assets. They may have also accumulated many assets in their house throughout the years compared with someone younger.</li> </ul>
<b>Travel insurance</b>	<ul style="list-style-type: none"> <li>Covers for medical expenses from personal injury or illness during travel, loss of goods, luggage theft and disruptions to travel plans.</li> </ul>	<ul style="list-style-type: none"> <li>Long distance travelling for personal or business or if you are unfamiliar with the country.</li> <li>For seniors, urgent medical interment or flights cancelled is</li> </ul>

		<p>important. Moreover retirees are more likely to travel.</p> <ul style="list-style-type: none"> <li>• Purchase travel insurance as soon as paid for your trip as it may then cover for unused travel and accommodation in the event you must cancel your trip due to a covered event such as illness or a natural disaster.</li> <li>• Short tail</li> </ul>
<b>Lenders Mortgage protection insurance (LMI)</b>	<ul style="list-style-type: none"> <li>• On default of mortgage, the insurer makes up for any shortcoming when the property is sold</li> </ul>	<ul style="list-style-type: none"> <li>• Credit risk</li> <li>• People with low capital purchasing a house and funded through mortgage by the bank. The bank requires it before signing on the mortgage.</li> </ul>
<b>Consumer Credit Insurance</b>	<ul style="list-style-type: none"> <li>• CCI covers your payments in the event of death, permanent disability or loss of income due to injury, illness or involuntary unemployment.</li> <li>• CCI may also include merchandise protection cover, which covers damage, loss or theft of merchandise purchased with the loan product. It can also include stolen credit card cover, which provides a lump sum benefit if your credit card is stolen.</li> </ul>	<ul style="list-style-type: none"> <li>• Credit risk</li> <li>• something happens to you that affects your ability to meet your credit repayment.</li> <li>• the insurer pays the money to the lender, not to the consumer</li> </ul>
<b>Comprehensive motor Insurance</b>	<ul style="list-style-type: none"> <li>• Includes Compulsory Third Party, Third Party Property Insurance, Fire, Theft, Insurance. Cover your car and property as well as others. Some covers extras on car such as alloy wheels, sunroofs and custom sound systems.</li> </ul>	<ul style="list-style-type: none"> <li>• Accident risk</li> <li>• Expensive vehicle.</li> <li>• Household with cars as CTP is compulsory by government regulations</li> <li>• Many companies offer discount to seniors as have generally better driving records and less exposure to risk due to less driving.</li> </ul>
<b>Compulsory Third Party (required by law)</b>	<ul style="list-style-type: none"> <li>• provide compensation to other people injured or died in a motor vehicle accident caused the a negligent driver except the driver, including other drivers, passengers (in your car and other vehicles), pedestrians, cyclists and motorcyclists and anyone hurt as a result of the accident.</li> <li>• CTP insurance does not cover damage to car or property, theft, vandalism, natural disaster as fire,</li> </ul>	<ul style="list-style-type: none"> <li>• Owner of motor vehicle must necessarily have CPT cover in Australia.</li> </ul>

storm, flood, earthquakes

## Business Cover

Products	What does it cover	Target Audience
<b>Public liability insurance (PL)</b>	<ul style="list-style-type: none"> <li>Covers the legal and medical costs associated with incidents that occur on business premises and property due to negligence.</li> <li>Usually contain excess, limit under policy as well as per-claim limit.</li> <li>Does not cover for hazardous or criminal actions.</li> </ul>	<ul style="list-style-type: none"> <li>Business to protect own assets if sued by patrons, clients, customers</li> <li>In certain public events and facilities, it is compulsory and is checked through a licensing authority</li> <li>If you have to visit clients. (but cover by firm)</li> </ul>
<b>Professional indemnity insurance</b>	<ul style="list-style-type: none"> <li>Covers for liabilities (legal or damages payable) that may be incurred during one's performance in services to clients (such as a consulting professional) where the client suffers a loss after following your professional advice or as a result of receiving your service.</li> </ul>	<ul style="list-style-type: none"> <li>Business to cover for the employees/Personal.</li> <li>In the Code of Professional Conduct for Actuaries, a certain level of professional insurance is compulsory for those who provide actuarial advice (clause 5).</li> </ul>
<b>Product liability</b>	<ul style="list-style-type: none"> <li>Covers for damage or injury that you might cause to another business or person by your product or service.</li> </ul>	<ul style="list-style-type: none"> <li>A manufacturer of products, sell or distribute, or repair products or import products into Australia which has a high probability of causing harm.</li> </ul>
<b>Worker's compensation (required by law) / Employer's liability</b>	<ul style="list-style-type: none"> <li>Provides cover to workers suffering from illness, injury or disease arising from their employment which results in medical and treatment costs and loss of income, income replacement benefits.</li> <li>Residual Risk: caps, partial protection of income</li> </ul>	<ul style="list-style-type: none"> <li>Business to cover for the employees which is compulsory to protect injured workers</li> </ul>

## Life Insurance

**Life Insurance** - contingency dependent to termination or continuance of human life

### Risks:

**Provider:** Longevity, Mortality, Interest rate risks, inflation risk, investment risk, lapse rates, Asset liability risks (large reserves for endowment and Wol), Guaranteed value, expense risk, duration mismatch risk, reinvestment risk, changes in policyholder behaviour (lapse), antiselection risk

**Consumer:** Longevity, Mortality, Interest rate risks, inflation risk (payment cannot sustain its purchasing power), investment risk (flexibility of choosing), lapse rates, default risk, Liquidity risk

(lump sum vs annuity), Taxation (legislative risk), health risk (retirees can have sudden change in health that result in a sudden need of funds which a fixed annuity does not provide)

Products	What does it cover	Target Audience
<b>Whole of life [Traditional]</b>	<ul style="list-style-type: none"> <li>• Provides a lump sum on the death of the insured throughout life (guarantee return).</li> <li>• Premiums generally increase each year as you get older.</li> <li>• Have a surrender value - represents a reasonable return on premiums paid (unlike term insurance)</li> <li>• Relatively large reserves required.</li> </ul>	<ul style="list-style-type: none"> <li>• Financial security and protection to surviving family members or beneficiaries.</li> <li>• More attractive to those who wish to be covered for life than for term insurance. However, premium starts off being higher.</li> <li>• cover for funeral costs</li> <li>• pay off mortgage and other financial obligations that have been left by the insured behind</li> <li>• take care of your estate planning needs</li> <li>• cover for other extra expenses your family might need, like child care</li> <li>• provide a reserve for the remaining spouse should he or she decides not to work anymore.</li> </ul>
<b>Endowment insurance [Traditional]</b>	<ul style="list-style-type: none"> <li>• pay the sum insured on death or on survival to the end of the policy term (maturity value)</li> <li>• Endowments typically have high monthly premiums — the shorter the endowment term, the higher the premiums</li> <li>• Have surrender values</li> </ul>	<ul style="list-style-type: none"> <li>• A way of saving and funding for an expense such as college savings for a child while having some insurance: guaranteed return on a guaranteed date as long as you make the fixed monthly payments.</li> <li>• If just focussed on saving a pure endowment is better as some of the premiums are going to buying insurance. If you focus on insurance, a term life insurance is better especially for healthy people.</li> </ul>

## Superannuation

Products	What does it cover	Target Audience
<b>Superannuation</b>	<ul style="list-style-type: none"> <li>Employers contribute 9.25% of their employees' salary into a chosen super fund on their behalf.</li> </ul>	<ul style="list-style-type: none"> <li>Employee contribution is attractive for higher income earners due to lower tax on superannuation profits.</li> <li>Salary sacrifice not suitable for low income earners unless they want the government co-contribution.</li> </ul>

## Health Insurance

Products	What does it cover	Target Audience
<b>Medicare</b>		<ul style="list-style-type: none"> <li></li> </ul>
<b>Private Health Insurance and extras</b>	<ul style="list-style-type: none"> <li>Hospital and medical costs not covered by Medicare: dental fees, optical, physiotherapy and ambulance service, private hospital cover</li> <li>Hospital cover covers the cost of hospital accommodation, theatre fees, medical and surgical charges. It does not cover doctors fees</li> <li>May have annual limits to the overall claims and excesses to protect against moral hazard.</li> </ul>	<ul style="list-style-type: none"> <li>Not suitable for younger audience who are fit and earning lower salaries who are not required to pay the Medicare surcharge.</li> <li>Higher income earners required to pay the medicare surcharge if they do not have private health insurance.</li> <li>People with younger children as children are more accident prone, and have weaker immunisation systems and parents prefer to select their own consultant and reduced waiting time for treatment.</li> <li>People who do not wait for a long time on waiting lists.</li> <li>Older people may require comprehensive cover due to potentially more health complications.</li> </ul>
<b>Hospital cash</b>	<ul style="list-style-type: none"> <li>Paying a fixed amount for each day the insured spends in hospital</li> </ul>	<ul style="list-style-type: none"> <li>Liquidity risk</li> <li>Elderly who expect to stay in ward for sometime when they are admitted to hospital</li> </ul>
<b>Long term care insurance</b>	<ul style="list-style-type: none"> <li>Covers the cost of assistance with the needs of everyday living</li> </ul>	<ul style="list-style-type: none"> <li>Frail aged</li> </ul>

## General Insurance Notes

### Aim 1: Actuarial Control Cycle

#### 1. What is the analytic cycle

Specify time horizon: annual cycle

1. Specify the problem
  - Clarify the problem as most of the time clients do not exactly know what they want. The need to synthesise
  - Understand the underlying concepts of the problem
  - Identify the stakeholders.
  - Consider the context and environment operating in
2. Solve the problem
  - Build model for particular problem
  - Understand the model such as the assumptions, limitations, inter-relationships.
  - What is the solution to financial problem. What is the results and is it able to project uncertain events over long time horizon.
3. Model
  - What is the problem to be solved. This should drive model selection and not the other way around.
  - The available data. Any outliers. Will the data set be discontinued. What is the time period of data collection.
  - The assumptions made
  - Who is the stakeholder. . How easy to communicate to the stakeholders.
  - Interrelationships. What are the parameters and how they relate to each other.
  - Assumptions inherent in the model and how they reflect reality. Eg. iid errors, independent of claim size and claim numbers, negative dependent variables, is the future going to continue like the past.
  - Materiality.
  - Iteratively build the model. Models need to be continuously updated to reflect changes in the environment and circumstances - new assumptions (feedback loop).
  - Set up a face-to-face meeting in advance of the presentation to include feedback.
  - Resource available : time and money available to build the model, software packages, computer performance.
4. Monitor, review the problem and create a feedback loop to refine the problem and results.
  - Look at the experience.
  - How does it compare to the model results and model assumptions
  - Sensitivity testing, consult and ask clients for feedback
  - adjust the premiums
  - Communicate the result clearly and concisely to the stakeholders; communicate uncertainty.
  - periodic reviews of the situation; regular timely reviews, or as a result of particular occurrence

## 2. Surrounded by the analytic cycle is the professional cycle

1. Professionalism
  - more than adhering to the CoC, standards, laws, but also communication, corporate governance and peer review.
  - Give a good understanding of risk appetite, circumstances and goals
  - Communicate risks especially the downside.
  - May also give guidelines for action if particular triggers.
  - Conducted with integrity and professionalism. Give value to clients
  - Convey uncertainty to clients as required by Code. Best done by presenting scenarios to demonstrate range of outcomes.
  - Communicate reasons for change
  - Judgement and Experience of actuary
2. Governance
  - ERM - consistent with risk appetite set by the board
  - Internal compliance
  - Compliance with standards and APRA requirements
  - periodic reporting
  - did it pass the regulator and relevant laws.
  - check that he is keeping to the plan as well as updating the input assumptions
3. Environment
  - check what is happening in the market and with competitors.
  - good knowledge of surroundings - investment opportunities
  - legislative changes
  - economic factors
  - suppliers
  - Investment outlook, future sales of various products
  - policyholder reasonable expectation
4. Implementation
  - give clear guidelines, ensure he understands, follow up over time
  - Update systems.
  - Consideration of different stakeholders
5. Risks
  - Consideration of risks and tackling such risks

## Aim 2: Professionalism

### 1. Why do we do peer review

- Definition: Peer Review is a constructive evaluation by a person (or persons) of similar professional standing to assess whether work has been carried out consistent with appropriate standards of competence, relevance and clarity as well as adherence to professional standards or any requirements the client/firm has set.
- Consider the task as a whole and review methodology, assumptions, processes, conclusions, scope fulfilment, in accordance with relevant standards/legislation, missing anything, reasonable results.
- Hope to get a better product. The peer reviewer is in a position to check for inconsistencies, make suggestions and provide feedback. By incorporating their input, this aims to enhance the overall outcome.
- Good risk management tool. Could reduce client dissatisfaction, potential legal action. We do not want to have clients suing us due to a negligent error. By having a peer review, it reduces the chance that a negligent error is made.
- A formal requirement such as PS315 – standard on external peer review of general insurance liability valuation: “having carried out the review as described in this report, nothing has come to my attention that would lead me to believe that the Primary Actuary’s Specified Valuation results are unreasonable.”

### 2. Skills of an actuary

- Skills of actuaries best applied to long term problems because they are better at dealing with uncertainties and variability by thinking about uncertainties in terms of distributions than point estimates.
- Desire to reduce financial risk; pricing, profitability, solvency
- Use of probability and statistics; use past data to understand future uncertainties by deducing trends and consequences from models.
- Time value of money
- Classification of risks, risk management
- Necessity to make assumptions
- Provide advice to decision makers

### Having inadequate data to do the job

- Communicate and disclose the concerns in a report notifying of the data issues and limitations. (clause 7)
- Required to act in the best interest of policyholders not only the principal. Using incomplete data may lead to the incorrect decision which is an impact on policyholders not getting their claim if reserves are incorrectly priced. (clause 4.1)
- Does the time constraints impact the ability to provide impartial advice due to not having the resources to consider all the relevant information (clause 4.4.2)
- A consideration of the relevant professional standards and relevant regulations and laws and where despite this lack of information, would it still be possible using very conservative assumptions to satisfy the requirements.

- Discuss with another actuary on their opinion of the data limitations. (clause 4.2.4)
- The material of note having the data and whether a best estimate could still be calculated.

### **Sample letters**

Dear Client,

You requested that I advise you on .... Having thought through some of the issues and considerations, here are my observations /what I like to say.

Please let me know if you would like more information.

Yours sincerely,

APC Consulting Pty Ltd

### **References**

- Advantage of Code (page 55 UAM)
- Legislated role of actuary (page 57 UAM)
- Considerations when using other's models (page 62 UAM)

## Aim 3: Environment

### Present economic trends

1. Low unemployment in comparison to overseas: 6.1% [lower levels of worker's compensation as people find it easier to find a job so less inclined to claim]
2. Low interest rates: cash rate is 2% [effect liability valuation where actuarial and accounting standards requires discounting at the government bond rate]
3. Strong Investment markets: ASX200 is around 5700 [Don't have to charge more premiums]
4. Low inflation at: 1.3% first quarter of 2015
5. Weak Australian dollar: 77 cent against US means higher exports than imports, increased holidays to Australia, less outside travelling means demand for travel insurance decrease.
6. Increasing Property prices [adult children to stay at home for longer]
7. Low Crime level. [Affect home contents insurance].

Petrol Prices: 125.9 cents per litre [Affect how much people drive and traffic so affects exposure of motor insurance and CTP]