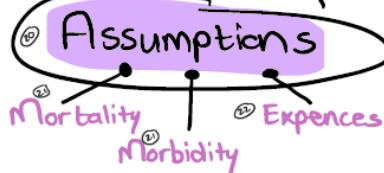
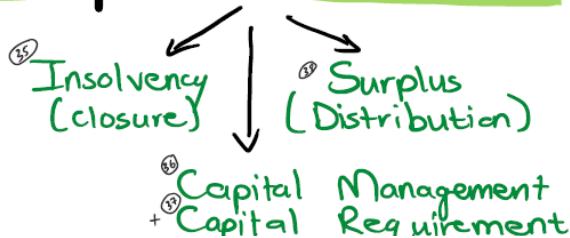


Risk Governance

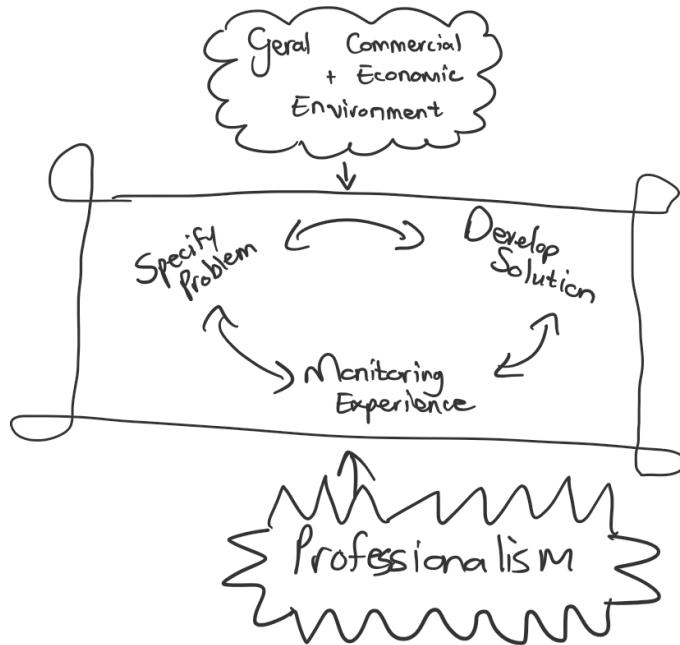
- ⑩ Risk Identification + Classify
 - ↳ Financial Products + BS's
- ⑪ Accepting Risk
- ⑫ Measure + Reporting Risk
- ⑬ Risk Transfer (RI; ART)
- ⑭ Risk Controls



Report Results



Monitor Experience



- ① General Commercial and Economic Environment
- ② Specifying the Problem
- ③ Developing the solution
- ④ Monitoring experience
- ⑤ Professionalism.

General commercial and economic environment

The company should investigate

- the competition,
- the current stage in the underwriting cycle
- any trends in this market sector such as demand for insurance
- the nature of the claim risks, including claim inception and disability annuity vs the business currently sold
- the size of the claims
- the economic outlook
- the risk profile of self-employed policyholders
- The needs of shareholders must be identified, and their interests understood
- The needs of policyholders must be identified, and their interests understood

- o competitor monitoring so as to be able to respond quickly to competitor actions.

Key assumptions will include:

- Claims inception rates
- Longevity and recovery after disability
- claims inflation
- volume / mix of business
- expenses (including commission) and expense inflation
- lapse rates (i.e. likely renewal rates)
- investment returns.

- The model should be dynamic, ie assumptions should interact.
- in order to understand the likely range of results, use sensitivity testing ...
- ... and scenario analysis
- The implications of the results on all stakeholders should be considered

Specifying the problem

- The company's primary goal is to set premium rates to achieve a certain profit criterion ...
- ... and/or market share
- The risks to the company of selling this product need to be identified and analysed and mitigated.
- Key risks of the new venture include:
 - o lack of data (as existing data on employed lives morbidity is likely to be of limited use)
 - o ... making it difficult to ascertain likely claims experience
 - o not selling enough business, particularly as this is a niche market
 - o that the competition react to a new entrant and alter their strategy.

Monitoring the experience

- Once the company has started to write business it should carefully monitor actual vs expected experience for all of the assumptions mentioned above...
- ... and investigate the cause of any departure from expected experience.
- The monitoring of experience should be carried out more frequently in the early lifetime of the new product
- Any issues need to be spotted early and acted upon
- The results of the monitoring should be fed back into the earlier stages of the cycle,
- ... for example, the solution may need to be redeveloped, in terms of waiting periods or exclusions
- assumptions might need to be changed
- premium rates may need to be revised if they are inadequate
- The insurer should also monitor competitors' reactions as this may influence the assumptions.

Professionalism

- Ensure that any relevant guidance, for example regarding premium rate adequacy, is adhered to.
- Communications (verbal and written) must be clear
- Ensure that TCF principles are adhered to

Developing the solution

- The company needs to choose appropriate models to determine premium rates and assess the profitability of these rates.
- A profitability model can be used to show the impact of a particular set of premium rates and experience assumptions on the profitability of the contract and on the business as a whole.
- To overcome the risks identified in the problem specification,
 - o the company could use industry data (if any) or reinsurer's data / assistance
 - o well-targeted advertising to reduce the risk of insufficient sales

S

Specifying the problem

- This additional provision is necessary to make sure that LifeCo can meet all policyholder obligations...
 - ...as well as represent an accurate view of the company's financial condition.
- This provision would represent the expected net present value...
 - ...of the additional future liabilities arising as a result of death claims as a result of Covid-19 ...
 - ...that were not anticipated as part of the current pricing basis.
- This would require an understanding of the impact of Covid-19 on the current mortality bases employed in the business.
- The nature of this impact likely to be complex and significantly different by factors such as...
 - ...age and duration...
 - ...socio-economic status, and...
 - ...vaccination status.
- Consideration may need to be given to what allowance should be made for new business in the near future...
 - ...given that pricing/underwriting changes would take some time to implement.
- Longer term changes to new business underwriting requirements might also be required...
 - ...which have an impact on the mortality basis used for new business...
- ...as well as the marketability of LifeCo's products.
- This may include different rates for vaccinated vs. unvaccinated clients.

Developing the solution

- Assumptions would be required for the increase in mortality rates as a result of Covid-19
- Observed in-house mortality experience can be used for this....
 - ...but given that it is still early in the pandemic, the data might not be reliable.
- Published mortality data/statistics/research can also be considered.
- For the calculation of the initial provision the current valuation can be used as a starting point...
 - ...and rerun with the amended mortality rates...
 - ...to gauge the increase in the present value of net future liabilities on existing business.
- At each future valuation date, this exercise would need to be repeated...
 - ...but using the latest adjustments for Covid-19.
- It is likely that the company would also incorporate some scenario analysis/stress testing...
- ...to see the extent to which the company can still be solvent under very adverse future scenarios.
- These scenarios must take into account the knock-on effects of the pandemic to e.g. asset values, investment income, business volumes.
- For new business, the company may need to gear themselves for more frequent changes to the pricing basis...
 - ...to incorporate the latest trends and experience as it emerges.
- It is also likely that the adjustments to the bases may not necessarily be the same for pricing and for solvency purposes...
 - ...the latter likely being more prudent.
- The team would need to engage with the product development team...
 - ...as well as take into account sales/marketing considerations...

Monitoring the experience

- LifeCo should endeavour to try and flag/identify Covid-19 related deaths as accurately as possible.
- Emerging mortality experience should be compared to what was expected...
 - ...on the basis of a no-Covid scenario.
- This would assist in understanding the excess deaths being experienced.
- This monitoring will feed back into the assumptions being made for new business...
 - ...as well as the provisions that were raised.
- New business volumes should be monitored carefully.
- While an increase in new business might be expected given the increased awareness of dying...
 - ...significant increases might be indicative of anti-selection.
- If new business is significantly down, ...
 - ...this may indicate that the basis is too prudent...
- ...or the underwriting approach is being poorly received.

General commercial and economic environment

- It might be possible to try and learn from the approaches other companies might have taken to raise provisions for Covid-19 related deaths.
- The markets may be comfortable with a conservative approach...
 - ...especially if widespread provisions for all life insurers are being observed.
- It would be important to consider the approaches competitors are taking with regard to changes to their new business processes/pricing...
 - ...for example, whether they will be loading unvaccinated applications.
- One would also need to be heed any legal requirements of governments.

Professionalism

- One should consider any new guidance already issued by professional bodies on Covid-19 provisions.
- Existing guidance notes and/or regulations around valuations may also include instructions around discretionary provisions.
- It is likely that this provision would require significant interaction with various professionals...
 - ...such as medical experts, accountants, statutory actuaries, company executives and shareholders...
 - ...and the team should behave professionally in all these situations, recognizing that more than one valid opinion may exist on a topic.
- Given the sensitive nature of vaccination status...
 - ...there is significant scope for conflict of interest between various stakeholders, ...
 - ...which should be managed carefully/objectively.
- Given the abundance of emerging information on this topic...
 - ...there would be a requirement to remain up to date with the latest research.
- The approach taken to set/review these provisions should be thoroughly documented...
 - ...and peer reviewed if possible.

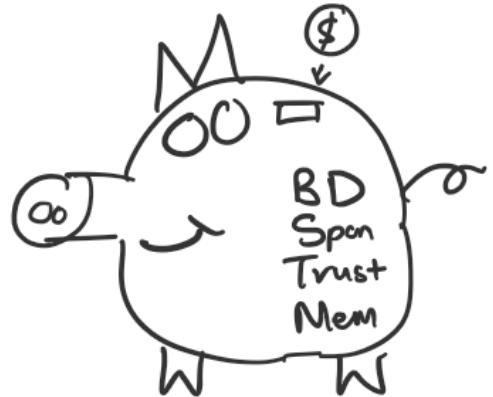
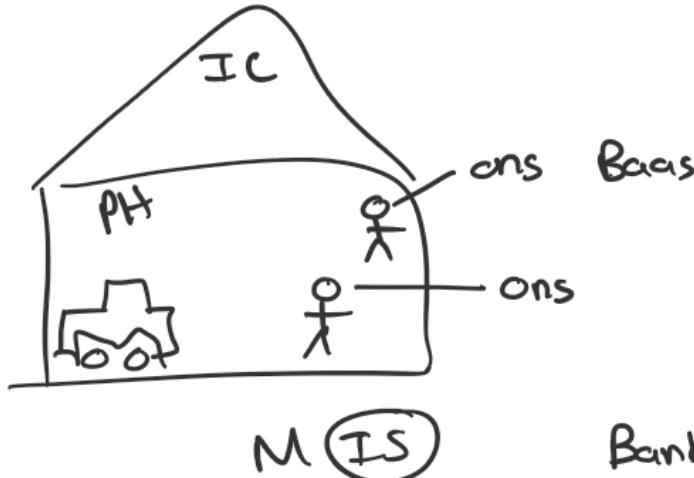
Chapter 1 - Actuarial Advice

Saturday, 04 February 2023 10:36



- R I F
- ↳ Indicative
- ↳ Factual.
- ↳ Recommendations

For Stakeholders



Bank.
+
Acc. Holders.

- Sponsor/contributing employer
- Members (active, deferred and current pensioners)
- Members' dependants
- Non-member employees
- The government
- Regulators
- Auditors
- Tax authorities
- Trustees

An actuary may be in a position to give advice on:

- General insurance arrangements such as asset insurance
- The company's retirement benefit scheme design...
- ...and/or funding levels of existing funds (or contributions required)
- Advising on appropriate medical scheme options for employees
- Group life and/or disability arrangements
- Valuing the company e.g. in a merger/takeover situation
- Assisting with setting up risk management frameworks
- Building projection/predictive models for stochastic features of the business
- Incorporating more data in the company's decision making
- Assisting with evaluation of project appraisals (or business plans)
- Investments of any free capital/assets
- Efficient use of capital
- Expense investigations.

The policyholder (current and future)

- Will the enhancements still be meeting the needs and interests of the policyholder?
- Are we only enhancing benefits for new policyholders or also existing ones?
- What will the response be if only new policyholders benefit?
- Will the amendments be seen in a negative light e.g. more difficult to claim?

The broker

- The distribution channel is crucial for the success of this product.
- Do they understand the changes...
- ...and are they comfortable marketing this new product to their clients?

The regulator

- Are the changes within any regulatory requirements?
- HappyLife will need to make sure any roll-out is still viewed as fair to the customer.
- Are there any implications to the company's solvency position as a result of the upgraded product?

Shareholders

- Will shareholders be expected to provide more capital as a result of the initiatives?
- How will their future return on investment be influenced?
- How will the changes affect the company or embedded value for example?

Board of directors / Executive management

Actuaries / Statutory actuary

- Do we understand the impact the change will have on the company's balance sheet / solvency position?
- What new assumptions (or basis changes) are required to quantify and calculate the risks involved?
- How will any existing valuation processes need to be changed?

Staff

- HappyLife would need to understand how processes (e.g. admin, claims, underwriting etc.) would change as a result of this change.
- Any additional training and the cost of such would need to be considered.

Reinsurers

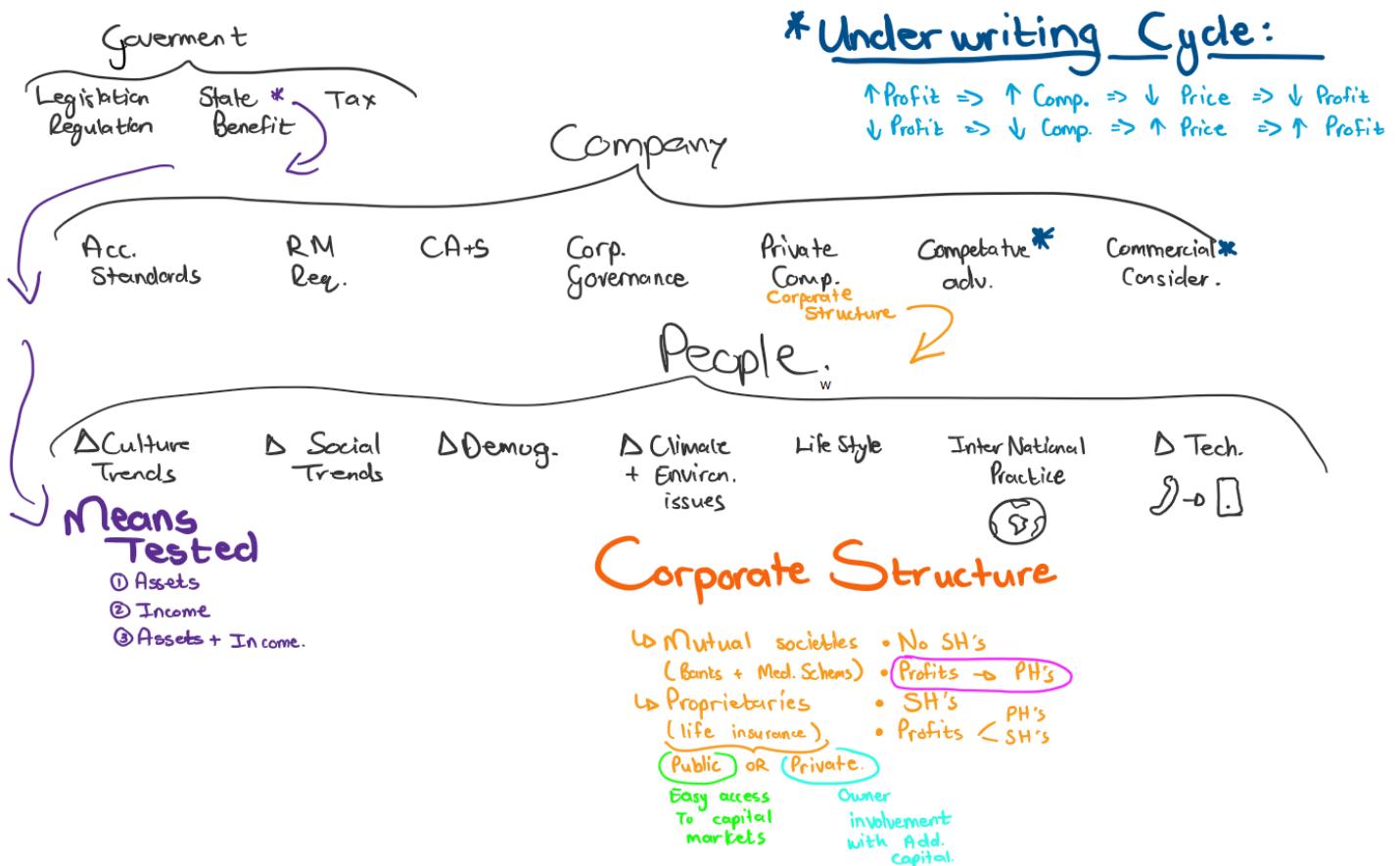
- The extent to which existing reinsurance treaties will need to be changed would have to be considered.
- Are there any additional requirements imposed by the reinsurer as a result of the changes?
- To what extent was the reinsurer included in the discussions to upgrade and amend?

Systems providers

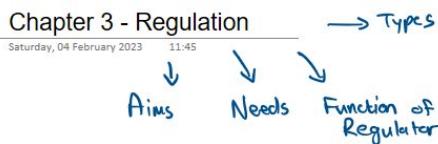
- The company would need to understand whether the existing admin system can accommodate the changes...
- ...or how long and expensive it would be to do so.

Competitors

- How will the competition react if news of the changes reaches the market?
- Care needs to be taken to keep developments confidential....
- ...in case competitors can steal the idea and bring it to market faster.



- Mutual societies are usually set up to address welfare of a defined group of people
- Stated otherwise, a mutual generally only starts for altruistic (not for profit) reasons.
- Capital required to establish the mutual society is borrowed and repaid as profits emerge
- There are no shareholders for a mutual...
- ...and hence all future profits (after paying the loan) belong to policyholders
- In the case of a public listed company, capital is raised on financial markets – e.g., by issuing shares.
- Shareholders for a listed company may receive dividends from profits which emerge
- Since there is no requirement for shareholder returns...
- ...benefits for a mutual should be better than a listed company.
- However, here is no opportunity for a mutual to raise capital in financial markets
- This means that capital intensive products are harder to launch and may be more expensive than for a listed company
- In a mutual society, inherent conflict between the need to reserve profits to build an estate to ensure long-term solvency and the promise to maximise benefits for the members

Aims:

- ⇒ Confidence in Fin. System
- ⇒ ↓ Fin. Crime
- ⇒ Protect Consumers
- ⇒ Correct Market ineff.
- + Promote eff. + orderly Markets

Costs: < Direct Costs
Indirect Costs.DC: \$
1 Compliance for firms
2 Administering Reg.IC: ⚡
1 ↓ Self-Reg.
2 ↓ Prod. innovation
3 ↓ Competition

- !! 4 Alter consumer behaviour - may be given a false sense of security of own actions.
5 Undermine Prof. Resp.

Needs:

- ⇒ Maintain Confidence
 - ↳ JSE Req.
 - ↳ Industry Compensation Schemes
 - ↳ Orderly + Transparent Mkts.
 - ↳ Capital Adequacy
 - ↳ Competent + Integrity.
- ⇒ Deal with info. asymmetries
 - ↳ Chinese Walls
 - ↳ Cooling off periods
 - ↳ Whistle Blowing
 - ↳ Education (Disclosure)
 - ↳ TLC

Functions:

- ⇒ Influence + Review Gov. Policy
- ⇒ Vetting + Registering Firms/Individuals
- ⇒ Supervise → Prudential Management (Fin. Org)
 - ↳ Conduct (Fin. Org)
- ⇒ Enforce Reg.
- ⇒ Provide info. to Consumers/ Public

Types Reg. Regimes:

- ① Unregulated (None)
- ② Voluntary Codes of Conduct (Industry)
- ③ Self-Reg. (Industry) No Gov.
- ④ Statutory Reg. (Gov.)
- ⑤ Mixed (Org. + Gov.)

Freedom of Action
Outcome Based
Prescriptive.

Most candidates managed to list at least some relevant points, but many failed to provide sufficient points given the number of marks available or make some application to the setting of a defined benefit fund. Some failed to notice the word "list" in the question and would elaborate unnecessarily!

Candidates generally scored well for this question. The setting related to financial markets specifically and hence received comments from an investment perspective to score well. Although the suggested solution is based on the course material, candidates were given credit where appropriate alternative measures were discussed.

- Investment regulation, such as:
 - o Limits on asset class exposure
 - o Liquidity requirements
 - o Prohibition of certain asset classes
 - o Requirement to invest in certain asset classes
 - o Regulation requiring a custodianship of assets
 - o Regulation around matching of assets and liabilities

- Tax regulation around the tax treatment of
 - o Contribution and
 - o Investment returns

- Governance related regulation
 - o Accounting and auditing regulation of the fund's assets.
 - o Regulation requiring regular actuarial valuations...
 - o ...as well as direction on assumptions/approaches to be used in the valuation.
 - o What to do if there is a surplus or deficit.
 - o Board of Trustees behaviour is regulated – fiduciary duty to act in members' best interests
 - o Regulation requiring them to appoint experts and advisors where there is lack of expertise
 - o ESG related regulation

- Regulation of benefits
 - o Regulation on the size and type of benefits and size of contributions
 - o Requirement for minimum benefits and maximum benefits
 - o Requirement for certain types of benefits to be offered e.g., death, disability
 - o Regulation around pension increases

- Regulation on the fees and expenses which can be deducted
- Regulation around timing of contribution payment and benefit payments
- Regulation if the fund should wind-up
- Regulation around options at retirement – lump sum commuted versus pension
- Regulation around adequate member communication

Capital adequacy

- Regulators would require that financial institutions hold sufficient financial resources to cover their liabilities.
- Financial resources can include capital, cash, liquid securities, credit lines etc.
- Regulation would also require that there are sufficient margins in place to ensure that liabilities can be met in adverse/unexpected scenarios as well.
- The regulator may prescribe methods of calculating such margins...
- ...or allow companies to model it within a prescribed framework.

Competence and integrity

- Regulators would want to ensure that financial practitioners operate with a minimum standard of competence and integrity.
- Individuals may have to prove their competence by obtaining specified qualifications...
- ...or being a member of certain professional organisations.
- Regulators may also want to prevent someone from working in a particular industry or at a certain level...
- ...if they don't meet "fit and proper" requirements.

Compensation schemes

- Regulators may establish compensation schemes...
- ...either funded by the industry or the government...
- ...which provide recompense to investors who have suffered losses.
- These typically cover losses due to fraud, bad advice or failure of a service provider...
- ...and note market related losses (e.g. shares going down in value, because a company underperforms).
- Compensation may be limited to a maximum...
- ...to ensure that investors also retain incentive to consider the financial integrity of providers.

Stock exchange requirements

- Companies listed on the stock exchange will have to fulfil criteria regarding financial stability...
- ...and will have strict obligations around disclosure of financial and other information.
- Regulators will monitor aspects such as the prices at which trades are done and the reporting of trades/deals.
- Regulators will aim to limit insider trading.
- Regulations will be in place to govern issuance of new shares...
- ...as well as takeover bids (or disclosure around acquisition of large portions of shares).

Other protection for investors

- Market regulators will seek to ensure that the market is transparent and orderly...
- ...and provides proper protection to investors.
- This is especially the case for private investors, who might be less well informed than their institutional counterparts

Discuss how the regulatory environment might have an impact on AgriCo's sales processes and contract design.

- The insurer may need to provide detailed information about its products in an understandable form to the regulator upfront.
 - Brokers may need to be approved by the regulator...
 - ...e.g. passing certain fit and proper tests.
 - At sales stage, the broker may need to provide certain disclosures to the client...
 - ...as well as abide by standards for giving advice...
 - ...that clearly takes into account each prospective policyholder's circumstances and needs.
 - Regulator may require certain compulsory covers...
 - ...e.g. compulsory motor third party insurance on vehicles.
 - There might be a cooling-off period...
 - ...allowing a new client to cancel his product with no penalty.
 - There may be treating customer fairly principles to adhere to in the market, which might have an impact on:
 - o The contract wording to make sure it is clear and understandable...
 - o ...and not having contract terms that are unfair.
 - o Processes involved to cancel/amend the policy or switch providers
 - The regulator may have a standardised policy design, with insurers only competing on price.
-

The main benefits produced by regulation arise from the successful achievement of its aims, which are primarily to:

- *correct perceived market inefficiencies and promote efficient and orderly markets...*
 - ...in which investors can trade confidently and fairly...
 - ...such as by ensuring investors have adequate information
 - *protect consumers of financial products ...*
 - ... against losses due to fraud or mismanagement...
 - ... but not against losses arising purely from market movements.
 - *maintain confidence in the financial system*
 - ... so that it continues to operate effectively for the greater good of society.
 - *help reduce financial crime...*
 - ... by vetting firms and individuals authorised to conduct certain activities
 - ... and by enforcing regulations,...
 - ... investigating suspected breaches...
 - ... and imposing sanctions.
 - Regulation may also aim to *limit the likelihood of failure of major financial institutions...*
 - ... and to reduce the likelihood of the government or central bank having to step in as lender of last resort.
-

The main costs involved are:

- the direct costs that arise from administering the regulation
- complying with it.
- These will normally be passed on ultimately to the end investor/policyholder...
- ... in the form of higher charges / dealing costs.

There are numerous indirect costs, such as:

- an alteration in the behaviour of consumers, ...
- ... who may be given a false sense of security ...
- and a reduced sense of responsibility for their own actions
- an undermining of the sense of professional responsibility among intermediaries and advisors ...
- ... who may have less incentive to provide the best advice for the investor/policyholder
- a reduction in consumer protection mechanisms developed by the market itself...
- ... as the providers of financial services know that consumers are protected by regulation against mismanagement or insolvency
- reduced product innovation...
- ... due to the additional costs of complying with the regulatory requirements
- reduced competition...
- ... again, due to the additional constraints imposed by the regulations on the providers of financial services|

Benefits

- ↳ X Time X Event → Unpredictable [Car Accident]
- ↳ X Time ✓ Event [Death]
- ↳ ✓ Time ✓ Event → Immediate [Retirement]
- ↳ ✓ Time X Event [Term Assurance]

- ↳ Accumulation [Savings]

Provision of Benefits.

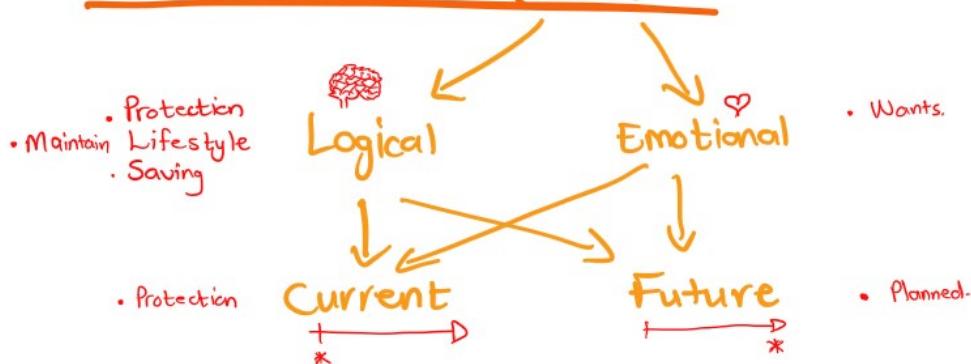
- Detail later {
- ↳ Social Security [State Benefit]
 - ↳ Financial Products + Contracts [Insurance]
 - ↳ Schemes [Benefit] [Pension] [Investment] ↑ Value
 - ↳ Transactions [Derivatives]

Insurance Principles:

- ① Insurable Interest
- ② Pooling of Risk
- ③ Pre-Funding

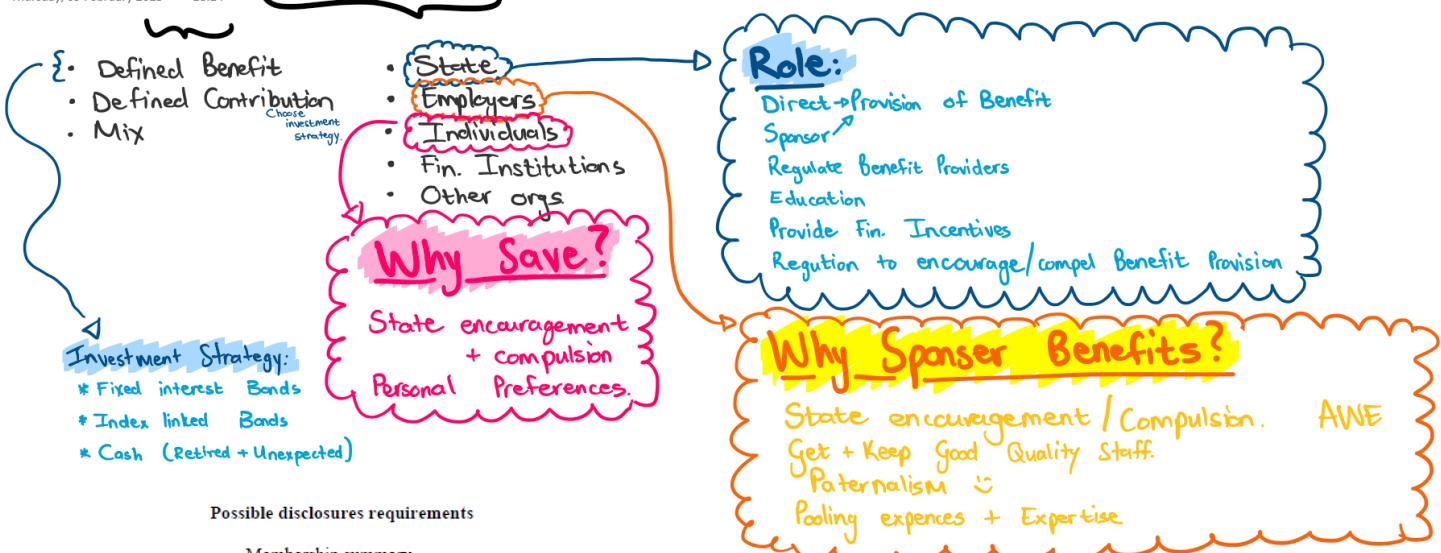


Customer Needs



Chapter 5 - Benefit + Provider Overview

Thursday, 09 February 2023 18:14



- A DB scheme offers a fixed benefit at retirement which is related to final salary and years of employment
- A DC scheme accumulates an investment portfolio on behalf of a member...
- ...and the value of this portfolio is then used at retirement to secure an income
- The value of the retirement benefit and income in retirement is therefore far more predictable for a DB fund
- Both funds will offer some form of cover for death-in-service and disability benefits to members and the dependents of employees who pass away before retirement and while working for the company
- This benefit may be insured by the fund in the case of the DB fund, whereas the DC fund will purchase this cover outside of the fund on a group basis
- DC members will receive the accumulated value of their fund account when leaving the employer before retirement.
- In the case of a DB fund the withdrawal benefit may be limited to a return of member contributions (plus some interest)
- Contributions made by members are fixed in the case of both DB and DC funds (although members may have a choice in a DC fund)
- Contributions made by employers are also fixed for a DC fund, but are variable for a DB fund depending on the solvency position of the fund
- The expenses associated with a DB fund are likely to be higher as a valuator needs to be appointed and actuarial valuations regularly undertaken.

Investment Types:

- ↳ With Profit
- ↳ Without Profit
- ↳ Unit - Linked
- ↳ Index Linked.

Group Products:

- * ↳ Pure endowment
- * ↳ Term Assurance
- * ↳ Endowment Assurance
- ↳ Whole of Life
- * ↳ Convertible / Renewable Term Assurance.
- * ↳ Immediate Annuity
- * ↳ Deferred Annuity
- ↳ Income Drawdown
- ↳ Investment Bond.
- * ↳ Income Protection Insurance. \$\$\$ when can't work
- * ↳ Critical Illness Insurance. \$ when critical ill (Defined)
- ↳ Key Person Cover (Very important)
- ↳ Long-term care Insurance. + (Nurse)

Group life insurance

- This would provide a lump sum pay-out on the death of an employee.
- It is essentially a one year term assurance.
- The lump sum may be a function of the income/salary of the employee.
- Premium might be expressed as a percentage of salary or as a rate on the cover provided.
- In some cases employers will also give a smaller, separate, amount as funeral cover.

Group critical illness

- Provides a cash lump sum on the diagnosis of a “critical illness”...
- ...such as heart attack, cancer, stroke or some other serious illness/condition/diagnosis.
- In some cases it may accelerate (reduce) any death benefits that might become payable later.

Group income protection insurance

- This provides an income for the employee...
- ...in the event that he/she suffers an event/illness that renders them unable to work.
- Income will be provided up until the employee recovers and can return to work...
- ...or until retirement.
- In some cases a waiting period at the beginning of any claim may apply...
- ...since an employee might have access to paid sick leave (for example)

Group lump sum disability (TPD)

- This provides a lump sum on becoming disabled and unable to work.
- Can be defined with reference to the insured's ability to perform their occupation...
- ...or with reference to standardised functional impairment criteria.

• **Mutuality** Vs. **Solidarity.**

Underwriting:

- ↳ Full Medical UW. Exclude pre-existing at sole stage
- ↳ Moratorium UW. Exclude pre-existing for a period.
- ↳ Medical Hist. Disregard No exclusions
- ↳ No worse Terms \geq
- ↳ Continued Personal Medical Exclusion. =

Products:

Group:

- * ↳ PMI
- * ↳ Critical illness Cover
 - ↳ Long Term Care Ins.
- * ↳ Cash Benefits
 - * • Gap Cover
 - * • Personal Accident Cover Lump sum injury
 - * • Major Medical Expenses Lump sum Surgery
 - * • Hospital Cash Plan Hosp. Only ↳ min stay ↳ Pays > 1 day

Private medical insurance

- This cover aims to indemnify the policyholder from the cost of medical treatment.
- The treatment is usually provided by a private service provider.
- The extent to which indemnity is provided is usually governed by a set of scheme rules.

Critical illness cover

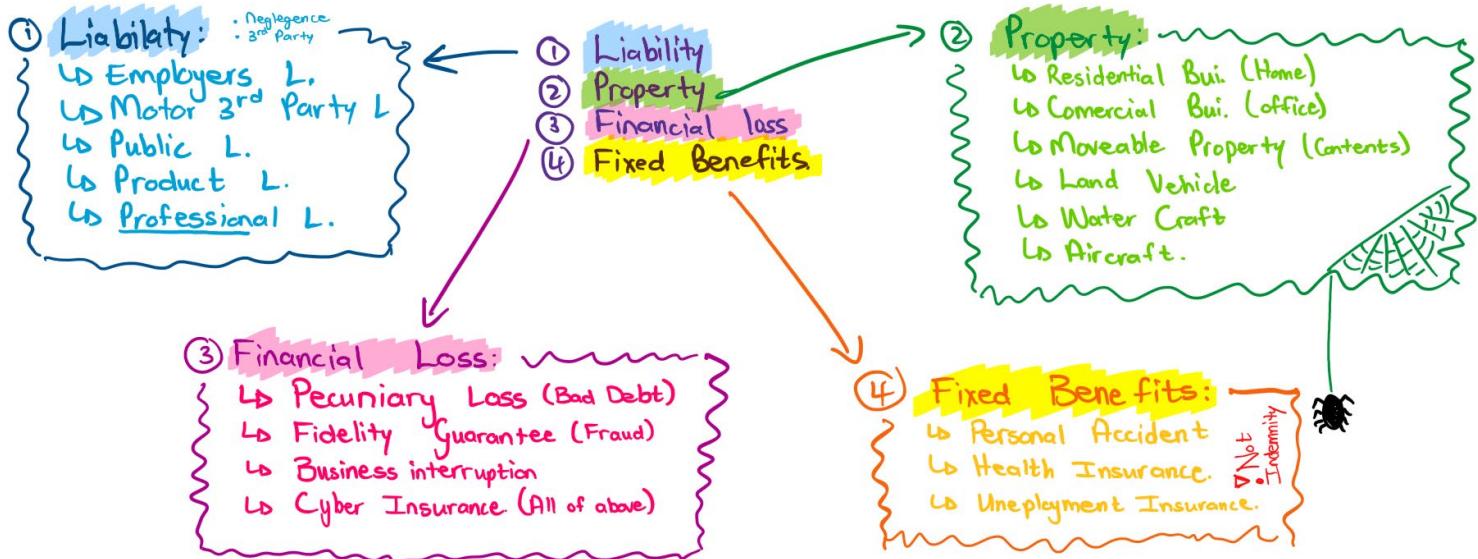
- Also known as dread disease, trauma, serious illness cover
- Benefit is typically a lump sum...
- ...payable on the diagnosis of an illness...
-or on the occurrence of a defined event...
-as defined/include in the contract wording
- The lump sum is not necessarily related to the financial consequences of the event occurring.

Long term care

- These are amounts payable in the event of an individual requiring ongoing nursing or personal care.
- It can be pre-funded or an immediate needs policy.
- ADLs (activity of daily living) usually used to define claims.

Cash benefits

- Provides a cash pay-out on the occurrence of a defined event.
- Can take the form of major medical expenses...
- ...Hospital cash plans...
- ...medical shortfall (gap) cover...
- ...or personal accident cover.

**Outflows:**

- Expected Motor vehicle claims related outflows
 - o including seasonal variations in claims
- Reinsurance premiums
- Other business related expenses
 - o For example, administration costs, underwriting costs
 - o broker commissions
 - o Business development costs – marketing, new business
 - o Regulatory levies
- Tax payments

Inflows:

- premiums from members
- Policyholder co-payments (excesses)
- Reinsurance recoveries
- Investment incomes should be modelled separately...
 - ...from investment proceeds from asset sales and maturities

Description

- Public liability indemnifies the insured...
- ...against legal liabilities...
- ...arising from some form of negligence...
- ...that resulted in death/injury to a third party,...
- ...or damage to property belonging to a third party,...
- ...other than those liabilities covered by other liability insurance products (e.g. product liability or professional indemnity).
- In many cases, legal costs will also be covered.

Structure:

- ① Investment (9+10+11)
- ② SYSTEM T (9+10+11)
- ③ Behaviour (Economic Factors) (12)
- ④ Valuation (13)

Security
 Yield Real vs Nominal
 Yield Expected Return. $[E(r)]$
 Spread (Volatility)
 Term
 Exchange Rate
 Expenses
 Marketability
 Tax

Investments:

- ① Money Market Instruments
- ② Bonds
- ③ Equity
- ④ Property
- ⑤ Other → CIS's
 - Derivatives
 - Overseas investment
 - Emerging Markets.

① Money Market

- Call Deposits
- Notice Deposits
- Term Deposits
- Treasury Bills
- Local Authority Bills
- Bills of exchange
- Commercial Paper

S - Depends on issuer. Mostly Good.
 Y - Nominal - short term Rates. Real - Short term follow inflation.
 Y - Risk Free ∵ Lowest $E(r)$
 S - Low Volatility
 T - Short Term (< 1 year)
 E - Minimal
 E - Possible if overseas Currencies.
 M - Great + Unquoted except call/term Deposits.
 T - Income Tax

Behaviour:

Economic Factors → Short term interest (i)

- Monetary Policy: Central Bank set Repo Rate (Direct)
- Inflation (j): $j \uparrow \Rightarrow i \uparrow$
- S+D: Economy $\downarrow \Rightarrow D \downarrow + S \uparrow \Rightarrow P \downarrow \Rightarrow i \downarrow$

Gov. Policy Objectives → i

- Control j low $i \Rightarrow$ High j if ① Money: i is low $\Rightarrow D \uparrow \Rightarrow$ More Money \Rightarrow Price $\uparrow \Rightarrow j \uparrow$
 ② Demand pull: i is low \Rightarrow Economy $\uparrow \Rightarrow D \uparrow + S \downarrow \Rightarrow$ Price $\uparrow \Rightarrow j \uparrow$
- Maintain Currency. ① i is low $\Rightarrow D \downarrow \Rightarrow P \downarrow \Rightarrow$ Currency \downarrow
 $\text{Cost Push: } i \text{ is low} \Rightarrow D_t = P_t \Rightarrow \text{Currency } \downarrow \Rightarrow \text{Cost } \uparrow \Rightarrow \text{Price } \uparrow = j \uparrow \Rightarrow i \uparrow$
- Economic Growth: i is low \Rightarrow Cost Borrowing $\downarrow \Rightarrow$ Investments Spending $\uparrow \Rightarrow$ Economy \uparrow

Why Temporarily if other Assets look

- ↳ ↑ interest Rates
- ↳ Economic Resession
- ↳ Domestic Currency ↓
- ↳ General Economic Uncertainty,

② Bonds

Discounted CF

- Gov. Fixed interest
- Gov. Index linked
- Corporate Fixed interest
- Corporate Index linked.

Gov:

- S - Very good (No Risk) * Index-linked. Real known unless Assumptions Change
 Y - Nominal known unless Assumptions Change. Real unknown. Nominal Unknown.
 Y - Low Risk \rightarrow Low E(R)
 S - Volatile for longer bonds (Supply & Demand)
 T - Short (< 5 years); Medium (5-15); long (> 15); Undated.
 E - Low
 E - Possible if overseas
 M - Excellent
 T - Income + Capital Gains Tax.

Corp:

- S - Depends. Less than Gov. Bonds
 Y - Higher than Gov. Bonds. since More Risk
 Y - $E(R) > E(R)$ of Gov. Bond.
 S - More Volatile than Gov. Bonds.
 T - Same
 E - Same
 E - Same
 M - Less Marketable.
 T - Same.

* Yield Curve Theories

- ① Expectations Theory
- ② Liquidity Preference Theory
- ③ Inflation Risk Premium Theory
- ④ Market Segmentation.

Economic Factors \rightarrow Conventional Bonds

- ① Inflation: $j \uparrow \Rightarrow Y \uparrow$
- ② STIR(i): $i \downarrow \Rightarrow Y \downarrow \Rightarrow P \uparrow$
- ③ Institutional CF: $\uparrow CF \Rightarrow \uparrow D_{Bonds}$
 $\Rightarrow \uparrow P = \downarrow Y$
- ④ Fiscal Deficit: $S_{Bonds} \uparrow \Rightarrow P \downarrow \Rightarrow Y \uparrow$
- ⑤ Alternative investments.
- ⑥ Exchange Rate: Currency $\uparrow \Rightarrow D \uparrow \Rightarrow P \uparrow = Y \downarrow$
- ⑦ Regulation: $\Delta Reg \Rightarrow \Delta S + D$

③ Equity

- Measurable Key factors of Company.
- Discounted CF (Model with Assumptions)
- Net Asset Value / Share
- Value Added Method

S - Depends. on Stability / Profit / Earnings to Dividends

Y - Real Yield over long Term (loose hedge)

Y → Risk $\Rightarrow \uparrow E(r)$ (Depends)

S - Volatile Dividends + Prices (S & D)

T - Perpetuity.

E - Greater than Bonds, Depends on Marketability.

E - Possible if overseas.

M - Depends on Size and Listed.

T - Income and Capital Gains (Depends on listing).

Demand:

- ↳ Real interest rates and inflation expectation
- ↳ Currency movement expectation.
- ↳ Real level of economic growth
- ↳ Investors Perception of Risk.

Supply:

- ↳ # Rights issues
- ↳ Share Buy Backs
- ↳ Privatisations

Grouped Per industry!

Why?

- ↳ Practical
 - ↳ Effect by similar factors
 - ↳ Info from same source in same format
 - ↳ Can't specialise in all areas
 - ↳ Adds structure to decision process
- ↳ Share Price Correlation
 - ↳ Similar Resources + Input Cost
 - ↳ Supply Same Market \therefore Same Δ Demand.
 - ↳ Same Financial Structure.
 - ↳ Same Δ in Interest rate.

Disadvantages

- Specialising by industry can mean that analysts miss out on companies which are between sectors.
- Some shares may not move with their industries...
- ...or may be influenced by different factors from those the analyst is focusing on. (e.g. company could have a significant overseas earnings base).
- It might require a relatively large number of specialists if many sectors are to be covered.
- Not all companies can be easily categorised.

4 Property

• Discounted CF

- Direct
 - Indirect
- G* *open/closed ended.*
- Pooled Prop. Fund
 - Property Shares
- | | |
|----|---|
| S- | Depends on Tenant. Risk of void + Obsolescence + Gov. intervention. |
| Y- | Real (Hedge) |
| Y- | E(R) ↑ Since ↑ Risk due to Marketability. |
| S- | Volatile over long Term Not short term. |
| T- | Long term |
| E- | Very high |
| E- | Possible if overseas. |
| M- | Very low! |
| T- | Income + Capital Gains. |

S+D

Prime Property :

- location
- Age + Condition
- Quality of Tenant
- # Comparable properties
- Lease Structure
- Size.

- The flats themselves would be valued using a DCF approach
- The departure point would be the current rentals agreements in place
- You would discount the expected rental proceeds from the property
- Allowing explicitly for management expenses and tax – ie net rental income
- One would need to make allowance for expected or agreed rental growth
- Expenses should be split into ongoing maintenance expenses...
- ...plus once-off regeneration/upgrade projects.
- Expected net rental income should then be discounted at an appropriate discount rate
- This discount rate will be calculated based on a risk-free real rate plus margins for property specific factors such as:
 - o Illiquidity of the property (related to property size)
 - o Expected inflation
 - o Voids in rental
 - o Quality of tenant
 - o Quality of building
 - o Alternative uses of the property
 - o Location of the property
 - o General Economic uncertainty/outlook for property market as a whole
 - o Development potential of property/land
- Some of the factors above may also be allowed for in the cashflows themselves, e.g. allowing for vacancies by assigning a probability less than 1 for each cashflows.

Advantages

- A pension fund needs to be able to value its assets on a regular basis (even daily for a DC fund)...
- ...and a (listed) REIT is likely to have daily valuations...
- ...whereas a direct holding in a property will only be valued infrequently.
- The cost of valuing a direct investment in property is also higher.
- Useful for obtaining specialist expertise.
- This is a specialist sector and trustees are unlikely to have time and experience required to run a property portfolio.
- They are an easy way of obtaining diversification.
- A shopping centre is a sizeable investment, and the fund would want to diversify to reduce risk...
- ...which would be difficult for even large funds.
- Some costs of direct investment management are avoided
- Managing a shopping centre is very complex...
- ...and external companies would need to be employed for rent collection, maintenance, security etc.
- Holdings are divisible – a part-holding can be sold.
- If the fund held, for example just one shopping centre it would not be able to realise part of its holding if needed.
- There may be marketability advantages...
- ...since, aside from the poor divisibility, it would probably take a long time to conclude a deal where an entire shopping centre is sold.
- Can be used to track the returns on a specific index (index tracker)
- The fund may just want exposure to property as a sector and this can be achieved by simply investing in an index fund
- In particular the ALM would have modelled the property sector using such index returns, which may be very different to a commercial property portfolio.
- Investing in a REIT provides a strong layer of regulatory protection and governance...
- ...which is appropriate where assets are managed by fiduciaries such as a pension fund

Disadvantages

- Loss of control over investments chosen
- Using a REIT will mean a portfolio of underlying properties chosen by the trust...
- ...which may or may not include commercial property.
- Extra layer of management charges...
- ...since the REIT managers will charge fees for running the fund.
- These fees are more than likely to be economies of scale...
- ...so these fees would be offset against the cost of the fund trying to manage its own property portfolio
- Some taxes may not be able to be reclaimed...
- ...for example a pension fund is likely to be tax exempt on rental income...
- ...yet the rent earned may be taxed within the REIT.
- The income from a REIT may be diluted by the range of properties and fees whereas a higher running yield may be obtained from direct investment...
- ...which would be useful for a pension fund with pensioner liabilities

5 Other

- CIS
 - Open ended → Unit Trust.
 - Close ended → Investment Trust
- Derivatives – Futures
 - Forwards
 - options
- Valuated with no-arbitrage
- Overseas Markets
- Emerging Markets.

Either Indirect:

- Multinational Comp.
- CIS for overseas.
- Derivatives for overseas.

OR Direct.

Consider:

- | | |
|---|--|
| <ul style="list-style-type: none"> • Currency △ • Cost of expertise • Diff. Accounting • Diff. Market Performance => Mis Match • Tax disadvantages • Time delays • Lack of liquidity | <ul style="list-style-type: none"> • Restrictions on Foreign ownership • Additional admin. Functions • Language • Lack of Quality info. • Poorly Regulated Markets. |
| <ul style="list-style-type: none"> – Legislation and regulation – State benefits – Tax – Accounting standards – Risk management requirements, capital and solvency – Corporate governance – Current product/provider landscape – Potential for competitive advantage – Cultural and social trends – Demographics – Technology availability/trends – Investment market – Economic outlook – Disposable income – Environmental issues that could ultimate impact population health – Treatment trends/ Healthcare system – Barriers to entry e.g., language barriers, high initial expenses, poor infrastructure or resources – Distribution channels – Availability of staff resources/skills | |

General Supply + Demand

- **Demand**
 - Investors CF's
 - Investors Preferences
 - Price of other Assets.
 - **Supply**
 - Fiscal deficit + Strategy of finance.
 - Technological innovation
- △ Liabilities
 △ Regulatory / Tax Regimes
 △ Fashion / Sentiment
 △ Marketing
 Investors Education
 Uncertainty of Political Climate.

Expectations theory

- The shape of the real yield curve is determined by economic factors...
- ...which drive investors' expectation of short-term real interest rates in the future.

Market segmentation theory

- The shape of the real yield curve will reflect the relative impact of supply and demand at various durations along the curve.

Liquidity preference theory

- An upward sloping yield curve reflects investors' preferences for less volatile shorter dated ILB's.

iii. Discuss reasons why a real yield curve may be downward sloping.

[2]

iii.

- Investors may believe that short term real rates are expected to decrease going forward.
- Investor demand may be higher for longer dated ILB's.
 - o This is often the case as these bonds are preferred by institutions with long term real liabilities.
 - o Alternatively, investors may have concerns about high inflation over the longer term (possibly due to government policies) making these bonds more attractive.
- Government may prefer issuing ILB's of shorter duration – increasing supply at the shorter end of the curve relative to the longer end.
- The forces of supply and demand (market segmentation theory) appear to be more than compensating for liquidity preference.
 - o Liquidity preference theory suggests that the curve should slope upwards, as long dated inflation linked bonds are very volatile (even when compared with conventional bonds).
 - o Long dated ILB's are also often less marketable.

* Valuation: Consistency Between Assets & Liabilities.

- ↳ Market Value (MV)
- ↳ Smoothed MV.
- ↳ Fair Value.
- ↳ Discounted CF.
- ↳ Stochastic Models
- ↳ Historic / Written up/down Book Value.

- Smoothed market value
- Fair value
- Stochastic model
- Arbitrage value
- Historic book value
- Written up/down book value

Disadvantages

- * Not readily available.
- * Not reflect future CF's
- * Not realisable on sale
- * Difficult to ensure consistency with liabilities
- * Decision between bid/mid/offer
- * Marginal investor position not individual
- * Volatile.

Advantages

- Objective
- Realistic as realisable value on sale.
- Easy
- Well understood + accepted
- Used as comparison.

Market value advantages

- Easily available
- Objective
- Universally understood

Market value disadvantages

- Will be very volatile in the short term relative to value of liabilities.
- Valuation result could change significantly from day to day.
- Yet the intention of the fund and the valuation is to hold the assets over the longer term
- Does not represent consistency with the long-term ongoing value of the liabilities
- May not receive this value in reality – if stale/illiquid assets
- May not be quotes prices available for certain assets
- Will not necessarily consider dealing costs

Discounted income model advantages

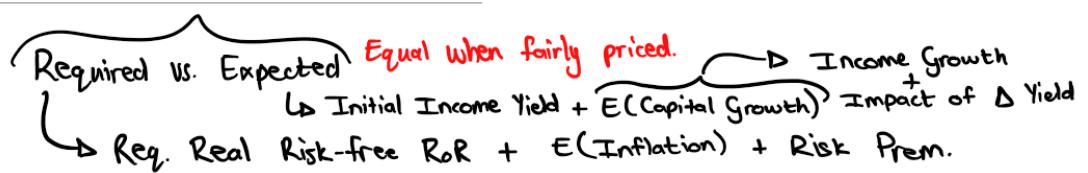
- Reflects the value of the assets if held over the long term
- Easily consistent with value of liabilities
- Can take account of expenses (net discount rate)
- Can adjust discount rate to allow for level of riskiness

Discounted income model disadvantages

- Requires assumptions for discount rates and income projected far into future
- In the case of bonds projecting income will be quite simple,...
- ...but in the case of equities assumptions will be needed for dividend growth.
- Will involve judgement and may incorporate bias
- Different actuaries would place different values on the assets

Chapter 14 - Relationships of Returns on assets

Thursday, 23 February 2023 19:49



- In general, government bonds provide the most secure and marketable fixed interest investment in a particular currency...
- ...and in developed economies they are almost risk free.
- Investors will require a higher yield on other forms of debt that are deemed less secure than the risk-free government bond referred to above.
- The size of the yield margin depends on both the credit (default) risk...
- ... and the marketability of the corporate bond issue.
- A particular bond may have high credit risk due to a low credit rating...
- ...as a result of specific risks associated with the corporate issuer itself
- A particular sector may have high credit spreads...
- ...due to risk (systematic) in that specific sector.
- A corporate bond may have low marketability...
- ...due to small issue size...
- ...or because it is infrequently traded.
- Low marketability introduces additional risk (e.g. liquidity risk)...
- ...which the market will require higher yields for.
- Yield of any fixed interest security is ultimately a function of the price...
- ...and generally there is higher demand for the most marketable and secure bonds...
- ...which increases yields on corporate bonds for the reasons described above already.
- The corporate bond may have features that make it particularly desirable/undesirable to certain classes of investor,...
- ...for example a low and/or infrequent coupon might be unattractive to institutional investors.
- Investors are concerned with post-tax returns,...
- ...so different tax treatment between government and corporate bonds, if applicable, will be reflected in the yield.

Marketability would be increased with the following features:

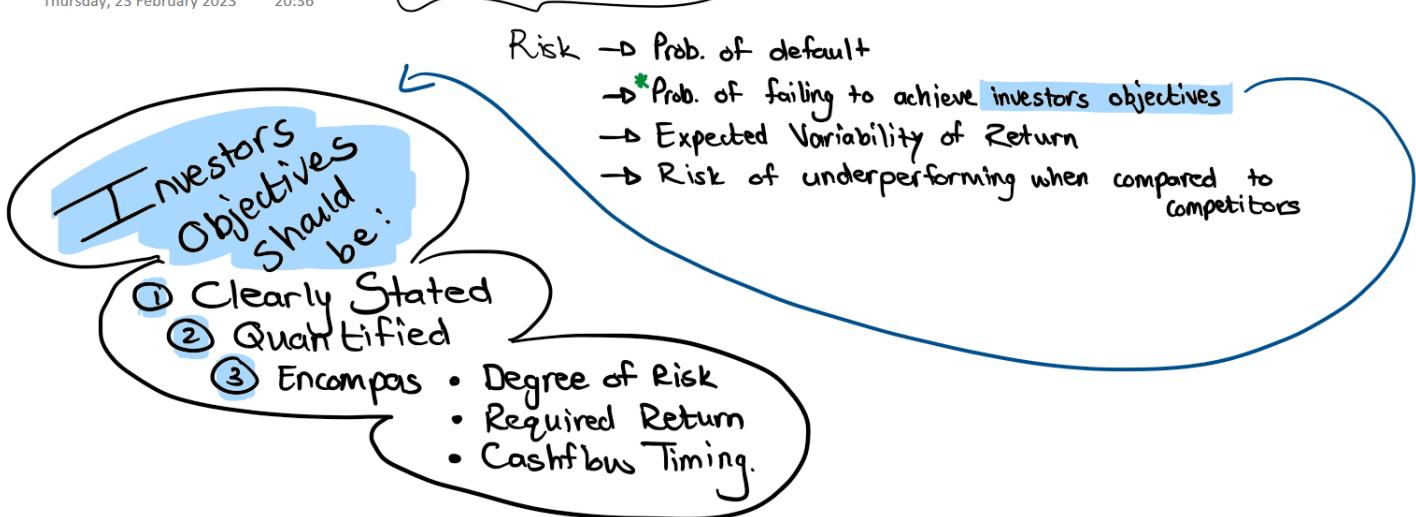
- A larger issue size
- Listing on an exchange...
- ...as opposed to a private placement.
- No options set against the investor...
- ...e.g. no early redemption.
- Options for the investor...
- ...e.g. convertible debt.

Credit risk could be reduced with the following features:

- Collateral/security provided
- Financial covenants e.g. income cover
- Not having prior ranking debt
- Restrictions on further borrowing
- Rights in a technical default
- Restrictions on further borrowing / equity distribution
- Parent company guarantees
- Third party guarantees, e.g. insurance protection
- Shortening the term
- Existence of fixed or floating charges

Chapter 15 - Choosing Investment Strategy

Thursday, 23 February 2023 20:36

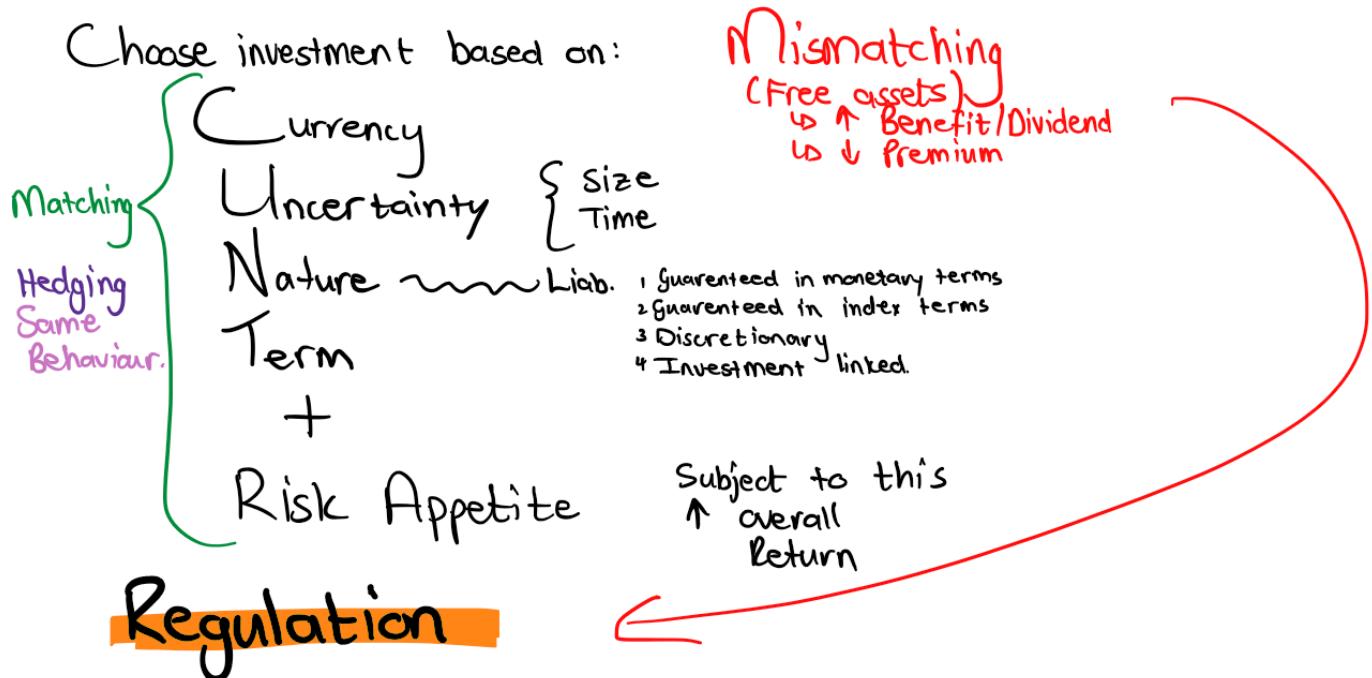


Factors Influencing Investment Strategy: Institution:

1. Existing Liab.'s - Currency
2. - Uncertainty
3. - Nature
4. - Term
5. Tax + Expences ?
6. Statutory / Legal / Voluntary Restrictions
7. Size of Assets (Absolute + Relative) }
8. Expected long term Return
9. Accounting Rules.
10. Statutory valuation + Solvency Requirement.
11. Future Liabilities }
12. Existing Assets Portfolio. }
13. Other funds Strategies
14. Own Risk Appetite
15. Own Objectives
16. Diversification
17. ESG (Environmental, Social, Governance)

Investor:

1. Characteristics of Assets + Liab. + Matching CF's
2. Risk
3. Returns from diff. asset classes
4. Investment Constraints
5. Practicality



- ↳ Restrict type of Asset
- ↳ Restrict Amount of Asset for Solvency
- ↳ Match A-L by Currency
- ↳ Restrict Max Exposure To single counterparty (Diversify)
- ↳ Custodianship of Assets.
- ↳ Requirement to hold x% of an asset class
- ↳ Mismatching Reserve
- ↳ Limit on Mismatching

- The actuary would produce a set of expected liability cashflows by projecting the expected pension payments into the future using mortality assumptions.
- The actuary could produce both nominal cashflows (using an inflation assumption)
- Or real cashflows
- The value of the liability could then be calculated by discounting these cashflows at nominal or real yields respectively

Pure matching

- Under this strategy a flow of income and maturity proceeds could be constructed using a portfolio of bonds and other fixed income assets (money market instruments)
- These income and maturity proceeds would coincide perfectly with the expected liability cashflows
- One could use nominal bonds to construct a profile which matches nominal liability cashflows generated by the actuary
- Or inflation-linked bonds to match the real cashflows
- In the former case the fund would only be able to afford to award increases to pensions in line with the actuary's assumptions
- In the latter case CPI increases could be awarded every year, but no higher increase than inflation could be afforded.

Liability hedging

- Liability hedging involves simply choosing assets which behave in the same way as the liabilities.
- These liabilities are real (pensioners expectations is for increases at least as high as CPI)
- And known in terms of timing and amount
- Hence a liability hedging strategy would likely involve investing in a portfolio of inflation linked bonds of different maturities
- In this way the assets and liabilities should be impacted in the same way (but not to the same degree) by movements in interest rates and inflation

Immunisation

- This involves investing in a portfolio of assets in such a way that the PV of the assets proceeds and the PV of the liabilities are immune to small changes in the interest rate
- This is normally used where pure matching is not possible
- It involves setting up a portfolio of bonds of different maturities
- ...such that the PV of the liability outgo, calculated at the discounted value of the actuary's liability projection, and the PV of the asset proceeds (calculated by discounting the coupons and maturity amounts) from the constructed portfolio of bonds are equal
- The discounted mean term of the asset proceeds must equal the DMT of the liability outgo
- The convexity of the asset proceeds should be greater than the convexity of the liability outgo
- Ideally one would use inflation-linked bonds, and calculate the discounted value of the real liabilities using a real yield curve.

Active vs. Passive

Tactical Asset Allocation }
(Short Term)

- Consider : Expected Returns vs. Additional Risk
- : Constraints
 - : Expences of Switch
 - : Problems of switching large amounts

Active management

- Manager has few restrictions on choice of investments...
- ...perhaps just a broad benchmark of asset classes.
- Manager can make judgements on future performance of specific investments...
- ...in both short and long term
- Expected to yield better returns if market has inefficiencies
- Involves extra costs due to more frequent transactions
- Risk that the manager is wrong

Passive management

- Manager holds assets closely matching those of a specific index or benchmark
- Little freedom to choose investments
- Not risk free as the index may underperform...
- ...or there are tracking errors.

Active advantages

- Opportunity for higher returns
- May be able to construct a portfolio taking liabilities into account

Active disadvantages

- Additional costs
- Fund manager may get it very wrong

Passive advantages

- Predictable performance relative to the index
- Cheaper – lower asset manager fees and no research costs

Passive disadvantages

- Will always underperform benchmark after fees
- Loss of upside potential (if you believe in market inefficiency)

Risk Budgeting

invest based on Risk.

Portfolio ensure security
Achieve long-term Returns

Risk : Strategic - Benchmark doesn't Match Liab's
Active - Individual investor Relative to Benchmarks (BM)
Structural.- Aggregate of individual investment Manages
benchmarks ≠ Total BM of fund

Monitor Investment Performance

- 1 Liab. Structure
- 2 Funding or Free asset Position
- 3 Managers Performance.

Measure Investment Risks

- 1 Tactical Asset allocation risk
 - a Historical Tracking error
 - b * Forward looking Tracking error.
- 2 Strategic Asset Allocation Risk.
- 3 Duration Risk
- 4 Counterparty ; Interest Rate and Equity Market Risk.
- 5 Diversification Benefits.

Measuring Performance

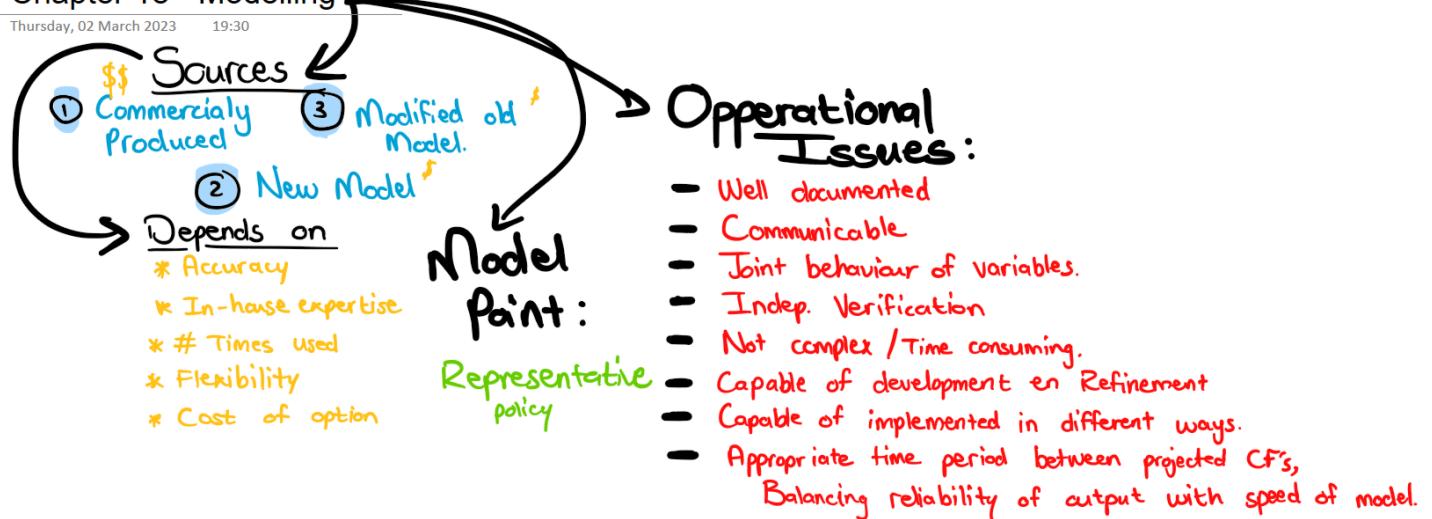
- 1 MWRR
- 2 TWRR
- 3 CIS

- The MWRR factors in all cashflows, including cashflows and withdrawals.
- Assuming the MWRR is calculated over many periods, the formula will place a greater weight on performance in periods where the account size is the highest.
- In this case, if the investor deposits large funds at the beginning of a quarter of under-performance, the MWRR would produce a much lower return...
- ...even if the performance was good over long periods where the funds invested was small.
- Investor deposits and withdrawals are usually beyond a portfolio manager's control.
- Since TWRR is defined as the compound growth rate of 1 over the period being measured...
- ...TWRR isolates the investment actions/decisions of manager...
- ...and does not reward/penalise deposit/withdrawal activity.

Chapter 18 - Modelling

Thursday, 02 March 2023

19:30



Deterministic

Fixed → M → Single

- Ad:
- Easily explicable
 - Clear what is tested
 - Cheaper
 - Easy to design
 - Quick to Run
 - Not 'Blinded by Science'

- Dis Ad:
- Thought to what is tested (Might miss scenarios)

Stochastic

Dist. → M → Dist.

- Ad:
- Complex

- Dis ad:
- Long Run time

- Ad:
- Range of Scenarios Tested.
 - Better quality Results.

NB for
Guarantees!

Use

- Future Financing Strategy (Budget)
- Risk Management
- Assessing Provisions
- Pricing Options + Guarantees



- Sensitivity + Scenario** ^①
② **Goodness of Fit** ^{1;2;3}
- ① Specify Purpose + Key Features
 - ② Obtain + Adjust data
 - ③ Set Assumptions + Parameters (Dynamic linking)
Dist. Corr.
 - ④ Construct model CF's
 - ⑤ Check Accuracy + Model fit.
 - ⑥ Run as many times as Required.
 - ⑦ Output + Summarise Results.

Julie can obtain a model by:

- Buying/using a commercial modelling product
- Reuse an existing model, likely modifying it.
- Creating a new model.

In general, the approach used will depend on:

- The level of accuracy required.
- The expertise that she has in building the type of model required
- Costs of the various options...
- ...compared to the budget available.
 - o In this case, the one man shop that Julie runs might imply that the resources to spend on the model are limited.
 - o Hence developing a new model may be too costly or time consuming.
- The potential to use the model again in future.
 - o Even though the investigation is one-off, a new model could have applications for other work either for this or other clients, which could mitigate the costs.
 - o It may be possible to sell the model to other actuaries or potential users
 - o If the model required is unlikely to have wider applications,...
 - o ...the actuary may take a more simplistic approach to modelling...
 - o ...and combining it with a lot of judgement.
- Whether a high level of accuracy is required
- Desired flexibility of the model
- What type/quality of data the actuary will have access to...
- ...since it is no use to spend huge effort on a model and feed it with poor quality data.

Other considerations

- Of course, professionalism dictates that the standard of work be of an appropriate standard.
- It will also be necessary to make sure that the model is fit for the purpose for which it is being used, ...
- ...and captures all the essential features of the problem she needs consult on.
- If the task is very unique then a new model will likely need to be developed.
- ...especially if a model is being purchased or an existing model is repurposed.
- Julie would need to plan the modelling requirements carefully,...
- ...since significant unexpected challenges/requirements in the modelling may result in the initial approach not being fit for purpose.

{Popia} Big Data

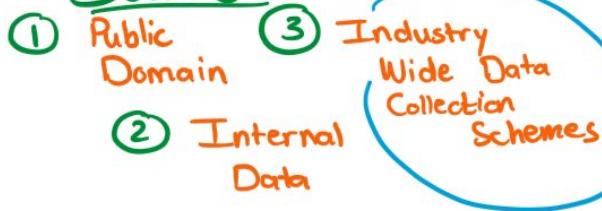
Data Risks

- ↳ Inaccurate
- ↳ Incomplete
- ↳ Insufficient Volume
- ↳ Not Relevant
- ↳ Not Appropriate form
- ↳ Past data might not reflect Future
- ↳ Chosen data groups not optimal.

Good Quality if:

- Complete • Accurate
- Up to date • Consistent
- Level of detail

Sources



Consider:

- Diff. location / socio-economic class
- Diff. Practices (Underwriting, etc.)
- Sales method
- Policies by diff. Companies
- Nature of data.
- Coding of Risk factors

Additional Problems:

- Not Representative of whole Market
- More out-of-date data
- Less detailed and flexible
- Poor Quality.

Data Checks (Assertions)

- ↳ Reconciliate – member / Policy Nr.
- Benefits + Prem.
- ↳ Consistency of asset income data
and accounts.
- ↳ Validity of dates
- ↳ Full deed audit of property
- ↳ Spot checks.

Data integrity

- Ensure basic validity checks on the data.
- Check that the data received from the accounting department ties up with that from the admin department...
...i.e. that the policy did exist and the premium that should have been received.
- Check that the policy count builds up correctly:
 - o in-force at start of the period
 - o + new policies written during the period
 - o - policies lapsing during the period
 - o - policies terminating for reasons other than lapses (e.g. death, maturity)
 - o = in-force at the end of the valuation period.
- This needs to be done for each major product class and underwriting year.
- Check if the results, and raw input, for the report are consistent with that in the previous report.
- Check the data for the report reconciles with that in other reports e.g...
...supervisory returns, published accounts.

When data is not ideal

- ① Insufficient Volume
- ② + Level of detail

Key Factors

- o Use of model
- o Financial Significance of Assumptions
- o Consistency
- o Regulation + Legislation
- o Needs of client

Please Consider these when using Past data :-

- Abnormal fluctuations
- Δ's over time
- Random Fluctuations
- Δ's in data recording.
- Possible data errors
- Δ's in homogeneous groups in Past data
- Δ's in homogeneous groups to which Assumptions apply.

↑ Risk of Contract Design:

- o lack of historical data
- o High guarantees
- o Policy holder options
- o Overhead costs
- o Complexity of design
- o Untested market

- Assumptions relating to the distributions of both the claim amounts...
- ... and claim numbers
- investment return ...
- ...since employers' liability insurance is a relatively long-tailed class of general insurance business...
- ... significant provisions may build up prior to making claim payments
- Expenses on this class of business will be significant...,
- ... particularly claim expenses such as legal fees.
- Commission may or may not be significant, depending on the distribution method
- Inflation assumptions will also be needed...
- ...for both claims and expenses
- Employers' liability insurance is a relatively long-tailed class of business and claims are subject to court award inflation.
- Claims expenses will be subject to inflation of legal expenses.
- Profit margins assumptions.

Claim amounts and numbers

- Statistical methods could be used to fit a distribution to past claim amounts and numbers...
- ...and to solve for the parameters
- Such distributions would need to be adjusted in light of any changes in...
- ... policy cover ...
- ...inclusions and exclusions...
- ...claim limits
- ... underwriting standards
- ... target market.
- If insufficient data exists, then industry or reinsurers' data would be useful.

Investment return

- The investment return assumption will depend on...
- ... the types of assets...
- ...and the mix of assets
- in which the premiums will be invested
- If cash and bonds are used, it will be necessary to project interest rates and bond yields,
- If equities are used, it will be necessary to project equity dividend yields and growth rates.
- Past data (e.g., from relevant indices) may be useful.
- However, economic conditions change over time ...
- ...and therefore, consideration needs to be given to the investment environment that is expected to apply over the future term of the contracts.
- If past data is used, it will need to be modified, to strip out the fluctuations relating to the economic conditions of the time.
- The investment return may need to be netted down for:
 - tax
 - investment expenses.

Expenses

- Expenses could be set by looking at the results from a recent company expense analysis for this product.
- However, if insufficient data exists it may be necessary to use other sources of data, for example:
 - the company's expense data for a similar contract
 - industry data
 - reinsurers' data.
- Any past data will need to be modified for any aspects relating to the expenses which might be significantly different, ...
- ... for example, underwriting or claims administration

Commission

- Rates should be in line with the market for this type of contract, ...
- ...then just assume these actual levels in the pricing basis

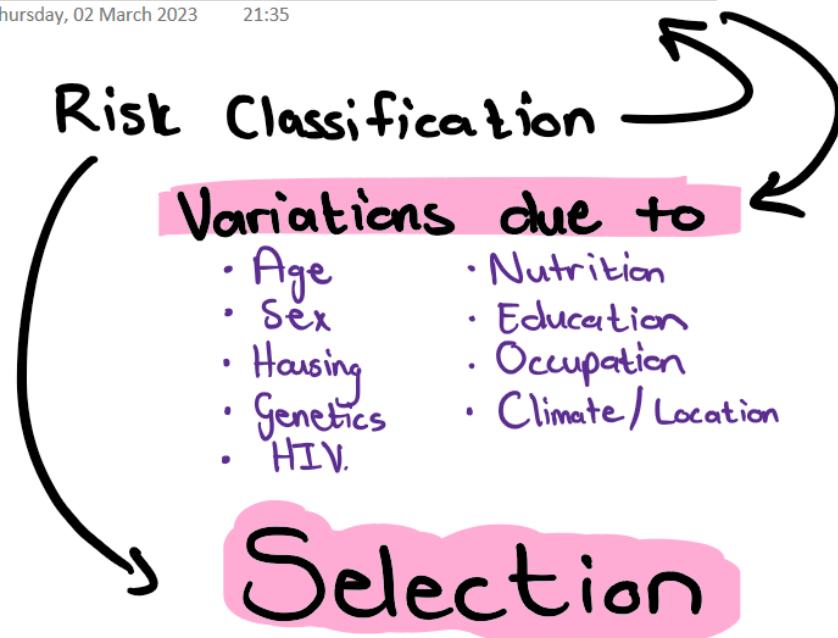
Inflation (claims and claims expenses)

- Inflation assumptions are needed from the middle of the investigation period (from which any past data on claims and expenses has been taken) ...
- ... up to the middle of the period during which claims are expected to be paid.
- Industry inflation indices may exist for employers' liability claims and claims expenses.
- These would need to be extrapolated forward.
- Consult with underwriters and reinsurers...
- as they may be aware of any likely future court rulings / changes in legal fees which could affect the cost of claims and the associated expenses.

Chapter 21 - Mortality and Morbidity

Thursday, 02 March 2023

21:35



- ① Temporary initial selection
- ② Class Selection (Smoking vs. Non-Smoking)
- ③ Time Selection (Calendar)
- ④ Adverse / Anti- Selection.
- ⑤ Spurious Selection

Moral hazard

- The action of a party who behaves differently or less carefully,...
- ...from the way they would if they were fully exposed to the consequences of their actions...
- ...leaving the organisation/insurer etc. to bear some of the consequences of that action.
- *Example:* policyholder claims for more expensive procedures than necessary; claims for new glasses every year, even if there is nothing wrong with existing glasses; policyholder not making an effort to seek out more affordable healthcare if scheme will pay for the more expensive option.



Anti-selection

- The action where people are more likely to take out a contract,...
- ...where they believe their risk is higher than the insurer priced for.
- It may also involve the policyholder lapsing, or exercising an option...
- ...when they have the most to gain from it.
- *Example:* a younger scheme member lapsing their policy and moving to another scheme, leaving the scheme with a worse profile; a member joining the scheme because he knows they pay for a benefit not covered elsewhere.

Temporary initial selection

- It is “initial”, since underwriting happens at the start of the policy...
- ...and hence the cohort of lives is defined upfront.
- It is “selection” because we expect that a life underwritten at application of a life insurance contract to have better mortality experience on average...
- ...than a life that did not undergo underwriting.
- This is because lives that do not meet underwriting requirements will not be issued policies...
- ...or will be issued policies on special terms, exclusions or with loaded rates/premiums.
- It is “temporary” since the selection effect of underwriting is expected to wear off over time.
- Stated differently, the mortality of a group underwritten lives might be better in the first few years...
- ...but over time the difference in mortality will become smaller and smaller.

Occupation

- Occupation determines a person's environment for 40 or more hours a week.
- The environment may give rise to exposure to harmful substances, chemical etc....
- ...or involve more travelling that increases risk of accidents
- Occupations that involve manual labour often give rise to higher risks of accidents...
- ...than say occupations that are less labour intensive or more desk bound.
- In some cases, one can also argue that stress levels associated with some occupations are higher than others...
- ...which might give rise to stress related illnesses down the line.

Education

- Education influences the awareness of components of a healthy lifestyle...
- ...which will reduce mortality rates...
- ..or reduce likelihood of getting certain illnesses.

The effect can be apparent in aspects such as:

- Increased income
- Choice of a better diet
- Regular exercise
- Personal health care
- Moderation in alcohol consumption
- Awareness of the dangers of drug abuse.
- Awareness of a safe sexual lifestyle
- Education and/or occupation can also be seen as a proxy for income/wealth...
- ...and with more income/wealth comes better access to healthcare...
- ...which may lead to earlier diagnoses of serious illness and/or better treatments/outcomes.

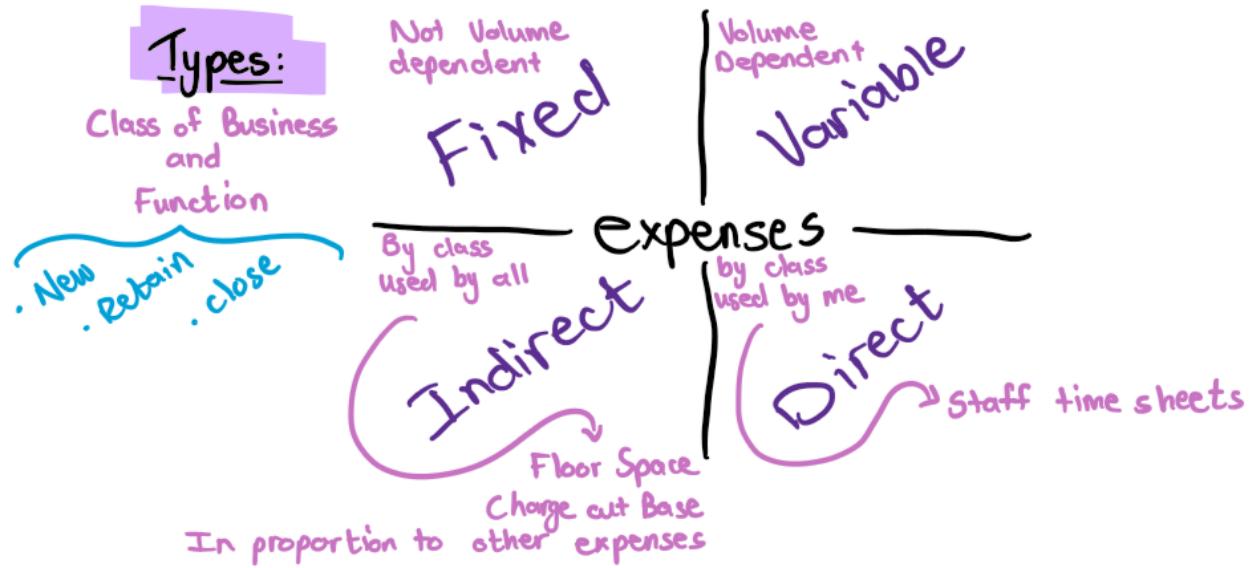
Example:

Underwriting } Sum Assured
 Commission } % of Prem/Claim/Investment
 Investment expenses
 Claim expenses }
 Admin Expenses } Fixed amount per claim/admin.

Types:

Class of Business and Function

New . Retain . close

**Consider:**

- ↳ Competition
- ↳ Cross-Subsidies
- ↳ Inflation.

AMPLE DIRECT FACTORS

- ✓ Admin System
- ✓ Marketability
- ✓ Profitability
- ✓ Level + form of Benefit
- ✓ Early leaver Benefits. (Withdrawal)

- ✓ Discretionary Benifit (Dividend)
- ✓ Interest + Needs of Customers.
- ✓ Risk appetite
- ✓ Expenses vs Charges
- ✓ Competition (Price vs Features)
- ✓ T's and C's (Contract)

- ✓ Financing (Premium) (New Business Strain)
- ✓ Accounting Implications
- ✓ Consistency with other products
- ✓ Timing of Contributions + Prem.
- ✓ Options + Guarantees
- ✓ Regulatory Requirement (Provision)
- ✓ Subsidies - Cross (Expense Allocation)

- ① Capital Requirements
- ② Characteristics of other Stakeholders.

Cost should consider:

- | | | |
|-------------------|------------------------|---------------------|
| ① Tax | ④ Contingency Margins | ⑦ Experience Rating |
| ② Commission | ⑤ Options + Guarantees | ⑧ Investment Income |
| ③ Cost of Capital | ⑥ Provisioning Basis. | ⑨ Reinsurance Cost. |

Factors Influencing Price:

- | | |
|------------------------|--|
| ① Dist. Channel | ③ Approach taken to expense + profit loading |
| ② Level of Competition | ④ Captive Market & Price Sensitiv |

Fix Profit Ask Premium
Fix Premium Ask Profit.

Financing of Benefits:

Unfunded \rightarrow PAYG 

- Funded \rightarrow Lump Sum in advance 
 \rightarrow Terminal funding 
 \rightarrow Just-in-time funding 
 \rightarrow Regular Contributions 
 \rightarrow Smoothed PAYG 

Defined Benefit Scheme:
Why Actual \$ \neq Calculated \$ $(\$ = CR)$

- ① Rectify Shortfall or Surplus
- ② Reflect Sponsors desire to pay more / less
- ③ Legislative Constraints.

RM Process :

- ① Identification → Risks + Controls
- ② Classification → Into groups + Ownership
- ③ Measurement → Likelihood + Severity
- ④ Control → Mitigation to ↓ Likelihood + Severity + Fin. Consequences
- ⑤ Financing → Determine Costs + effectiveness of Risk Control + Capital Availability
- ⑥ Monitoring → Regular Review + Re-asses Risks (New/old)

Benefits of Good RM:

- ↳ Avoid Surprises
- ↳ React quicker to emerging Risks
- ↳ ↑ Stability + Quality of Business
- ↳ ↑ Growth + Return By: Exploit Risk Opportunities
: Better Management + Allocation of Capital
- ↳ Identify Aggregate Risks + Assess interdependencies.
- ↳ Integrate Risks into Business Processes + Strategic decision Making.
- ↳ ↑ Confidence of Business to Stakeholders

Risk vs Uncertainty

Systematic VS Diversifiable.

ERM

Group Risk at Enterprise level.

Pooling of Risk.

Diversification

Efficient Capital Use.

Key Features

- ① Holistic
- ② Consistency Across Business units
- ③ Seeking opportunities to enhance value

Advantages of managing risk at the business level

- Parent company decides on its overall risk appetite...
- ... and then divides this between the business units.
- The management of each business unit then manages the risks of the business...
- ... within the allocated risk appetite
- Business units may "bid" for risk to ensure that risks are allocated to those areas with the highest expected return
- Each business unit feels a sense of responsibility / direct involvement in risk management
- The management teams of the various business units are most closely involved in understanding the risks ...
- ... and how to deal with them.

Advantages of managing risk at the enterprise level

- Group risk management function is established.
- The risks of the various business units are identified ...
- ... and then the results combined into a risk assessment model at the enterprise level.
- Enterprise risk management involves considering the risks of an enterprise as a whole...
- ... rather than considering individual risks in isolation.
- This approach makes allowance for the benefits of diversification or pooling of risk
- It provides insight into the areas with undiversified risk exposures or too much concentration of risk...
- ... where the risks need to be transferred or sufficient capital set aside to cover.
- Such an approach is important in ensuring efficient capital use across the group.
- Enterprise risk management is also more effective in enabling a company to take advantage of opportunities to add value.
- Understanding risk better across the whole enterprise can allow the company to take greater risks in order to increase returns.

- Business unit risk management works best when the business units have a high degree of risk correlation ...
 - e.g., the business units are all life insurers operating in different geographic areas

- Enterprise-wide risk management has maximum value when the business units are very diverse (in different industries and across different geographies) ...
 - ... such as a multinational diversified financial services group

Credit risk – Bank

- One of the main risks facing the bank in its day-to-day operations
- This is a risk the bank chooses to take on to generate income
- By lending in terms of short-term loans, mortgages etc.
- The risk being that loans default
- This can be partially mitigated through requiring collateral such as in the case of a mortgage
- Also managed through the requirement to hold capital in credit reserves

Credit risk – General insurer

- An insurer may take on credit risk to the extent that it invests in corporate bonds or money market instruments.
- It also faces credit risk from counterparties such as reinsurers...
- ...as well as intermediaries who must pay over policyholder premiums.
- It may also take on credit risk if it enters into derivative agreements with a bank

Liquidity risk – Bank

- Liquidity risk is also critical to a retail bank...
- ...since their assets (loans) are usually long term...
- ...while their liabilities (deposits) are usually short term (on call)
- There is always the risk that there is a "run" on the bank...
- ...and too many depositors require their funds at once and this money cannot be easily raised
- Liquidity is therefore very carefully managed...
- ...e.g. prescribed liquidity ratios held.

Liquidity risk – General insurer

- Insurer usually has regular inflow of cash premiums...
- ...that may be used to settle claims and pay expenses...
- ...which are generally expected to be less than the premiums.
- However, in the event of single large claims or accumulations such as catastrophes...
- ...there may be some liquidity risk since assets may need to be liquidated.
- While seldom an issue, there may also be a delay between paying the client and receiving reinsurance recoveries that may cause liquidity strain in the event of big claims

ClassificationRisk IdentificationTechniques:

- Risk classification
 - Risk checklist
 - Experience of staff joining
- For Project Management:**
- High level prelim. analysis
 - Brainstorming
 - Desktop analysis
 - Risk Register / Matrix

Risks:

- ① **Market** - Δ in investment market values / Features correlated with market
- ② **Credit** - Failure of 3rd Party to meet obligations
- ③ **Liquidity** - Solvent but not sufficient financial resources to meet obligations when due
 - Not capacity to handle volume of transacted asset without adverse price impact.
- ④ **Business** - Specific to business
 - Underwriting - Poor underwriting standards
 - Insurance - Poor claims experience
 - Financing - Providing finance for unsuccessful business
 - Exposure - Expose of Risk greater than expected / Lower sales / (New business strain)
- ⑤ **Operational** - Failed internal people, processes or systems or external events.
- ⑥ **External** - External event like - Fire, flood, storm, terrorist attack.
 - ↳ Climate change - Physical
 - Transitional
 - Liability.

- Inadequate or failed internal processes, people or systems, e.g.
- Poor quality control of products
- The dominance of a single individual (or group of individuals) in the running of the company.
- Given this is a family business there is clearly a risk that emotions can get in the way and sub-optimal business decisions may be made e.g. appointing an unqualified family member
- Reliance on third parties to carry out tasks for the company.
- Some functions are likely outsourced e.g. shipping. These service providers may fail in delivering their services on time or to the correct standard.
- Failure of plans to recover from an external event
- There may be power interruptions, fires, storms that cause disruption in production at the company.
- Conduct risk
- The company may be making unsafe products or engaging in false advertising.

Underwriting risk

- Risk that the underwriting process is inadequate leading to inappropriate premiums being charged
- Given that T-Sure is new to this type of product, they might not have the data or expertise to underwrite properly.
- This might also lead to anti-selection risk...
- ...for example, applications by clients who know their facilities present greater risk than implied by T-Sure's premium.

Insurance risk

- There is a risk that the *claims frequency is higher than expected*.
- This might be due to inadequate data when pricing...,
- ...an ambiguous contract wording, ...
- ...or a change in the legal system leading to more court awards in favour of the client.
- There might be more moral hazard than expected

*- There is also the risk that *claims severity is higher than expected**

- Perhaps as a result of a large single claim,
- ... e.g., a wealthy foreign tourist dying at an insured's facility
- Unexpected aggregation of claims may also happen, ...
- ... e.g., many clients being exposed to a harmful substance at the same lodge.
- Claims volatility might be more than anticipated.

- Development expenses might be larger than expected.

- The expenses of selling and managing the product might be larger than expected.

Since it is likely that reinsurance would be required on this product:

- Risk that reinsurance terms might be poor value for money
- There is a risk that the product is not reinsured properly...
- ...and retained risks are more than expected.

Financing risk

- There is a risk that this expansion ends up generating a poor return for the shareholders...
- ...when compared against other alternatives such as other products or acquisitions.
- This should be important to management, given their desire to grow.

Exposure risk

- Risk of insufficient sales volumes...
- ...leading to fixed expenses not being recovered.
- This may be due to an uncompetitive product,
- ...or downward pressure on price to competition...
- ...or a general downturn in the market.
- Too much business might also be sold...
- ...resulting in more exposure to this type of risk than budgeted for...
- ...as well as strain on service levels.
- Persistency (renewals) might be too low

Uncertainty in Benefit + Contribution.

Benefit Risk

* Sponsor/Provider ≈ S/P

DB	DC	Both
<ul style="list-style-type: none"> Inadequate Funds Illiquid Funds Beneficiaries Need Not Met Benefit Δ's (options) 	<ul style="list-style-type: none"> Investment Return ↓ Expences ↑ Beneficiaries Need Not met Annuity Purchas Inflation Risk 	<ul style="list-style-type: none"> Default by S/P Take over of S/P Bad communication by S/P Premium not Paid

Contribution Risk

DB	DC	Both
<ul style="list-style-type: none"> Future Contributions unknown <ul style="list-style-type: none"> + Depends on: <ul style="list-style-type: none"> - Amount of Benefit - Eligibility to accrue Ben. - Inflation - Investment Return Takeover of s/p Not willing to continue on DB. S/P fund the shortfall 	<ul style="list-style-type: none"> Unaffordable contributions Insufficient Liquidity Inflation ↑ than expected Not linked to inflation. 	<ul style="list-style-type: none"> Incorrect Benefit Payment Inappropriate advice Admin Costs Δ's to tax Rates / Status Loss of funds from fraud or Miss appropriation.

Financial Products

- Claims
- Expences
- Withdrawals or Renewals
- New Business Volume + Mix
- Options + Guarantees
- Use of Insurance or RI.

- Risk Appetite
- Risk Profile
- Risk Limits
- Risk Capacity

NB!! Insurable Risk: ★★

- ① Insurable interest
- ② Quantifiable Nature
- ③ Claim amount payable has relation to Fin. loss.



Desirables

- ① Risk independence
- ② Low Probability of event
- ③ Pooling of Risks (large # of risks)
- ④ Limit on ultimate Liability taken.
- ⑤ Moral hazard eliminated as far possible
- ⑥ Sufficient data/info to quantify risk.

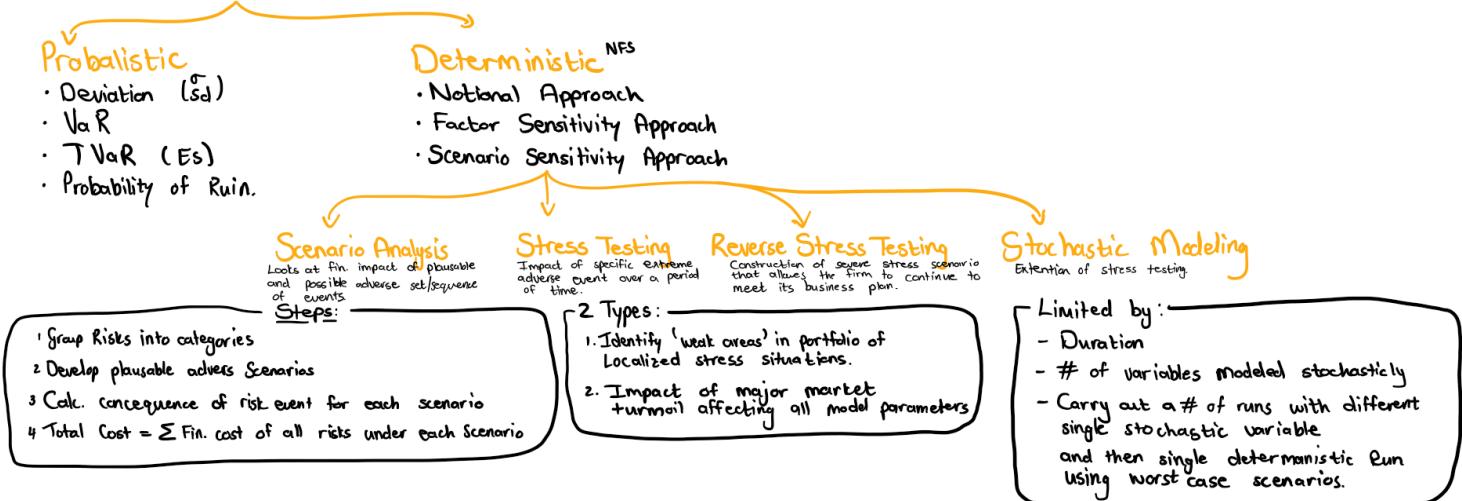
Discuss the extent to which such events are insurable by considering the required and desired characteristics of insurable risks.

This question was poorly answered since it required that candidates use the information given in the question. Generic comments on risk management or CRO responsibilities without even basic application to the setting generally did not score well.

- The organization is diverse both geographically and in terms of product lines...
- ...and hence the risks facing the business are very complex...
- ...and there is scope for interaction of risks.
- Taking on a risk in a particular area of the business may unintentionally magnify risks in other areas...
- ...or alternatively could serve to diversify risks elsewhere in the business
 - o e.g. mortality risk from the point of view of life policies versus annuity policies
- Since many risks are specific to type of product and geography (e.g. different regulatory environment)...
- ...risk management will almost surely be undertaken at the business unit level...
- ...where a risk manager could be assigned to each business unit and geographical location.
- However it would be essential for risk to be managed from an enterprise perspective...
- ...by a single risk officer to whom the individual risk managers report.
- The CRO will collate risks across the entire organisation...
- ...and allocate capital accordingly.
- The CRO is also responsible for reporting on the enterprise risk to the board...
- ...and would work closely with the risk and audit committees
- CRO would also engage with other stakeholders such as
 - o Credit rating agencies
 - o Regulators
- Would also be involved in setting corporate strategy...
- ...and product development.

Chapter 29 - Risk Measure and Report

Tuesday, 21 March 2023 13:13

Aggregation of Risk

- ▷ Stochastic Modeling
- ▷ Simple Formulae
- ▷ Correlation Matrixes
- ▷ Copulas

Risk Portfolio details for Retained Risks:

- Control measures
- Reassessment value and impact after controls
- Risk owner
- Identifications of risk concentration and related actions.
- Board committee or Senior Manager

Risk Reporting

- Identify new risks
- Quantify impact of individual risks
- Determine appropriate control systems for specific Risks
- Monitoring effectiveness of existing control systems.
- Assessing changes to risks faced
- Assessing interactions between risks
- Assisting with pricing/ reserving and determining Capital Requirements

VaRAdvantages

- The simplicity of its expression
- The intelligibility of its units, i.e. money
- Its applicability to all types of risks
- Its applicability over all sources of risk ...
- ... facilitating easy comparisons between products ...
- ... and across businesses
- Its inherent allowance for the way in which different risks interact to cause losses
- The ease of its translation into a risk benchmark.

Disadvantages

- It gives no indication of the distribution of losses greater than the VaR, ...
- ... as it does not reveal how much is likely to be lost should a loss occur that is greater than the VaR
- It can under-estimate asymmetric and fat-tail risks...
- ... as it does not quantify the size of the tail
- The sensitivity to the choices of data, parameters and assumptions
- If used in regulation it may encourage herding ...
- ... thereby increasing systemic risk.]

Risk Register

- A risk portfolio or risk register is a document that contains all the material risks a business/individual is exposed to...
- ...as well as some categorisation of the various risks.
- Against each risk would be a quantification of the impact...
- ...as well as probability of it occurring.
- The product of impact and probability gives some measure of the relevant importance of each risk.
- The risk portfolio should then be extended to indicate how each risk was dealt with:
 - o Avoided
 - o Retained (and how much capital is needed to support it)
 - o Diversified (and an assessment of the remaining combination of risks)
 - o Mitigated, including any remaining risk,
 - o ...and whether this was internally or by transfer to another party.
- For retained risks, the portfolio would also contain details of:
 - o Control measures
 - o Reassessment of the impact and probability after control measures
 - o The risk owner
 - o Board committee/senior manager with oversight of this risk.
 - o Identification of risk concentrations.

Risk options

Avoid. Retain.

Accept. Reject.

Transfer. Reduce. (Mitigate) — Depends on:

Depends on

- Prob. of occurrence
- Risk appetite
- Cost of transferring the risk
- Willingness of 3rd Party to accept the risk

- Impact on Freq + Severity
- Feasibility of implementation
- Cost + Impact on profit
- Secondary risks arising and how to deal with them

Types of RI

① Proportional RI

- o Quota Share RI
- o Surplus RI

② Non-Proportional RI (Excess of loss = XL)

- o Risk XL
- o Aggregate XL
 - ↳ Stop loss (All peril)
- o Catastrophe XL

★ Benefits of RI

↳ ↓ Claims Volatility

- ↓ Capital requirements
- Smooth Profits
- ↑ Capacity to write more business => ↑ Diversification.

↳ ↓ large losses

- Single claim from single risk
- Single event
- Cumulative events
- Geographical + Portfolio concentration of risk
- ↓ Risk of insolvency
- ↑ Capacity to write larger risks

↳ Access to expertise and data.

- o Smaller and start-up insurers may benefit from this expertise
- o Assistance with underwriting and/or claims services may be available
- Reinsurers can also provide data and/or rates as part of this assistance.

ART

- Integrated Risk Cover
- Securitization
- Post loss Funding
- Insurance derivatives
- Swaps

★ Reasons to ART

- Provision of cover that might otherwise be unavailable
- Stabilisation of results
- Cheaper cover
- Tax advantages
- Greater security of payment
- Management of Solvency margins
- More effective provision of Risk Management
- Source of Capital.

① Diversification within

- lines of business
- Geographical areas of business
- Investments asset classes
- Assets within a class.
- Providers of RI

② Underwriting



Manages risk by:

- Protect Provider against anti-selection.
- Creating standard rated Homogeneous groups
=> All risks are rated fairly
- Identify risks that need special terms
- Identify the special terms for sub-standard risks.
- Helps claims experience align with expected when pricing.
- Reduce risk of overinsurance.

Types

- Medical
- Lifestyle
- Financial

Special Terms

- ↑ Premium
- ↓ Benefit
- Exclusions clause
- Decline applicant

Medical evidence

- Proposal form...
- ...along with any disclosed information on the policyholders medical history.
- Reports from applicant's doctor
- Results from standard medical examination done by the life company
- Laboratory tests
- Specialist tests done on the applicant

Lifestyle considerations

- Applicant's occupation
- Applicant's education
- Leisure pursuits, hobbies etc.
- Normal country of residence.

Financial information

- Current income/payslip
- Tax return

- There will be an application/proposal form, with questions on the medical history of the applicant.
- Depending on some of the responses on the proposal form...
- ...additional reports may be requested from a medical practitioner...
- ...or additional medical tests may be requested.
- Certain additional information may only be required for certain combinations of ages and sums insured...
- ...with higher sums insured (and/or older applicants) likely requiring more comprehensive information to underwrite on.
- The evidence obtained will be interpreted by specialist underwriters.
- The outcome of an application is either to be accepted at standard rates.
- ...or accepted with special terms...
- ...or declined cover.
- Special terms may include an addition to standard premium...
- ...or reduction in cover offered...
- ...or exclusions clauses added that will exclude benefit payments as a result of certain claim causes.
- There will be financial underwriting to ensure the amounts of cover requested are in line with the applicant's financial situation...
- ...which may include comparing required sum insured with income or financial position (e.g. net worth, assets, liabilities etc.)
- There may also be lifestyle underwriting to identify any high-risk occupations...
- ...as well as dangerous past time activities.

③ Claims Control Cycle

- Guard against Fraud / Excessive claims.

④ Management Control Systems.

- Data Recording
- Accounting + Auditing
- Monitoring liabilities
- Management of options + Guarantees
 - ① Liability hedging
 - ② Asset - Liability Matching
 - ③ Restriction on option eligibility conditions.

⑤ Low Likelihood, High Impact

- Diversify but limited
- Transfer
- Mitigate by management control procedures.

⑥ Optimise Risk/Return by:

- Support selective growth
 - ① New business opportunities (RaR)
 - ② Allocate Capital + Resources to business Units (\uparrow RaR)
- Support Profit by Risk adjusted pricing
 - ① Price should reflect \rightarrow cost of risk + funding costs + operational expences
- Using limit setting of size + Prob. of losses.
 - ① Set basic exposure limits (size)
 - ② Set stop loss limits
 - ③ Set sensitivity limits (Prob.)
- Managing existing Risk
 - ① Active portfolio management
 - ② Reduce Risk (Eg. Matching)
 - ③ Transfer Risk (RI; ART)

Amount set aside to meet future liabilities.

WHY?

- ⇒ Determine value of liabilities for → Published Accounts
 - ↳ Internal Management Accounts.
- ⇒ Determine if discretionary benefits can be awarded.
- ⇒ Demonstrate Supervisory Solvency
- ⇒ Valuing Provider for merger / Acquisition
- ⇒ Setting future contribution levels for BS's
- ⇒ Valuing Benefit improvements for Pension Schemes
- ⇒ Calculating Discontinuance Benefits.
- ⇒ Influence investment strategy.
- ⇒ Providing disclosure info to beneficiaries
- ⇒ Provide for expected credit loss of banks.

HOW?

Bases

- ① Optimistic (Strong) A↑; L↓
- ② Best estimate (so). over and under
- ③ Cautious (Prudent) (Weak) A↓; L↑

Depends on:

- ① Reason for valuation
- ② Regulation and Legislation
- ③ Needs of clients
- ④ Nature of assets

Examples of how:

Life ⇒ Discounted CF's

General ⇒ Run off Triangles

BS ⇒ DC ⇒ Value

⇒ DB ⇒ Formula

Banks ⇒ Formula: LGD × PoD

Methods

- ⇒ Statistical Analys
- ⇒ Case by Case Estimate
- ⇒ Proportionate Approach
- ⇒ Equalisation Reserve

Op - Optimistic
BE - Best Estimate
P/C - Prudent / Cautious

Reason of Valuation => Bases

- ⇒ Published Accounts (legislation + Accounting Principles) => BE or P/C
- ⇒ Supervisory Solvency => BE or P/C or Actuarial Judgement with disclosure
- ⇒ Internal Accounts => BE
- ⇒ Liability Transfer => BE depending on power.
- ⇒ Determine discretionary Benefit => P/C
- ⇒ Setting Contribution Levels => P/C
- ⇒ Calculating Discontinuance Benefits => BE
- ⇒ Setting Investment strategy => BE + Sensitivity + Scenario Testing
- ⇒ Disclosure info for Beneficiaries => BE + legislation

- To show value of liabilities in published accounts
- To show value of liabilities in statutory returns
- To calculate claims incurred for pricing exercises
- To calculate value of the company/liabilities in the case of merger/liability transfer
- To help inform/influence investment strategy

- The reserves below are closely linked to the accrual principle of accounting...
- ...that requires premiums and claims should be recognised in the period where it was earned (premium) or incurred (claims).

Reserve for unexpired risk (or unearned premium reserve)

- This arises when there is still a period of unexpired risk at the valuation date (or financial period end date) for which premium has already been received.
- This will happen frequently for policies where premium was payable annually in advance, but the reporting period is before the end of the policy period.

Reserve for unexpired risk (or unearned premium reserve)

- Likely to use a proportionate approach.
- The unearned premium reserve is calculated by applying the proportion of unexpired risk period...
- ...to the premium written for the risk period.

Reserve for outstanding claims

- Likely to use a case-by-case estimate...
- ...where there is an estimated claim amount recorded for each claim notified.
- This amount may be based on expert judgement or the best available information at the time...
- ...or a past average amount of similar cases

Reserve for incurred, but not reported claims

- At any given reporting date, it is likely that insured risk events have happened that the insurer would be liable to pay...
- ...but these have not been notified to CoverU yet...
- ...and in some cases not even the policyholder may know that there is a claim
- An example where an employer with an employer liability policy only gets sued many years after employees were unknowingly exposed to a dangerous chemical.

Methods:

- ① Traditional Discounted CF's:
 - A: Disc. Proceeds with long Term assumptions.
 - L: Disc. Outgo with same long Term rate as A.
- ② Market Based reflecting assets held:
 - A: Market Value
 - L: Disc. Outgo using $E(\text{Return})$ on A's held weighted by proportions of A's held in each class
- ③ Fair Value: Replicating Portfolio
 - A: Market Value
 - L: Market Value of Assets on theoretical Replicating Portfolio.
- ④ Fair Value: Risk Neutral Market Consistent
 - A: Market Value
 - L: Disc. CF's using Risk Free Rate.

Options & Guarantees

- ! Stochastic Model (guarantees)
- ! Anti-Selection
- ! Options \Rightarrow Replicating Market Option.

Assumptions:

- \rightarrow Cultural Bias
- \rightarrow Customer Sophistication
- \rightarrow Demographic Factors
- \rightarrow State of economy.

Allowing for Risk

- \rightarrow Margin into each assumption
- \rightarrow Overall contingency loading
- \rightarrow Disc. Rate adjustment

Report on:

- Governance Arrangements
- Attitude to Risk
- Performance against Key objectives
- Progress against Short- and Long-term strategic goals
- Investment strategy and performance

With:

- Commission Ratio
- Operating Ratio
- Ratio of outward RI premium to gross premium income.
- Expense Ratio

To Beneficiaries:

Info includes:

- Investment Strategy
- Contribution obligations
- Risks involved
- Treatment of entitlements when insolvent
- Benefit entitlements
- Expense charges

Possible disclosures requirements

- Membership summary...
- ...along with membership movements
- Assumptions used in the valuation
- Actuarial method used
- Values of liabilities accruing over the year
- Increase in past service liabilities over the year
- Investment return achieved on assets over the year
- Surplus / deficit in fund
- Changes in surplus / deficit over the year...
- ...along with some analysis of surplus.
- Expense breakdown
- Benefit cost over the year of any directors

In Accounts:

Common aims of Accounting Standards

- Consistency from year to year
- Avoiding fluctuation in contributions from employer to pension scheme
- Recognised realistic cost of accruing benefits
- Disclosure of Appropriate info.

Disclosed info includes

- Assumptions
- Actuarial Methods
- Value of Liabilities Accruing over a year.
- Increase in past service liabilities
- Investment return over a year
- Surplus / Deficit + Δ in S/D over a year
- Benefit cost over a year for directors
- Membership Movements.

Chairperson and CEO's statements

- Might give details of successes of the year.
- Performance against key objectives will be reported
- Normally refer to changes at board and senior management level...
- ...and give an idea of whether the company is flourishing or not.

Investment report

- Gives a summary of investment strategy and/or performance.

Strategic report

- Refers to the company's long-term and short-term objectives.
- Reports how objectives have been met.
- Might give performance against key indicators.

Risk report

- Explains the company's attitude to risk
- Outlines key risks faced and how these are managed/mitigated.

Remuneration report

- Records the pay for executive and non-executive directors
- Shows attendance at board meetings and turnover of directors...
- ...both of which give an idea of the state of the company.

Corporate governance report

- Describes how the company is organised in terms of board and board committees
- May include statements of how the board assures itself of independence.

① Insurance Company

A-L < Min Capital Requirement

Rarely Insolvent Because

- ① Regulator Regularly monitors Financial Position.
- ② Min. level of Solvency Capital. } ←



If ② then:

- Close to New business or
- Discuss Recovery plan with Regulator.

Project Solvency using

- Stochastic Model
- Deterministic Model
- With Scenario Testing

But Needs to Consider these issues:

- ↳ Estimation of future post-Tax profits
- ↳ Current value of surplus assets
- ↳ Amount + Timing of Debt Redemption
- ↳ Problems relating to industrial Relations.
- ↳ Issues with staff benefit schemes
- ↳ Outstanding financial obligations.

If insolvent there might be a take over.

Then Consider:

- Location of Operation
- Integration of Systems platform
- Relocation of Staff
- Effect of Unit cost.

If no take over, then

Compensation Schemes (levy)

Role of the regulator

- Insurance companies are normally subject to a requirement by the regulator to maintain a specified level of solvency capital.
- There are also regular reporting requirements ...
- ... that enable the regulator to monitor the financial position of companies.
- Intervene in the running of a company...
- ... before it reaches a position of technical insolvency
- Require insurance company to close to new business if its financial position is serious
- Require insurance company to establish a recovery plan for less serious problems...
- ... and for this to be monitored closely by the regulator.
- In some jurisdictions, ...
- ... when these courses of action fail and an insurance company cannot meet its liabilities, there may be a statutory scheme set up from which some or all of the benefit payments are paid...
- ... funded by a levy on all other providers.
- Perform background checks and vetting of new prospective insurance companies to ensure that they have access to enough capital before they are awarded an insurance license.

ii.	Set out the short-term and longer-term effects of closing to new business on the insurance company's:	
a.	expenses	[5]
b.	withdrawal rates	[3]
c.	investment policy	[5]
d.	with-profit bonus strategy	[2]

(ii).a

Closing to new business will have *a major impact on the operations and expenses* of a life insurance company.

Shorter term

- Short-term, most operations relating to the acquisition of business can be dispensed with immediately, such as
 - o sales and marketing staff
 - o branch offices
 - o some head office functions (e.g. new business customer support)
 - o new business systems (e.g. new business illustrations).
- It might also be possible to sell any direct salesforce (and so raise capital).
- These expense reductions will be offset by additional costs associated with the closure including:
 - o redundancies
 - o disposal of marketing literature
 - o notifying policyholders
 - o early termination of office buildings' leases.
- All product development and most systems development work can be stopped ...
- ... although some systems development is likely to have to continue to comply with changing legislation and replacing obsolete technology.
- The company might decide to cut back on its administration function, ...
- ... as it no longer needs to attract new business.
- However, business retention may be important to keep per-policy fixed expenses at an acceptable level.

Longer term

- In the longer term there will be further redundancies, as the number of staff required to administer a decreasing number of policies falls.
- As the number of policies in-force decreases, fixed expenses will be split between an ever-decreasing number of policies.
- This effect will increase per-policy fixed expenses.

(ii).b

Short term

- Withdrawal experience (surrenders and lapses) will vary by investment type.
- Withdrawal rates may increase as a result of the bad publicity and concerns of policyholders ...
- ...regarding the security of their benefits.
- Higher withdrawals will increase the rate at which the fund becomes too small to be practically managed as a separate entity.
- Salespeople may encourage customers to transfer their existing policies to other providers.

Longer term

- Some of these withdrawals may be selective...
- ..., leading to a worsening of the mortality and sickness experience
- If service standards decline over time, withdrawals may increase.

(ii).c

Short-term

- The removal of new business strain will have a positive impact on the supervisory solvency position ...
- ... which might suggest a less constrained investment policy...
- ...and likely also improve liquidity.

Longer-term

- When the average term outstanding becomes much shorter...
- ... the asset portfolio should be moved more towards shorter-dated, fixed-interest type investments...
- ... to reduce the volatility of payouts...
- ...but will reduce expected returns...
- ...and not offer inflation protection.
- Volatility will increase relative to the size of the fund as the size of the fund reduces.
- The need for liquidity may increase as the fund runs off ...
- ...and if withdrawals increase.
- The company may be forced to dispose of illiquid assets at an unfavourable time.
- To prevent this, it could undertake a gradual move into more liquid assets
- As the funds under management decrease, the dealing costs will increase relative to the size of the fund, reducing net returns.
- It will become harder to attract and retain good fund managers...
- ... and investment return might be negatively affected.
- The tax position of the company may change as a result of contracting rather than expanding funds.
- Depending on solvency level a more fully matched strategy could be adopted

(ii).d

Short-term

- Bonuses may have to be reduced to maintain the solvency of the company.

Longer-term

- The company may wish to use more deferral of distribution of surplus...
- ... to provide some working capital to demonstrate solvency ...
- ...and as a cushion against adverse future experience.
- The company should be conscious of policyholder expectations and the need to communicate with policyholders.

② Benefit Schemes

Closure
When Sponsor is Insolvent / When Sponsor stops financing Benefits

Closes in 2 ways:

- ① No new members; but accrue benefits (No new; keep old)
- ② No new members; No further accrual of benefits (No new; now old)

If closed then:

- Continue scheme without benefit accrue
- Transfer Liabilities to another scheme (Same Sponsor)
- Transfer funds to beneficiary by ^{Cash}
^{Insurance Company}
^{New Employer.}
- Transfer funds to Insurance Company to invest in individual/group pension accrue (No Guarantee)
- Transfer Liabilities to Insurance Company to Guarantee benefits.
- Transfer Liabilities to Central Discontinuance Fund.

Benefit level depends on:

- o Rights of beneficiaries
- o Expectations of beneficiaries
- o Level of assets
- o Funding level
 - ↳ Over-funded : Surplus ∴ ↑ Benefit or Back to Employer
 - ↳ Under-funded: Deficit ∴ ↓ Benefit based on Priority

③ Banks

- Value of Assets < Value of Liabilities
- Cannot meet Obligations to depositors + creditors

The model design will need to consider and allow for:

- Levels of potential cashflows
 - o Premiums and claims
 - o investment income
 - o expenses
 - o tax.
- Any statutory requirements relating to the valuation of both assets and liabilities.
- The likelihood of catastrophes and accumulations of risk,...
- ...and the vulnerability of capital to major shocks such as these.
- The effects of reinsurance coverages.
- The spread of different risk groups within the portfolio.
- Insurer's experience of writing different classes of business.
- Liquidity risk, i.e. will the assets be able to be realised to pay unexpected claims.
- The current position in the insurance cycle.
- The expected level of profitability and level of investment return generated.
- The level of free assets.
- Volumes of new business.

- *Statutory authorities...*
 - ...to protect policyholders.
- *Company management...*
 - ... duty to company / shareholders / policyholders.
- *Analysts / rating agencies...*
 - ...to provide accurate information to investors.
- *Insurance brokers/intermediaries...*
 - ...who want to place business with companies who will be able to meet obligations.
- *Shareholders/bondholders...*
 - ...who monitor security of their investments.
- *Policyholders...*
 - ...to check the ability of their insurers to deliver on commitments.
- *Competitors...*
 - ...to try and understand features of other companies.
- *Potential future shareholders* (or companies eyeing acquisition of the company)...
 - ...to assess its value.
- *Employees...*
 - ...to assess security of jobs/pensions.
- *Creditors...*
 - ...to control their business risks
- *Auditors...*
 - ...to decide if going concern basis appropriate

Capital Needs:

Individual

- Cushion against unexpected events
- Save for future

Proprietary : Equity (Shares or debt)

Mutual: Subordinate debt.

Companies

- Financial Consequences of adverse events
- Cushion against fluctuating trade volumes
- Finance Expansion
- Finance Stock and WIP.
- Start - up Capital.



Financial Providers

Sponsor gives capital



- Meet benefits before sufficient premiums / Contributions
- Meet development expenses.
- For unexpected events
- Statutory / Solvency Requirements
- Invest more freely
- Sell products + Guarantees
- Demonstrate financial strength to get business
- Smooth Profits.
- Achieve Strategic Aims

State

= Capital

- Fluctuation in balance of payments + economic cycle
- Timing differences in income / expenses

- New business strain arises when the premiums paid at the start of a contract, less the initial expenses including commission payments, ...
- ...are not sufficient to cover the reserve that the company needs to set up at that point.

But what is Capital Management?

- Ensuring sufficient solvency and cashflow to meet:
 - ① Existing liabilities and
 - ② Future growth aspirations
- Maximize reported profits.

How do we manage Capital?

Capital Management Tools:

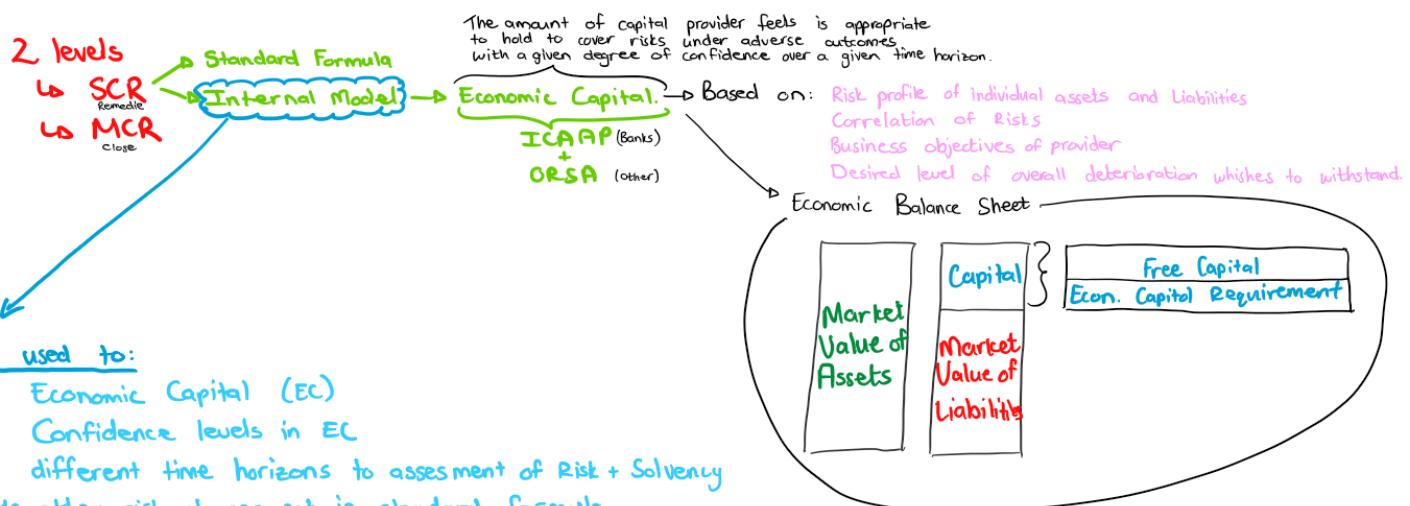
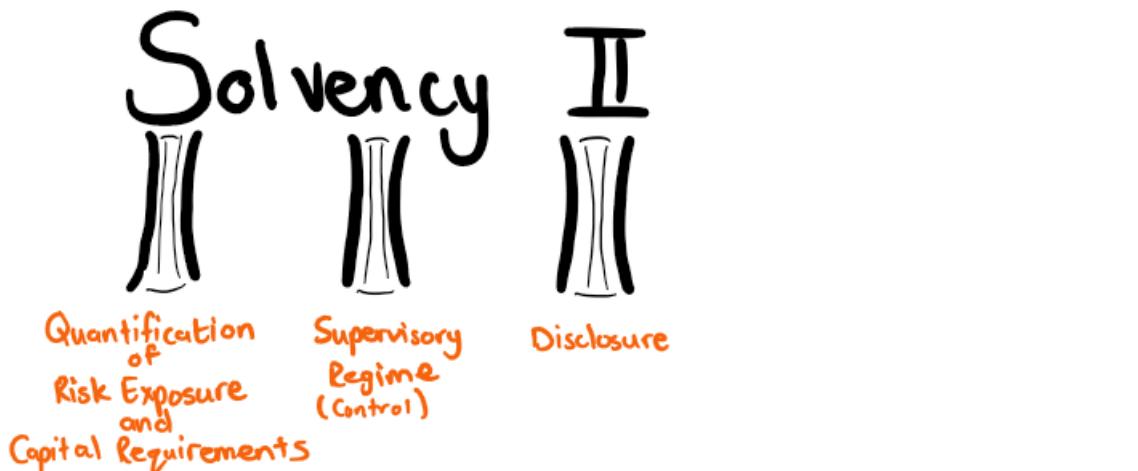
- ① **RI** ↓ Capital Required (Provision) ∴ ↑ Capital ∴ Source of Capital.
- ② **FinRe** Exploits regulatory solvency / tax arbitrage
Has benefits.
- ③ **Securitisation** Converts illiquid assets into tradeable form
- ④ **Subordinated debt** Capital ↑ without Liabilities ↑; Because only pay if SCR still met
 - Liquidity Facilities
- ⑤ **Banking Products**
 - Contingent Capital
 - Senior unsecured Financing (Within units in business)
- ⑥ **Derivatives**
 - Hedging
 - Speculation.
- ⑦ **Equity Capital** ↑ E ⇒ ↑ Assets by
 - Parent Company
 - Rights issues (Shares)
 - Shares by Market
 - Merge funds
 - Assets
 - Weaken Valuation Basis
 - Non-admissible → Admissible
 - Closer Matching
 - When Value of Liabilities depends on Assets
 - Defer Surplus Dist.
 - Retain profit
- ⑧ **Internal Restructuring**

Regulatory Solvency Capital

= Prudential margins in Regulatory liability valuation basis
 + An amount of additional Solvency capital in excess of regulatory provisions.

Difficulties of Prudence:

- Difficult to compare providers
- Ensure sufficient security provided to Policyholders.



Economic capital requirement

- The economic capital requirement is the amount of capital that the company determines is appropriate to hold ...
- ... given its assets, its liabilities, and its business objectives.
- Typically, it will be determined based upon the risk profile of the individual assets and liabilities in its portfolio as well as ...
- ... the correlation of the risk
- ... the desired level of overall credit deterioration that the company wishes to be able to withstand.
- For each major risk type (e.g., credit, market, operational), a stochastic model ...
- ... or a deterministic model with scenario or stress testing ...
- ... will generally be used to determine the capital requirement.
- A suitable stochastic model must produce internally consistent possible future scenarios
- e.g., for market risk a downturn in investment performance and inflation will have an impact on levels of withdrawals and new business.
- Such a stochastic model can automatically allow for correlations between different risk scenarios.
- The company would project its balance sheet for each of a large number of future scenarios, which are intended to represent all the risks the company faces
- A risk measure, e.g., Value at Risk or Tail Value at Risk, would be used to determine the economic capital requirement,
- ... e.g., sufficient capital to maintain solvency in 10 years' time in 99.5% of scenarios.

Economic capital available

- The starting point for assessing the economic capital available is for the company to draw up an economic balance sheet, ...
- ... which shows the market value of the company's assets and the market value of its liabilities.
- From this, the economic capital available would be determined as the excess of the market value of the assets over the market value of the liabilities
- For tradable assets, the market value of assets should be easily available.
- It is possible that the portfolio may include some assets which are not tradable or for which a market value is not available, and so an alternative valuation approach is needed.
- In the unlikely event that any of its liabilities are tradable, the insurance company could look up the market value of these liabilities.
- However, for the majority of its liabilities it is likely to have to use an alternative approach, e.g., use the market value of a replicating portfolio of assets whose cashflows replicate the liability cashflows in all circumstances, if available.
- The market value of liabilities can also be determined using a discounted cashflow approach.
- Alternatively, the company could determine the expected value of the unpaid liabilities stated on a present value best estimate basis ...
- ... and add a risk margin
- In addition to its current available economic capital, the company may also look at the availability in the market ...
- ... and the likely cost of various sources of further capital

— Basal —

- * Capital assessed for each credit; operational; market Risk
 - * Aggregated without diversification
 - * Additional Capital Conservation + Counter Cyclical Capital buffers must be held
-

Capital Requirement and Profitability

① Trading Profit

- = Premium
- + Investment income on Provisions
- Claims
- Expences
- Tax
- ↑ Provisions

② Investment Profit

- = Investment Return
- Tax
- Investment Expenses on Free assets

$\$ \text{Profit} = \text{Income} - \text{Expenses}$

$\$ \text{Surplus} = \text{Value of Assets} - \text{Value of Liabilities}$

$\$ \text{Surplus Arising} = \Delta \text{Surplus over time} \equiv \text{Profit}$

★ Reasons for Analysis of Surplus:

Surplus = Profit/Loss

- Show financial effect of divergences between valuation assumptions and Actual experience.
- Determine most significant financial assumptions
- Show financial effect of writing new business
- Validate calculations and assumptions
- Check on valuation data and process if done independently
- Identify non-recurring components of surplus to help distribution of Surplus.
- Reconcile values for successive years
- Provide management information
- Provide data for use in executive remuneration schemes
- Provide info for providers accounts.
- Demonstrate that Var(Parts) describes Vas(Whole)
- Gives info on trends in experience of provider to feed into ACC.

How?

- Compare Actual vs. Expected.
- Use assumptions to get expected.
- Add adjustment for new business.
- Assumptions should be mutually consistent.
- Aggregate Results to set up revenue accounts.
- Relationships of Revenue accounts should be mutually consistent.
- After time compare Actual vs Expected with:
 - Expected Experience with expected volumes
 - Expected Experience with Actual Volumes
 - Actual Experience with Actual Volumes
- Deviation to answer questions.
- * Expenses as unit cost.

- Increase premiums to make business more profitable...
- ...and whether this should be across the board or only certain professions.
- If sales is the problem, can we make premiums more marketable?
- Is the pricing supporting all features of the product?
- Can an overly prudent reserving basis be contributing to underwriting losses?
- Reduce the likelihood of actual claims differing from the expected through good underwriting of new business.
- Withdrawing from writing certain professions.
- Cancelling worst performing policies.
- Review underwriting at claims stage to ensure only valid claims are paid...
- ...and whether there is scope to manage claims expenses down.
- Review product design and reduce benefits where possible...
- ...or increase excesses.
- Alternatively, the product may be selling poorly because of outdated design and require a revamp.
- Can we add new lines of business to increase sales and/or diversification?
- Reduce/control unnecessary expenses
- Reduce the number of contracts that lapse
- Optimise/Improve investment policy to increase returns.
- Use any free capital to allow a strategy that tries to increase investment returns subject to an acceptable level of risk
- Are cheaper sales channels available.
- Review reinsurance to make sure the reduction in claims versus cost is optimal.
- Investigate other risk management options available to limit claim amounts/volatility
- Can we boost sales through better marketing?
- Is merging with another company an option to get more scale and market penetration?
- Is the tax management as effective as it could be?
- Are there trends in the market we have not responded to?

Levers on Surplus:

- ↓ claims likelihood
- ↓ Cost of claims
- Control expenses
- ↑ Renewals / ↓ lapses
- Invest as to ↑ investment Returns
- Effective Tax management

Sources of Surplus:

Claims:	Volume:	Other CF's:	Other Factors:
Mortality Morbidity Claim Frequency Claim Amounts	New business levels Withdrawals Lapses	Investment income / gains Expences Commission Premiums / Contributions	Salary Growth Inflation Taxation.
Strategic Events Change in Valuation Method or assumption			

Distribution of Surplus



Benefit Schemes Surplus is Retained for:

- ↑ Benefit
 - ↓ Contribution
 - Once off payment
- } Application.

Depends on:

- Provision of capital
- Margins for future adverse experience
- Business objectives of company
- Policyholder / shareholder / other stakeholder expectations

Depends on:

- legislation
- Scheme Rules
- Tax treatment
- Discretion of Sponsor / Manager

▷ Consider also:

- Risk exposure of various parties
 - Source of surplus / deficit
 - Expected effect on industrial relations
- Also consider timing / Pace.

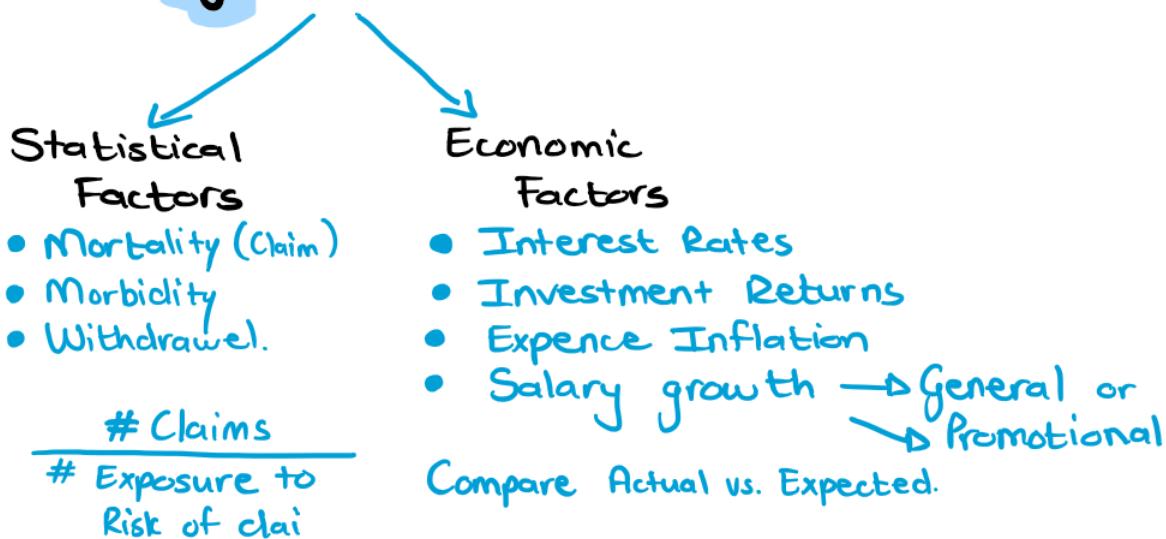
WHY?

- ↳ Update method + Assumptions
so that it is relevant to future experience
- ↳ Monitor trends in experience
to take corrective actions
- ↳ Provide management and other key stakeholder info.

Requirements:

- Stable, Consistent data
- Homogeneous Risk groups
- Data for exposure to risk to be decided into the same sell structure as the experience data.

Analysis Process:



Use of Results:

All allowance should be made for:

- Trends
- Cycles
- Abnormal Events
- Random Fluctuations
- * - Heterogeneity

Monitoring and ACC

May result in:

- Changes to assumptions or Models
- Change in assessment of Risk

Summary for Questions:

How to Analyse experience:

① Divide data into homogeneous groups

Consider:

- Volume of data per cell (Credibility)
- Risk factors for investigation (e.g. age; gender)
- Δ's making old data irrelevant

② Identification in Past data:

- Trends
- Cycles
- Anomalies
- Random variation

③ Use Results to revise model and Assumptions.

Consider:

- Purpose → Need for accuracy and margins for prudence
- Allow for future trends
- Likely differences in future experience from past.

It has come to light that the total claims experience was significantly heavier in the most recent year, compared to previous years. Management has tasked you with performing an actual versus expected claims analyses and then investigating the reasons for the poor claims experience.

iv. Outline what data and information you would require to perform this analysis.

[8]

v. Describe how you would analyse the actual and expected claims experience.

[5]

vi. Outline some of the issues you would investigate as possible reasons for the poor claims experience.

[4]

(iv)

- Exposure data on all the schemes insured would be required, including:
 - o Type of industry
 - o Benefits offered, how they are calculated.
 - o Age and gender details per scheme
 - o ...preferably obtained from full membership lists...
 - o Salary details in case benefits are a function of salary
 - o Size of scheme
 - o Benefits offered
 - o Membership profiles such as age and gender mix...
 - o ...possibly even full membership lists
 - o Size of scheme
- Data on all claims made, including:
 - o Claimant data to be able to link it back up to the scheme
 - o What benefit was being claimed for.
 - o Cause of claim/death/disability
 - o Date of claim events...
 - o ...as well as date of notification of claims event.
 - o These dates are required to calculate IBNR provisions
 - o Whether there are any outstanding claims provisions
- One would at least require the data above for the past year...
- ...but preferably for a few years prior as well to be able to spot trends etc.
- The pricing bases assumed would be required...
- ...for all the different products offered e.g. mortality rates, morbidity rates, disability rates...
- ...which might be different by age, gender, industry, region.
- Reinsurance structures in place.
- Changes, if any, to the claims processes of BetaLife.
- Any previous investigations done.

(v)

- For each scheme, one would attempt to calculate the expected claims...
- ...using the membership and exposure information combined with the pricing bases provided.
- Following this, one can allocate the actual claims to the scheme.
- One would need to allow for claims that might still be outstanding...
- ...and would hence need to make some assumptions for IBNR...
- ...perhaps by using run-off triangle methods or another method to gross up the claims to date.
- Different benefits will be treated separately...
- ...i.e. we want to show expected and actual claims separately for death, CI, disability etc.
- It will be useful to consider the expected claim counts...
- ...as well as the expected claim amounts separately.
- In the case of income protection, it may be necessary to look at actual vs. expected claim termination rates.
- For each scheme we want to make sure that we have as much detail as possible on the likely rating factors...
- ...such as age, gender, industry, average salary etc.
- One can then aggregate the experience and start looking at where the deviations from expected claims are the largest.

(vi)

- Some issues to consider would be:
 - o Whether the poor experience was across all benefit types or just one e.g. disability.
 - o If only one of the benefits performed worse than expected it would be worthwhile to focus on that type of risk?
 - o Was the adverse deviation the result of a relatively small combination of schemes and/or rating factors...
 - o ...or was the experience poor across the board?
 - o Did some industries fare consistently worse...
 - o ...blue vs. white collar workers for example?
 - o Were there any accumulations of claims...
 - o ...e.g. a number of people dying as a result of the same event...
 - o ...or perhaps as a result of a pandemic (think about Covid19)?
 - o If retrenchment cover claims are excessive, was it perhaps as a result of a downturn in the economy?
 - o Were there any single large claims...
 - o ...e.g. an executive dying in an accident?
 - o If there were very large claims, were these subject to underwriting at inception?
 - o Has there been a significant change in mix of claims causes that might signal an emerging trend...
 - o ...or indicate a risk of fraud?
- Were there any adjustments made to reserves on disability claims in payment from previous years?
- Did any changes in the reinsurance structure have an effect?
- Perhaps BetaLife paid large claims that would previously have been reinsured.
- Has there been any changes to the claims underwriting process that is causing fraudulent claims to pass through?
- Investigating whether there is any reason to believe that this is just random fluctuation.