2024 Study Guide

Subject F103

Introduction

This Study Guide contains all the information that you will need before starting to study Subject F103 (previously Subject ST3) for the 2024 exams. **Please read this Study Guide carefully before reading the Course Notes,** even if you have studied for some actuarial exams before.

Contents:

1 The Subject F103 course structure

There are six parts to the Subject F103 course. The parts cover related topics although some parts are longer than others. The parts are broken down into chapters.

The following table shows how the parts, the chapters and the syllabus items relate to each other. This table should help you plan your progress across the study session.

Part	Chapter	Title	No of pages	Syllabus objectives
1	0	Introduction to general insurance	39	
	1	Insurance products - background	45	General principles (b)
	2	Insurance products - types	76	General principles (b)
	3	Tackling an unusual product	10	
	4	Accounting methods	51	Reserving and capital modelling (m)
	5	Reinsurance products - background	30	General principles (c)
	6	Reinsurance products - types	55	General principles (c)
	7	Determining appropriate reinsurance	23	Reserving and capital modelling (k)
	8	General insurance markets	33	General principles (d) (e) Reserving and capital modelling (n)
	9	External influences	40	General principles (d)
2	10	Risk and uncertainty	27	General principles (f)
	11	Data	44	General principles (g)
	12	Actuarial investigations	58	General principles (h)
	13	Reasons for reserving and reserving bases	18	Reserving and capital modelling (b)
3	14	Best estimate reserves	61	Reserving and capital modelling (a) (e)
	15	Quantifying uncertainty in reserves	33	Reserving and capital modelling (c) (e)
	16	Assessment of reserving results	27	Reserving and capital modelling (d)
	17	Reinsurance reserving	21	Reserving and capital modelling (l)
4	18	Rating methodologies	51	Pricing (a) (h) (j)
	19	Methods of calculating the risk premium	87	Pricing (c) (d) (e) (f) (g) (i)
	20	Further considerations when rating	27	Pricing (a) (b)
5	21	Investments and ALM	35	Reserving and capital modelling (f)
	22	Capital modelling	81	Reserving and capital modelling (g) (h) (i) (j)
	23	Glossary	46	Pricing (f)

2 The Course and the Profession

The Course consists of Course Notes, the Question and Answer Bank and the Series X Assignments. Collectively, these are referred to as the Combined Materials Pack (CMP).

Course Notes

The Syllabus for Subject F103 has been written by the Actuarial Society of South Africa (ASSA) and states the requirements of the examiners. In doing this, the ASSA has based the Subject F103 syllabus very closely upon the syllabus of the UK Profession's Subjects SP7 and SP8. The relevant individual Syllabus Objectives are included at the start of each course chapter and a complete copy of the Syllabus is included in Section 6 of this Study Guide. We recommend that you use the Syllabus as an important part of your study.

The Subject F103 Course Notes include the majority of the UK Profession's Core Reading from Subjects SP7 and SP8. This Core Reading covers what is needed to pass the UK exams and is equally relevant for Subject F103. The tuition material that has been written by ActEd enhances it by giving examples and further explanation of key points.

Question and Answer Bank

The Question and Answer Bank provides a comprehensive bank of questions (including some past exam questions) with full solutions and comments.

The Question and Answer Bank is divided into six parts. The first five parts of the Question and Answer Bank include a range of short and long questions to test your understanding of the corresponding part of the Course Notes, whilst the last part contains a set of exam-style questions covering the whole course.

Assignments

The five Series X Assignments (X1 to X5) cover the material in Parts 1 to 5 respectively. Each assignment contains at least 80-marks. The actual Subject F103 examination will have a total of 100 marks, to be completed in three hours.

Core Reading accreditation

The Institute and Faculty of Actuaries would like to thank the numerous people who have helped in the development of this material and in the previous versions of Core Reading.

The Profession's Copyright

Past exam papers

You can download the past papers and reports for Subject F103 from the Actuarial Society's website at **www.actuarialsociety.org.za**.

Past papers and reports for UK Subjects SP7 and SP8 (and their predecessors, Subjects ST7 and ST8) are available at **www.actuaries.org.uk**. These cover similar material to Subject F103.

Recommended reading

The exam will be based on the relevant Syllabus and the Course Notes will be the main source of tuition material for students.

Calculators

Please refer to the profession's website for the latest advice on which calculators are permitted in the exams.

3 Further study support

Queries and feedback

From time to time you may come across something in the study material that is unclear to you. The easiest way to solve such problems is often through discussion with friends, colleagues and peers – they will probably have had similar experiences whilst studying. If there's no-one at work to talk to then use ActEd's discussion forum at **www.ActEd.co.uk/forums** (or use the link from our home page at **www.ActEd.co.uk**). You might find the Subject SP7 and SP8 forums useful, along with the forum for students studying in South Africa.

Our online forum is dedicated to actuarial students so that you can get help from fellow students on any aspect of your studies from technical issues to study advice. You could also use it to get ideas for revision or for further reading around the subject that you are studying. ActEd Tutors will visit the site from time to time to ensure that you are not being led astray and we also post other frequently asked questions from students on the forum as they arise.

If you have any comments or concerns about the Syllabus or Course Notes, these can be passed on via ActEd by emailing SP7@bpp.com or SP8@bpp.com. Alternatively, you can send these comments to:

Education Support

Email**:** assaadmin@actuarialsociety.org.za

Office: +27 (0) 87 073 8940

Website: https://www.actuarialsociety.org.za/contact-details/

The ActEd website

The ActEd website at **www.ActEd.co.uk** contains much useful information on all aspects of ActEd's products and services, including:

- copies of the Study Guide in every subject
- the current *Student Brochure* and application forms
- a link to ActEd's online store
- a link to the ActEd discussion forum
- details of any minor corrections to the study material
- advice on study and a blank personal study plan.

4 How to study to pass the exams

The F100 Subject exams

It is important to recognise that the F100 subject exams are very different from the earlier exams in both the nature of the material covered and the skills being examined.

Both the Course Notes and the exam papers themselves are generally less numerical and more "wordy". The exam will primarily require you to explain a particular point in words and sentences, rather than to manipulate formulae. If you haven't sat this type of exam for some time, you need to start practising again now. Many students find that it takes time to adjust to the different style of the F100 subject exam questions. As ever, practice is the key to success.

The aim of the exams is to test your ability to apply your knowledge and understanding of the key principles described in the Course to specific situations presented to you in the form of exam questions. Therefore your aim should be to identify and understand the key principles, and then to practise applying them. You will also need a good knowledge of the Course to score well and quickly on any bookwork questions.

We recommend that you prepare for the exam by practising a large number of exam-style questions under exam conditions. This will:

- help you to develop the necessary knowledge and understanding of the key principles described in the Course
- highlight exactly which are the key principles that crop up time and time again in many different contexts and questions
- help you to practise the specific skills that you will need to pass the exam.

There are many sources of exam-style questions. You can use past exam papers, the Question and Answer Bank (which includes many past exam questions) and Assignments.

Overall study plan

We suggest that you develop a realistic study plan, building in time for relaxation and allowing some time for contingencies. Be aware of busy times at work, when you may not be able to take as much study leave as you would like. Once you have set your plan, be determined to stick to it. You don't have to be too prescriptive at this stage about what precisely you do on each study day. The main thing is to be clear that you will cover all the important activities in an appropriate manner and leave plenty of time for revision and question practice.

Aim to manage your study so as to allow plenty of time for the concepts you meet in this course to "bed down" in your mind. Most successful students will probably aim to complete the course at least a month before the exam, thereby leaving a sufficient amount of time for revision. By finishing the course as quickly as possible, you will have a much clearer view of the big picture. It will also allow you to structure your revision so that you can concentrate on the important and difficult areas of the course.

A sample UK exam study plan is available on our website at:

www.ActEd.co.uk/Html/help_and_advice_study_plans.htm

Study sessions

Only do activities that will increase your chance of passing. Try to avoid including activities for the sake of it and don't spend time reviewing material that you already understand. You will only improve your chances of passing the exam by getting on top of the material that you currently find difficult.

Ideally, each study session should have a specific purpose and be based on a specific task, *eg* "*Finish reading Chapter 3 and attempt Questions 1.4, 1.7 and 1.12 from the Question and Answer Bank*", as opposed to a specific amount of time, *eg "Three hours studying the material in Chapter 3*".

Try to study somewhere quiet and free from distractions (*eg* a library or a desk at home dedicated to study). Find out when you operate at your peak, and endeavour to study at those times of the day. This might be between 8*am* and 10*am* or could be in the evening. Take short breaks during your study to remain focused – it's definitely time for a short break if you find that your brain is tired and that your concentration has started to drift from the information in front of you.

Order of study

We suggest that you work through each of the chapters in turn. To get the maximum benefit from each chapter you should proceed in the following order:

1. Read the Syllabus Objectives. These are set out in the box on page 1 of each chapter.

2. Read the Chapter Summary at the end of each chapter. This will give you a useful overview of the material that you are about to study and help you to appreciate the context of the ideas that you meet.

3. Study the Course Notes in detail, annotating them and possibly making your own notes. Try the self-assessment questions as you come to them. Our suggested solutions are at the end of each chapter. As you study, pay particular attention to the listing of the Syllabus Objectives.

4. Read the Chapter Summary again carefully. If there are any ideas that you can't remember covering in the Course Notes, read the relevant section of the notes again to refresh your memory.

It's a fact that people are more likely to remember something if they review it several times. So, do look over the chapters you have studied so far from time to time. It is useful to re-read the Chapter Summaries or to try the self-assessment questions again a few days after reading the chapter itself.

You may like to attempt some questions from the Question and Answer Bank when you have completed a part of the course. It's a good idea to annotate the questions with details of when you attempted each one. This makes it easier to ensure that you try all of the questions as part of your revision without repeating any that you got right first time.

Once you've read the relevant part of the notes and tried a selection of questions from the Question and Answer Bank, you should attempt the corresponding assignment.

To be really prepared for the exam, you should not only know and understand the Course, but also be aware of what the examiners will expect. Your revision programme should include plenty of question practice so that you are aware of the typical style, content and marking structure of exam questions. You should attempt as many questions as you can from the Question and Answer Bank and past exam papers.

Active study

Here are some techniques that may help you to study actively.

1. Don't believe everything you read! Good students tend to question everything that they read. They will ask "why, how, what for, when?" when confronted with a new concept, and they will apply their own judgement. This contrasts with those who unquestioningly believe what they are told, learn it thoroughly, and reproduce it (unquestioningly?) in response to exam questions.

2. Another useful technique as you read the Course Notes is to think of possible questions that the examiners could ask. This will help you to understand the examiners' point of view and should mean that there are fewer nasty surprises in the exam room! Use the Syllabus to help you make up questions.

3. Annotate your notes with your own ideas and questions. This will make you study more actively and will help when you come to review and revise the material. Do not simply copy out the notes without thinking about the issues.

4. Attempt the questions in the notes as you work through the course. Write down your answer before you refer to the solution.

5. Attempt other questions and assignments on a similar basis, *ie* write down your answer before looking at the solution provided. Attempting the assignments under exam conditions has some particular benefits:

   - It forces you to think and act in a way that is similar to how you will behave in the exam.
   - The knowledge that you are going to do an assignment under exam conditions can act as a powerful incentive to make you study each part as well as possible.
   - It is also quicker than trying to write perfect answers.

6. Sit a mock exam four to six weeks before the real exam to identify your weaknesses and work to improve them. You could use the Subject SP7 and SP8 mock exams written by ActEd or a past exam paper.

5 Frequently asked questions

Q: What knowledge of earlier subjects should I have?

A: The Course Notes have been written assuming that you have already studied, or been exempted from, Subjects A111 – A214. The key topics that you will need to understand when studying Subject F103 are covered in Subjects A111, A212 and A214. (The relevant material from these exams was previously examined in Subject A204).

Before attempting Subject F103, you also need to have achieved at least an FA in, or been exempted from, Subject A311.

Q: What is your advice if I am simultaneously studying Subject F203?

A: Subject F203 builds on the principles developed in Subject F103, but requires a much greater depth of knowledge and understanding. Consequently, there is some overlap between the subjects, particularly in the types of questions that are likely to appear on the exam papers. It is therefore important to assimilate the key ideas presented in Subject F103 before tackling the same ground in Subject F203.

We suggest that you aim to cover the Subject F103 course as quickly as possible, so as to get a general feel for the principles underlying general insurance together with an overview of the course content. It also makes sense to quickly review the relevant Subject F103 material prior to working through each chapter in Subject F203. From time to time over the study session, and particularly at the revision stage, it might also be a good idea to review the Subjects F103 & F203 Course Notes at the same time, along with the Question and Answer Banks. In particular, it is always worth thinking about how each idea or principle is presented in each of Subject F103 and Subject F203 and hence how it might consequently be examined in either exam.

Q: How have these study materials changed since 2023?

A: There have been no changes to the Combined Materials Pack (CMP) since 2023.

Q: Are there any tutorials available for F103?

A: The Subject SP8 and Subject SP7 Online Classrooms cover much of the material in Subject F103. They are a valuable add-on to your private study.

At the heart of the Online Classrooms is a comprehensive, easily-searched collection of tutorial units. These are a mix of:

- taught material, helping you to really get to grips with the course content, and
- guided questions, enabling you to learn the most efficient ways to answer questions and avoid common exam pitfalls.

The best way to discover the Online Classrooms is to see them in action. You can watch a sample of the Online Classroom tutorial units on our website at **www.ActEd.co.uk**.

You should bear in mind however that while there is a close correspondence between the South African and UK course material, Subjects SP7 and SP8 contain some topics that are not covered by the F103 syllabus, and at times refer to UK-specific issues.

Q: Are there any revision products for Subject F103?

A: Subjects SP7 and SP8 in the UK are, when combined, broadly equivalent to Subject F103, so we provide details of relevant revision products for these subjects below. Bear in mind however that while there is a close correspondence between the South African and UK course material, Subjects SP7 and SP8 contain some topics that are not covered by the F103 syllabus, and at times refers to UK-specific issues.

Subject SP7 / SP8 Mock Exams

Both of these 100-mark mock exam papers are available for students as a realistic test of their exam preparation.

Subject SP7 / SP8 Additional Mock Packs (AMP)

The Additional Mock Pack (AMP) consists of two further 100-mark mock exam papers. These are ideal if you are retaking and have already sat the Mock Exam, or if you just want some extra question practice.

Subject SP7 / SP8 ActEd Solutions with Exam Technique (ASET)

The ActEd Solutions with Exam Technique (ASET) contains ActEd's solutions to exams in 2020-2023, plus comment and explanation. In particular, it will highlight how questions might have been analysed and interpreted so as to produce a good solution with a wide range of relevant points. This will be valuable in approaching questions in subsequent examinations.

Subject SP7 / SP8 Flashcards

Flashcards are a set of A6-sized cards that cover the key points of the subject that most students want to commit to memory. Each flashcard has questions on one side and the answers on the reverse. We recommend that you use the cards actively and test yourself as you go.

Flashcards may be used to complement your other study and revision materials. They are not a substitute for question practice but they should help you learn the essential material required.

Subject SP7 / SP8 Revision Notes

ActEd's Revision Notes have been designed with input from students to help you revise efficiently. They are suitable for first-time sitters who have worked through the ActEd Course Notes or for retakers (who should find them much more useful and challenging than simply reading through the course again).

The Revision Notes are a set of A5 booklets – perfect for revising on the train or tube to work. Each booklet covers one main theme or a set of related topics from the course and includes:

- Core Reading with a set of integrated short questions to develop your bookwork knowledge
- relevant past exam questions with concise solutions from the last ten years
- detailed analysis of key past exam questions (selected for their difficulty), and
- other useful revision aids.

Q: What calculators am I allowed to use in the exam?

A: Please refer to the profession's website for the latest advice.

6 Syllabus

The full Syllabus for Subject F103 is given here. To the right of each objective are the chapter numbers in which the objective is covered in the ActEd course.

Aim

The aim of the General Insurance Specialist Technical subject is to instil in successful candidates the ability to apply, in simple reserving, capital modelling and pricing situations, the mathematical and economic techniques and principles of actuarial planning and control needed for the operation on sound financial lines of general insurers.

The objectives have been split into three main sections, namely:

- General Principles
- Reserving and Capital Modelling
- Pricing

Links to other subjects

Subject A111 (CS1) – Actuarial statistics: provides a basic grounding in statistics.

Subject A212 (CS2) – Risk modelling and survival analysis: covers some stochastic models used in general insurance.

Subject A311 – Actuarial Risk Management: covers the general underlying principles affecting all specialisms.

Subject F203 – General insurance Fellowship Applications: will use the principles of general insurance developed in this subject to develop a deeper understanding of general insurance business and South African practice.

Additional Reading

Statistical and Probabilistic Methods in Actuarial Science by Philip J. Boland (University College Dublin).

Objectives

On the successful completion of this subject the candidate will be able to:

General Principles

(a) Define the principal terms in use in general insurance *(Glossary)*

(b) Describe the main types of general insurance product in terms of:

(i) the needs of customers

(ii) the financial and other risks they pose for the general insurer including their capital requirements and possible effect on solvency.

(Chapters 1 & 2)

(c) Describe the main types of general reinsurance products and the purposes for which they may be used. *(Chapters 5 & 6)*

(d) Describe the implications of the general business environment in terms of:

(i) the main features of the general insurance market

(ii) the effect of different marketing strategies

(iii) the effect of fiscal regimes

(iv) the effect of inflation and economic factors

(v) the effect of legal, political and social factors

(vi) the effect of the climate and environmental factors

(vii) the general effect of professional guidance. *(Chapters 8 & 9)*

(e) Outline the key features of the Lloyd's market. *(Chapter 8)*

(f) Describe the major areas of risk and uncertainty in general insurance business with respect to reserving, capital modelling and pricing, in particular those that might threaten profitability or solvency. *(Chapter 10)*

(g) With regard to the use of data in reserving, capital modelling and pricing:

(i) describe the types of data that are used

(ii) describe the main uses of data

(iii) describe the requirements for a good information system

(iv) outline the possible causes of data errors

(v) identify checks that might be used

(vi) understand the effects of inadequate data. *(Chapter 11)*

(h) Outline the major actuarial investigations and analyses of experience undertaken with regard to reserving, capital modelling and pricing for general insurers. *(Chapter 12)*

Reserving and Capital Modelling

(a) With regard to reserving work using triangulations:

(i) Understand the range of general issues that can affect reserving work using triangulations.

(ii) Gain an appreciation of how to deal with these general issues in reserving work.

(iii) Have an understanding of the main triangulation methods in use - namely the chain ladder method, the Bornhuetter-Ferguson method and the Average Cost per Claim method. *(Chapter 14)*

(b) Develop appropriate reserving bases for general insurance business, having regard to:

(i) the different reasons for calculating reserves

(ii) the assumptions that might be appropriate in each case

(iii) the allowance for future inflation

(iv) whether or not to discount for investment income

(v) the likely sources of uncertainty

(vi) communication of the reserving basis. *(Chapter 13)*

(c) (i) Describe the uses of stochastic reserving methods.

(ii) Describe the following types of stochastic reserving methods:

(1) analytic methods

(2) simulation-based methods.

(iii) Describe the Bootstrapping approach to reserving, and the various approaches that may be followed.

(iv) Describe the issues, advantages and disadvantages of each of the methods.

(v) Describe the approach to aggregating the results of stochastic reserving across multiple lines of business, and discuss methods of correlation.

(Chapter 15)

(d) (i) Describe the factors an actuary should consider in assessing the reasonableness of the results of a reserving exercise.

(ii) Describe typical diagnostics that are commonly used to assess the reasonableness of the results of a reserving exercise.

(iii) Describe the factors an actuary should consider in assessing the reasonableness of changes in results of a reserving exercise over time.

(iv) Describe how an analysis of experience might be carried out in the context of a reserving exercise.

(v) Describe how alternative results of reserving exercises can arise and highlight some of the professional issues in resolving them. *(Chapter 16)*

(e) (i) Understand what is meant by a "best estimate" reserve.

(ii) Describe the following approaches to estimating ranges of reserves:

(1) stochastic models

(2) scenario tests

(3) use of alternative sets of assumptions

(iii) Discuss the uses and issues with each of these methods.

(iv) Discuss the issues to be considered when communicating reserve ranges and uncertainties. *(Chapters 14 & 15)*

(f) Describe:

(i) the principles of investment

(ii) the asset-liability matching requirements of a general insurer

(iii) how projection models might be used to develop an appropriate investment strategy. *(Chapter 21)*

(g) (i) Understand the following considerations in deriving and applying capital modelling techniques:

(1) business plans

(2) risk registers

(3) model requirements.

(ii) Understand the following approaches to capital modelling:

(1) deterministic models

(2) stochastic models

(3) aggregation methodologies

(4) correlations within models.

(iii) Discuss the following issues with regard to parameterisation of capital models:

(1) developing assumptions

(2) validation and back-testing

(3) sensitivity testing. *(Chapter 22)*

(h) Describe approaches to the assessment of capital requirements for the following risk types:

(i) insurance risk

(ii) market risk

(iii) credit risk

(iv) operational risk

(v) liquidity risk

(vi) group risk. *(Chapter 22)*

(i) (i) Understand the importance of diversification, and develop appropriate assumptions for capital modelling of diversification between risks.

(ii) Demonstrate an understanding of how actuarial judgement may apply to capital modelling.

(iii) Explain some of the areas to consider when approaching a capital modelling exercise. *(Chapter 22)*

(j) Describe how the principles of practicability and proportionality apply to capital modelling and explain what guidance exists. *(Chapter 22)*

(k) (i) Describe how to develop an appropriate reinsurance programme for a general insurer.

(i) Describe how to test the appropriateness of alternative reinsurance structures for a general insurer.

(ii) Describe how reinsurance purchasing decisions might be impacted by capital management considerations. *(Chapter 7)*

(l) (i) Describe the following approaches to reserving for outwards reinsurance:

(1) gross less net

(2) application of standard techniques to reinsurance data

(3) use of appropriate factors

(4) application of detailed contract terms.

(ii) Understand the advantages and disadvantages of each of the above methods and the appropriate circumstances in which to use them. *(Chapter 17)*

(m) Describe the methods and principles of accounting for general insurance business and interpret the accounts of a general insurer. *(Chapter 4)*

(n) (i) Discuss the purposes of regulating general insurance business.

(ii) Outline possible methods by which general insurers can be regulated, including advantages and drawbacks of each. *(Chapter 8)*

Pricing

(a) (i) Understand the various components of a general insurance premium.

(ii) Describe the basic methodology used in rating general insurance business.

(iii) Appreciate the various factors to consider when setting rates.

(Chapters 18 & 19)

(b) Develop appropriate rating bases for general insurance contracts, having regard to:

(i) return on capital

(ii) underwriting considerations

(iii) reinsurance considerations

(iv) investment

(v) policy conditions such as self retention limits

(vi) the renewal process

(vii) expenses *(Chapter 20)*

(c) (i) Describe the burning cost approach to rating.

(ii) Understand the assumptions required when using this approach.

(iii) Outline the practical considerations when using this approach.

(Chapter 19)

(d) (i) Describe the frequency / severity approach to rating.

(ii) Understand the assumptions required when using this approach.

(iii) Outline the practical considerations when using this approach.

(Chapter 19)

(e) (i) Describe how original loss curves can be used in rating.

(ii) Understand the assumptions required when using this approach.

(iii) Outline the practical considerations when using this approach.

(Chapter 19)

(f) Understand the applications of Generalised Linear Models to the rating of personal lines business and small commercial risks. *(Chapter 19)*

(g) (i) Understand the uses of multivariate models in pricing.

(ii) Outline the different types of multivariate models. *(Chapter 19)*

(h) Describe the practical uses of credibility models in a general insurance environment. *(Chapter 18)*

(i) (i) Outline the similarities and differences between pricing direct and reinsurance business.

(ii) Describe how to determine appropriate premiums for each of the following types of reinsurance:

(1) proportional reinsurance

(2) non-proportional reinsurance

(3) property catastrophe reinsurance

(4) stop losses

(iii) Describe the data required to determine appropriate premiums for each of the above types of reinsurance. *(Chapter 19)*

(j) (i) Outline the basic structure of a catastrophe model.

(ii) Describe the key perils that can be modelled. *(Chapter 18)*

Chapter 0

Introduction to general insurance

This chapter touches on many syllabus objectives. It provides an important introduction to topics that are addressed in more detail later in the course.

0 Introduction to Subject F103

This chapter aims to give you a broad understanding of many of the key topics in general insurance. Subsequent study of individual topics should then be clearer because you will understand the importance of the topic in the context of the whole subject. Because we cover so many fundamental topics in this chapter, we recommend that you work slowly and carefully.

The topics covered in this chapter are explained in more detail later in the course.

The sections in this chapter are as follows:

Section 1: Introduction to general insurance

Section 2: A general insurer's balance sheet

Section 3: Technical reserves

Section 4: Free reserves

Section 5: Investments

Section 6: Profitability and cashflow

Section 7: Reinsurance

Section 8: Glossary items

1 Introduction to general insurance

1.1 Why do general insurers exist?

To meet a need

Centuries ago merchants were encouraged to hazard great journeys by the existence of insurance: if they took the risk and disaster struck, then they would not be ruined if they were insured. The same social advantage is still there today. The exciting ventures have changed somewhat, but the ability to insure against various perils still enables individuals and companies to take on risks that they would not otherwise undertake.

The ability to make a known, small outlay to insure against the risk of a potentially large loss is justified by economists' utility theory, empirical evidence and common sense. People will pay more for insurance than the expected recovery from insurance (*ie* "the risk premium"), because they are risk-averse and prefer the more certain outcome.

To make money

Most general insurance companies exist primarily to make money. Get this firmly in mind at this early stage. A moneymaking opportunity exists, for Company *A,* because of the last sentence of the previous section. The constraints on *A*'s profitability are how much the customer is prepared to pay, any statutory controls on insurers and the competition from other companies.

These concepts apply to most industries, not just general insurance. All companies weigh up the potential risks of their business and invest their capital so as to maximise return to shareholders. For most of Subject F103 (and F203) you need very commercial, profit-driven thinking.

The link between the above two reasons for providing insurance is that insurers will attract customers and make a profit if they are adequately meeting the policyholders' needs. It may be possible to lure policyholders into buying insurance that does not meet their need or is very expensive, but this is not sustainable as policyholders will likely lapse their policies and the reputation of the insurance industry will be damaged.

Question 0.1

Why might some insurance companies quote much higher premiums than other insurance companies for car insurance for the same individual and period of cover? (Try to give several different ideas.)

1.2 What is general insurance?

In simple terms, general insurance is any type of insurance that is not life insurance.

General insurance therefore encompasses a wide range of types of insurance. In most cases a general insurance policy is a contract of indemnity, *eg* if a loss occurs of an insured article, the insurer will reimburse the value of the insured article. Other policies might pay specified amounts on specified contingencies only (*eg* R10,000 if you lose the use of an eye) or if the loss is unclear, the amount might be determined by a court of law.

1.3 Risks, uncertainty and general insurance

Policyholders reduce uncertainty by passing risks to an insurance company. It is not surprising, therefore, that insurance companies themselves are subject to risk and uncertainty. How to quantify and control this uncertainty is the underlying theme throughout this course. As you work through the different areas of the course think about how product design, capital requirements, pricing, reserving, reinsurance and accounts are influenced by the different risk and uncertainties involved in writing insurance. These are discussed in detail early in the course.

Most of the major uncertainties centre around *how many* claims there will be and *how much* the insurer will have to pay to settle them. These uncertainties have a big influence on how much the insurer will charge for the protection provided (covered in the pricing chapters) and how much the insurer needs to reserve for future claims payments (covered in the reserving chapters). Other risks to the insurer include: recovery of fixed expenses, failure of other parties (*eg* brokers or reinsurers), falls in asset values and the insurance cycle. The size of the free reserves will influence the ability of the insurer to cope with these risks as will reinsurance cover and the investment policy.

1.4 Actuaries and general insurance

That's all very well, but what about actuaries?

Rather surprisingly, actuaries are relatively recent arrivals in the general insurance world. It's clear to an actuary that we should have lots to offer this industry, but the industry has, until recently, been a little slow to recognise that.

The main actuarial roles have traditionally been in reserving and setting premiums. More recently, some actuaries have moved into much wider areas within general insurance. For example:

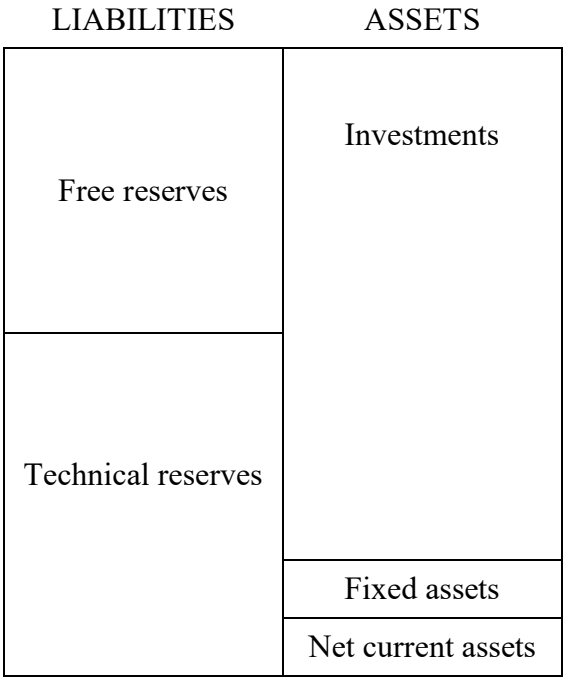
- strategic management of the business
- risk assessment, *eg* modelling catastrophic events
- determining a suitable investment strategy
- assessing reinsurance requirements
- expense allocation
- capital allocation
- assessing the effectiveness of marketing campaigns
- assisting with the early settlement of liabilities in the event of a wind-up.

Many of the topics that we study in Subject F103 are, in fact, areas where actuarial involvement is increasing.

2 A general insurer's balance sheet

The balance sheet of any organisation is a snapshot picture of the finances of that organisation as at the date of the balance sheet. The balance sheet of a general insurer is therefore a summary (strictly an estimate) of the financial status of the company at a particular moment. The balance sheet can be summarised in the diagram shown below.

The right-hand side is a statement of everything the insurer owns, and the left-hand side is a summary of what it owes. (Free reserves are "owed" by the insurer to the owner(s).)



Free reserves: The balancing item equal to the excess of assets over insurance liabilities. Discussed in Section 4.

Technical reserves: These are the amounts set aside in respect of expected payments to or on behalf of policyholders. Discussed in Section 3.

Investments: These might be bonds, equities, cash, property *etc*. Discussed in Section 5.

Fixed assets: For example, office building and equipment. Not discussed much in this course, but you should be aware that they exist.

Net current assets: Excess of current assets over current liabilities, *eg* money due from brokers.

Different types of balance sheet

The values placed on each of the items in the balance sheet are not always uniquely defined. Firstly, there may be an element of judgement used in deciding the values, so that a balance sheet based on a very prudent approach could be very different from a balance sheet produced with less conservative assumptions. Secondly, balance sheets produced for different purposes will be assessed using different approaches.

Statutory accounts, if required, may be in a prescribed format or there may be certain principles that must be applied.

Internal management accounts may be produced to assist internal decision-making. These are likely to be on an on-going, realistic basis, although a variety of "what-if" scenarios are also likely to be produced.

Question 0.2

Why might the latest balance sheet of an insurance company (as given in the company accounts) not give a true indication of the financial strength of the company?

3 Technical reserves

The technical reserves are held to cover the liabilities relating to existing policyholders. The technical reserves might also be called *insurance reserves* or *insurance provisions* because they relate to the liabilities arising from writing insurance business.

These liabilities can be split into two main categories:

(a) Past: liabilities in respect of accidents or losses from events that have occurred prior to the accounting date. Liabilities for *outstanding claims* are discussed in Section 3.2.

(b) Future: liabilities in respect of future insurance cover from policies for which premiums have already been received. Unexpired risks are discussed in Section 3.3.

First, in Section 3.1, we explain how the claim characteristics of the major insurance classes influence the degree of uncertainty in the reserving process.

3.1 Major claim characteristics

Claim characteristics refer to the ways and speed in which claims originate, are reported, are settled and are on occasion reopened.

Imagine the rather extreme scenario in which insurance companies make claim payments as soon as a claim event occurs. For example, the instant that a policyholder has a car accident, there is an immediate transfer to the accounts of the affected parties. In this scenario, what is the insurance company's liability at any one time for outstanding claims?

The answer is zero. If all claims are settled the instant the event occurs, then the company never has any outstanding claims liability. In reality, insurance companies *do* have outstanding claims liabilities because there *are* delays between claims occurring and being settled. Hence insurance companies will hold reserves for outstanding claims. Before looking at reserves, let's consider the delays more fully.

There are two main types of delays: reporting delays and settlement delays.

Reporting delays

The reporting delay is the time from the event occurrence through to the time that the insurance company is notified of the event. Sometimes policyholders may be slow in getting round to advising the insurer – possibly because the amount involved is quite small. Other times the policyholders do not submit claims because they do not realise there is cause for claiming. For example, in the case of a number of industrial diseases (*eg* asbestosis, industrial deafness) it may be many years before the condition emerges. In these cases, reporting delays are often considerable.

The part of the delay that relates to the period between when the insured event happens (*eg* original exposure to asbestos) and when the policyholder realises the event has happened (*eg* the policyholder starts to develop signs of illness) is referred to as the event delay. In many cases the event delay is minimal (*eg* car accidents). In practice therefore, the term "event delay" is not often used. Many people simply use the term "reporting delay" to mean "reporting delay plus event delay".

Settlement delays

The settlement delay is the period between notification to the company and the payment of the claim. These delays are due to:

(a) initial administrative processing

(b) establishing whether the insurer is liable

(c) waiting for a condition to stabilise (*eg* will the injured party recover, or is the disability permanent?)

(d) establishing how much should be paid.

In a few cases where the insurer and the claimant cannot agree, the case may go to court.

In general (but certainly not always):

- property damage claims are settled more quickly than claims in respect of bodily injury
- large claims take longer to settle than small claims

Short tail and long tail

Different classes of business are referred to as "short tailed" or "long tailed", where

- short tail means that claims are generally reported quickly and settled quickly by the insurer, and
- long tail means that there is a sizeable proportion of total claim payments that take a long time for the insurer to settle.

When looking at an individual class of business, or type of claim, you should make a point of noting whether it is short tail or long tail (or in-between!). This is important in developing your understanding of an insurance class, and may influence your answer to a question in the exam. The claim characteristics of the main insurance classes are detailed later in the course.

3.2 Reserves for outstanding claims

The outstanding claims reserve is the first of the two main components of the technical reserves. It may be given as a total figure or, alternatively, it may be split into anything up to four separate components:

(a) Reserve for outstanding reported claims: this is the estimated reserve needed to settle the claims that the company knows about at the accounting date.

(b) Reserve for *incurred but not reported* (IBNR) claims: the IBNR reserve is needed to cover the claim payments for incidents which have happened, but have not been reported to the insurance company.

(c) Reserve for re-opened claims: this is an additional reserve which may be explicitly shown to allow for claims that the insurance company treats as being fully settled, but which might one day require further payments. In practice, insurers differ significantly over when they "close" a claim.

(d) Reserve for claims' handling expenses: in settling claims in each of the above classes, the company will incur some additional expenses (*eg* legal fees). The reserve for these expenses may be held separately.

Even if the reserves are not shown split into these categories, an insurance company should still hold reserves to cover all of these items. For example, if the reserves are shown split into the first two components only, then the reserve for re-opened claims might be within the outstanding reported claims reserve and the reserve for handling expenses would be split between the two.

Question 0.3

There are two main reasons for needing outstanding claims reserves: reporting delays and settlement delays. Which of the components of the outstanding claims reserve is linked to each type of delay?

Estimating outstanding claims reserves

There is great uncertainty about the payments an insurer will need to make in respect of outstanding claims. The amounts which will be paid are not known, so the insurer must use estimates when deciding how much to set aside in respect of these liabilities. Two distinct approaches are:

(a) making estimates of the liability for each individual outstanding claim. ("case estimates")

(b) using statistical techniques to estimate the total outstanding payments for the portfolio.

In practice, insurers use a combination of the two. We study this topic in detail in the reserving chapters later in the course. In the meantime, the following observations should be apparent:

- individual estimates cannot be used for IBNR because the insurer does not yet know about the claim
- statistical techniques are more useful for classes of insurance where there are lots of claims (*eg* private motor), and where there is stability in the numbers and amounts of claims.

One important consequence of the uncertainty about the liability for outstanding claims is that any aspect of the insurer which relies upon estimates for outstanding claims (*eg* profitability) is, as a result, also subject to uncertainty. This is an important point that you should be aware of at all times when working with figures that rely upon technical reserves.

The degree of this uncertainty will vary from class to class. Generally, there is much more uncertainty with long-tail classes, where the reserves for outstanding claims are larger in relation to premium income.

Question 0.4

(a) The technical reserves can be split into two main components. What are they?

(b) The outstanding claims reserves might be split into two, or perhaps even four components. What are they?

Question 0.5

An insurance company splits its outstanding claims reserves into two components: reported claims and IBNR.

The company writes two classes of business. For each class, the outstanding claims reserve is split as follows:

	Class 1	Class 2
Reserve for reported claims	90%	50%
Reserve for IBNR	10%	50%

The reserves for Class 2 are a much bigger proportion of premium income than are the reserves for Class 1.

Suggest two common classes of insurance this company might write. (Note: You will find this type of question easier once you have read through the chapter on insurance products.

3.3 Reserves for unexpired policies

We have discussed reserves in respect of claim events that have already happened. We now turn to the other main component of the technical reserves, the liabilities in respect of existing policies with some unexpired exposure, *ie* future claim events from policies with future periods of cover remaining at the accounting date.

Unearned premium reserves

The usual basis for determining the reserves in respect of the unexpired exposure is to hold a portion of premiums in respect of that exposure. For example, on a straight averaging basis, for a policy with half of its term still to run, it might be reasonable to hold a reserve of half of the premium that was charged. For an annual policy with one month to run, a reserve of one twelfth of the premium might be held.

The name given to the portion of premiums held in respect of unexpired exposure is the *unearned premium reserve* (UPR). The title is quite logical: the UPR is simply the premiums that have been received which have not yet been earned. This is a retrospective assessment of the reserve.

The straight averaging approach used above has a number of fundamental weaknesses in practice:

- it ignores the fact that the risk from the policy may not be spread evenly over the period of cover
- it ignores the fact that expenses of setting up and servicing the policy may not be incurred evenly over the period of cover.

For the purpose of this discussion, we will assume that risk is even over the period of cover. However, a similar assumption about expenses would not be appropriate because there is clearly a large element of expense that is generally incurred at the commencement of a policy, *eg* commission paid to the sales outlet.

The expenses that are incurred by the insurer at the start of a policy are called *acquisition costs*. Commission is generally the major component of acquisition costs. But how should these acquisition costs be allowed for when setting the reserves in respect of unexpired exposure? The best way to see this is through a simple example.

Suppose a policy has acquisition costs of 20% of the premium. Then 80% of the premium is available to meet claims, on-going expenses and profit. If we assume that the risk and on-going expenses are spread evenly over the period of cover, then the 80% of premium (*ie* after deduction of acquisition costs) could also be spread evenly. If the policy were half-way through its life at the accounting date, the UPR would be 40% of the premium (*ie* half of the 80% which is to be spread over the life of the policy).

This approach to establishing the UPR can be extended to a more general formula:

$$\text{UPR} = \text{proportion of risk unexpired} \times (\text{premium} - \text{acquisition costs})$$

The UPR calculated in this way is the net UPR. The gross UPR doesn't allow for the acquisition expenses.

Question 0.6

Explain in layman's terms what is meant by UPR.

Question 0.7

An insurance company calculates its UPR using an individual, policy by policy approach. Calculate the UPR as at 31 December 2006 for the following annual policies:

(a) Premium R1,000. Commission R120. Started 1 October 2006.
Risk assumed to be uniform over the year.

(b) Premium R3,500. Commission 10%. Started 1 July 2006.
Risk starts at zero, and increases daily by a constant linear amount over the policy year.

(c) Premium R2,200. Commission R200. Started at 11.59pm on 31 December 2006.
Risk fluctuates throughout the policy year.

(d) Premium R10,000. No acquisition costs. Started 1 November 2006.
All risk assumed to be in April.

Unexpired risk reserve

So far, our assessment of the reserve to be held in respect of unexpired exposure has been retrospective by looking at the premiums we have received in the past. We have set up a reserve equal to the unearned premium net of acquisition costs, *ie* the UPR. A prospective approach should also be considered by thinking about possible future claim events. What reserve do we think we need to hold to cover the unexpired risks?

The *unexpired risk reserve* (URR) is the name for this prospective assessment. Again, the title is quite logical. Remember that such a reserve would need to cover all the claims and all the expenses that are expected to be incurred in the future by the unexpired portion of existing policies.

We would normally expect the unearned premium reserve to be bigger than the unexpired risk reserve. This is effectively the same as expecting the premiums to be big enough to cover the claims and non-acquisition expenses – which is what a profit-seeking insurer would generally want. In the cases where the UPR is greater than the URR, there is no need for the insurer to keep reserves greater than the UPR for unexpired policies. Because of the accounting accruals principle we would generally hold at least the full UPR. Here, holding a reserve equal to the UPR, we would expect some profit to emerge over the coming months from these policies.

In fact, regulation is moving toward allowing insurers to hold the unexpired risk reserve even when it is lower than the UPR. This essentially allows an immediate release of profits. The reserve will be referred to as the unearned premium provision (UPP) and the UPR will be done away with.

However, the cases where URR is greater than UPR are more complex. These cases imply that the company expects to make a loss on the unexpired policies because it expects to pay out more in claims and expenses than the amount of premium held back for the unexpired period. Therefore, the UPR will be insufficient to meet the expected payments, and the insurer should set up additional reserves to meet this strain.

These additional reserves are known (again, quite logically) as the *additional unexpired risk reserves* (AURR), or the *additional reserves (or provision) for unexpired risks*.

It should not surprise you that:

$$\text{AURR} = \text{URR} - \text{UPR} \quad \text{(minimum of zero)}$$

You will need to be particularly careful with the expression *unexpired risk reserve*. In some contexts practitioners use it to mean the total URR (as defined above), and others may use it to mean AURR. So:

- stick to the definitions given in this chapter
- be careful when reading *unexpired risk reserve*, and check which is meant in the context
- be clear in your own work as to whether you mean total unexpired risk or additional unexpired risk.

Question 0.8

State in layman's terms the key difference between the UPR and the URR. Which of the two calculations, UPR or URR, is open to most uncertainty?

3.4 Other types of technical reserve

So far in this section we have looked at reserves in respect of outstanding claims and reserves in respect of unexpired policies. We now look briefly at two further types of technical reserve which do not fall easily into either category: claims equalisation reserves and catastrophe reserves.

Claims equalisation reserve

Because insurance business is volatile, the year to year profits of an insurance company can be very volatile.

One way to reduce the volatility of profits is to hold a *claims equalisation reserve* (CER). This is a reserve that is used to smooth the profits from one year to another. In a good year when profits are large, money is transferred to the claims equalisation reserve, thereby reducing the initial assessment of profit. In a bad year, money is transferred from the equalisation reserve, thereby increasing the initial assessment of profit.

Catastrophe reserve

An insurance company may choose to set aside an additional reserve to cover the losses that might arise from a catastrophe. Whereas an insurer would expect to use the reserve for, say, outstanding claims, an insurer would not expect to have to pay out from the catastrophe reserve. It is genuinely a contingency reserve that would be held just in case something awful were to happen.

If an insurer did hold a large explicit catastrophe reserve, there would be less need for the insurer to hold extensive free reserves (*ie* the excess of assets over liabilities). Conversely, the free reserves for a company that does not hold a catastrophe reserve need to be sufficiently big to cover the possibility of a catastrophe (or two!).

Question 0.9

What are the two main approaches to estimating outstanding claims? Which of the two should be used for estimating IBNR? Which of the two is more likely to benefit from actuarial input?

Question 0.10

An insurance company that recognises that it has been writing business unprofitably for the last six months shows just three different types of technical reserve in its accounts. What do you think they might be? How would your answer change if the question had said *very profitably* instead?

4 Free reserves

The free reserves are the excess of the assets over the technical reserves (as shown in the diagram of the balance sheet on page 5).

You need to be particularly careful here because lots of different expressions are used by different practitioners in different circumstances to refer to the excess of assets over liabilities. The following expressions are all commonly used as alternatives to free reserves:

- free assets
- solvency margin
- shareholders' funds
- capital employed.

The word solvency has several different possible interpretations for a general insurance company. The most common is the concept that the assets exceed the liabilities. Hence the excess of assets over liabilities may be called the solvency margin. Where a solvency margin *ratio* is discussed in general insurance, it is the solvency margin divided by the net written premiums, not the solvency margin divided by total assets. This is another area where terminology sometimes differs. Some practitioners use the term solvency margin when referring to the ratio defined above.

4.1 Significance of free reserves

Without free reserves, an insurance company would not be able to operate.

Firstly, you may regard the free reserves as the pool of funds being used to provide the backing for insurance risks. If the insurer did not have an adequate level of free reserves, policyholders would have no reason to believe that the insurer would be able to meet claims in the event of disaster. Meeting claims after adverse events is the whole purpose of insurance.

Secondly, there may be a legal requirement for an insurance company's free reserves to exceed a statutory minimum level. In South Africa, this minimum capital amount is often called the *Minimum Capital Requirement (MCR)*.

The extent of the free reserves is very important for the management of the insurance company. For example, it is closely linked to the following:

- The maximum amount of business the company is able to write: free reserves are required to provide a cushion against unexpected adverse results. The more business that is written, the bigger the required cushion. Conversely, there is a maximum amount of business that a given level of free reserves can support.
- The classes of business written: some classes of business have more variable claims experience than others and some classes involve bigger risks. Bigger free reserves can support more variable and larger risks.

Question 0.11

Other aspects of the management of a general insurer are also influenced by the size of the free reserves. What do you think the effect of higher free reserves will be on an insurer's:

- reinsurance programme?
- investment strategy?
- pricing policy?

5 Investments

As with any investing institution, a general insurance company will want to achieve the maximum possible return from its investments, without exposing itself to an undesirable level of risk.

Here's a quick summary of the major factors influencing the company's investment strategy.

Nature of liabilities

Some of the liabilities will be in fixed monetary amounts. Investments producing fixed monetary returns are appropriate for these liabilities.

However, many of the liabilities will need to be settled in prices applicable at the time of settlement. This means that there is an element of inflation underlying most of the liabilities. The type of inflation the liabilities are exposed to varies by class and peril. This becomes important for those classes of insurance where there are considerable reporting and settlement delays. Investments that tend to maintain their real value are desirable for such liabilities.

Term of liabilities

Investments should have similar terms to those of the liabilities. The appropriate term of investments is very dependent upon the classes of business written. Compared with life assurance and pension funds, many liabilities tend to be short term, and the investments tend to reflect this. For long-tail classes of business (*eg* employers' liability), some medium-term and even some long-term investments are appropriate.

Currency of liabilities

In some classes of insurance, for example, marine, travel, and product liability, insurers may have liabilities in several currencies. Assets should be held to match.

Uncertainty of liabilities

In general insurance there is often a great deal of uncertainty about the amounts that will be necessary to settle claims and the timing of the claim payments. The proportion of the assets held in a form that is liquid and which has reasonably stable market values must be sufficient to cover this uncertainty.

Size of free reserves

The bigger the free reserves (relative to the size of the company), the greater the extent to which the investment strategy can be aimed at maximising returns.

Legislative influences

However, the need to maintain the free reserves above a particular minimum solvency margin means that insurers may be very wary of holding too many investments that have volatile market values. The extent to which this is a concern depends on the size of the free reserves relative to any statutory minimum solvency margin that may exist.

Taxation

Insurers will want to maximise their post-tax investment returns therefore the taxation basis for insurers is relevant to the choice of investment strategy.

Question 0.12

An insurance company produces provisional accounts, as at 31 December 2006, on 4 January 2007. These accounts do not include an AURR for its domestic household account.

When the draft accounts are drawn up two months later, the balance sheet *does* include an AURR for household business. Assuming that there was no change in the reserving or accounting basis, why might the accounts have been modified?

Question 0.13

Insurance companies are described as "capital intensive". Explain why they need so much capital in relation to payroll, size of premises *etc*.

Question 0.14

Which two aspects of an insurance company's operations will have the most impact on the company's investment strategy?

6 Profitability and cashflow

6.1 Basic measure of profits

In this section we will look at the items that make up profits.

Intuitively, it should be clear that:

$$\text{post tax profits} = \text{premiums} - \text{claims} - \text{expenses} + \text{investment return} - \text{tax}$$

(In case you are wondering why reserves are not explicitly shown in this equation, all is explained below.)

With the premiums, claims and expense items, we need to be careful that the figures we use are sensible and consistent. Suppose we are trying to calculate the profit earned in 2007. Then, if we write R10,000 of new business on 30 December 2007, does this mean that the 2007 profits will be bigger by R10,000? If we follow usual accounting principles, the answer is NO!

The accounting principle that matters here is *accruals*. Income and expenditure should accrue over the period to which they relate.

Let's consider various measures of premiums and claims and then select the measures that are consistent with the accruals principle.

Written premiums

This is the total amount of premium income written in the year. So for policies starting in the year, the whole premium will be included within written premiums (also expressed as premiums written).

Earned premiums

This is the amount of premium income relating to insurance cover provided during the year (also expressed as premiums earned). For example, if a new annual policy is started on 1 December 2007 for a premium of R1,200, the earned premium in 2007 from this policy would be R100 (assuming that the risk and expenses are even over the policy year). This policy would then contribute R1,100 to earned premiums in 2008.

So, which of these two measures of premiums is consistent with the accruals concept?

Hopefully, you will agree that it is earned premiums because this tells us how much premium has accrued during the year.

Paid claims

This is the total amount of claim payments made by the insurer during the year (also expressed as claims paid).

Incurred claims

This is the amount of claims paid (as above) *plus* the increase in the total reserve for outstanding claims (also expressed as claims incurred). For example, suppose that a claim for R1,000 is reported on 20 December 2007, but payment is delayed until 2 January 2008. The effect of this delay is to decrease the 2007 claims paid by R1,000 but the 2007 *claims incurred* is unchanged (assuming that the reserve for outstanding claims as at 31 December 2007 is increased by R1,000).

It's claims incurred that is consistent with the accruals principle.

Question 0.15

An insurance company (which writes remarkably little business!) writes six-monthly policies, each for a fixed premium of R1,200. Policies commencing in 2006 and 2007 were written on the following dates:

1/3/06, 1/4/06, 1/8/06, 1/10/06, 1/12/06, 1/1/07, 1/3/07, 1/5/07, 1/6/07, 1/8/07, 1/11/07.

At the end of 2006, the reserve for outstanding claims was R6,000. By the end of 2007, the reserve for outstanding claims was R7,300. A total of R5,500 was paid in claim settlements in 2007.

Calculate (for the 2007 accounting year):

- premiums written
- premiums earned
- claims paid
- claims incurred.

Expenses incurred

When policies are written the insurer pays commission and other initial expenses. At the accounting date those acquisition costs have been paid out but not wholly incurred for any policy that is unexpired at the time, just as part of the premium received has not yet been earned. These expenses are known as *Deferred Acquisition Costs* (DAC).

To be consistent with the treatment of premiums and claims above, the expenses item will also need to be based on an incurred basis rather than just showing expenses paid.

Underwriting result

Underwriting result (or underwriting profit) is the term given to the excess of premiums over claims and expenses:

	Earned premiums
–	Claims incurred
–	Expenses incurred
=	Underwriting result

Note that the whole of this account is based on the accruals concept. The underwriting result shown in the revenue account of a general insurance company is analogous to the operating profit of non-insurance companies. We discuss the issues covered in this section in more detail later in the course.

Question 0.16

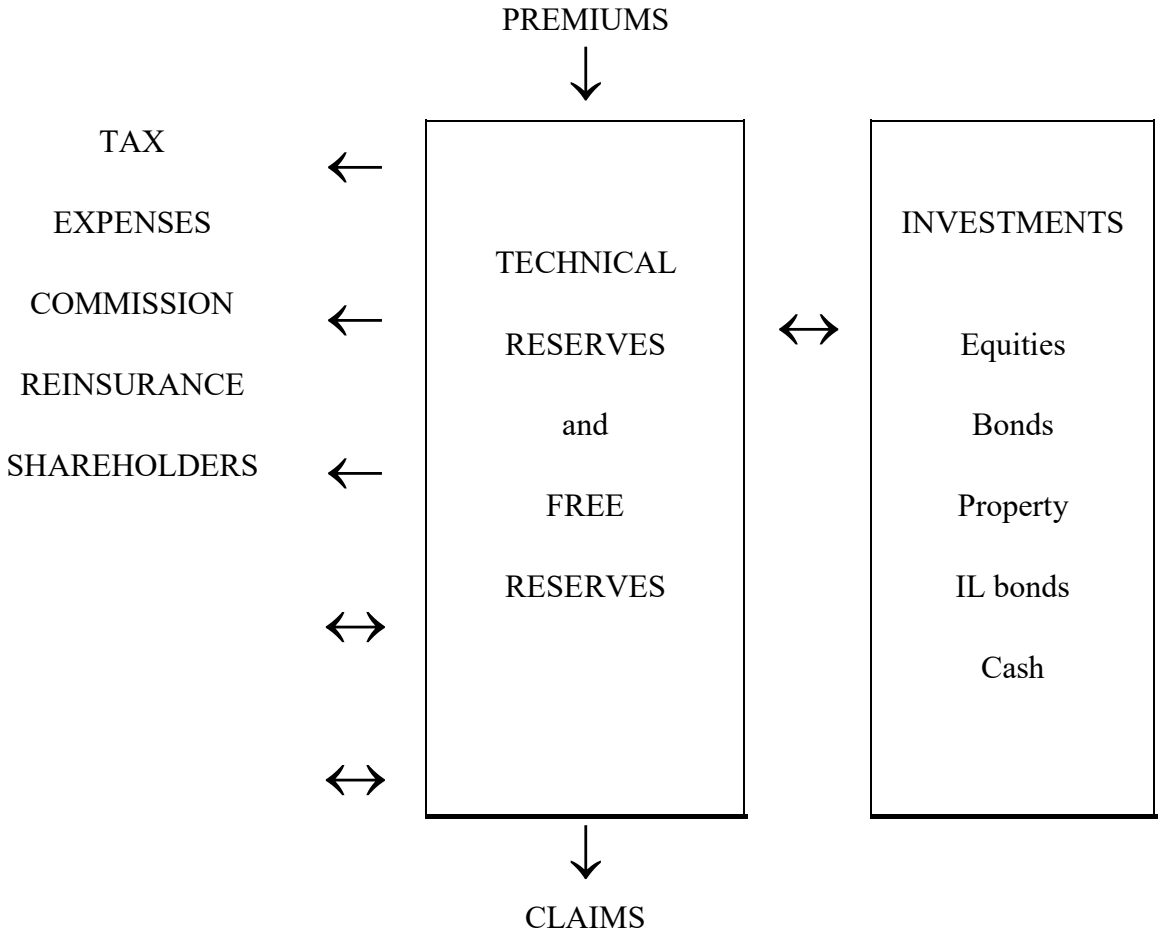
The following data is available for a general insurance company for an accounting year (in R million):

premiums receivable:	165
unearned premium brought forward at 1 January:	75
unearned premium carried forward at 31 December:	83
claims paid:	103
outstanding claims reserve at 1 January:	124
outstanding claims reserve at 31 December:	133
expenses incurred:	31

Produce the revenue account showing the underwriting profit (or loss) for the year.

6.2 Cashflow diagram

When considering the mechanics of an insurance operation, it is often useful to consider all the various cashflows that may take place. A simple diagram summarising the cashflows is:



Most of the expressions in this diagram should now be familiar to you, and the mechanics should be self-evident. However, the following points are worth bringing out:

Reinsurance

This is the insurance company's own insurance. That is, the insurance company pays out reinsurance premiums to a reinsurance company and the reinsurer covers part of the risk the first company has taken on. The insurance company will, as a result of this insurance, sometimes make reinsurance recoveries from the reinsurer.

Investments

The reason for the double arrow is to highlight that money may be lost on investments as well as being gained. Hopefully the investment income and investment gains will far outweigh the losses!

Shareholders

Shareholders will hope to receive dividends (hence the "out" arrow). From time to time shareholders may be asked to put more money into the company through rights issues.

Finally, thinking of the cashflow diagram and the parties involved in each cashflow is often useful in helping to generate ideas in the exam.

Question 0.17

List six different types of reserve which, when added together, make up the total technical reserves. Which of these is most likely to be zero, and why?

Question 0.18

What would happen to the post-tax profits of a general insurer if the company decided to reduce the reserve it had been holding for IBNR by R20 million? Assume tax is charged at a rate of 30%. Suggest (*ie* use some imagination and make something up) a single event which might cause this to happen.

Question 0.19

Complete the following statements by filling in the blanks.

AURR is the _____ of _____ over _____, subject to a _____ of _____.

UPR is the portion of _____ that relates to _____ cover.

Claims incurred is defined as the _____ _____ plus the _____ in outstanding claims reserves.

The main determinants of the investment strategy will be:

- the _____, _____ and _____ of the _____
- the relative size of the _____ _____.

A reserve used to smooth profits from year to year is called a claims _____ _____.

The excess of _____ premiums over _____ claims and _____ is called the _____ _____.

7 Reinsurance

The final topic that we wish to introduce here is reinsurance. Individuals and companies take out insurance when they perceive a need for it, so as to reduce risk to themselves. Insurance companies do precisely the same.

Reinsurance is the name for the insurance of insurance companies.

We study reinsurance in some detail in later chapters, but it is helpful early on to see a couple of examples in which it may be useful.

Enormous risks

Insurers like to do business, but there are some risks, *eg* large industrial or commercial properties, that are so large that no one insurer could possibly take them on, without endangering their own solvency position. A way for them to do some business without taking on undue risk is to reinsure the portion of the risk that they cannot cope with.

Proportional reinsurance or coinsurance can help with this situation.

Accumulations of risk

Accumulations of risk occur when the insurer has an unbalanced portfolio of risks. This imbalance may be due to the nature of the classes of business written (*eg* too much exposure to liability claims), the geographical areas covered or the types of policyholder attracted. The unbalanced portfolio exacerbates the problems of non-independent risks. An example would be a flood in a particular area leading to many domestic property insurance claims.

The risk of accumulations can be mitigated, in certain circumstances, by the insurer arranging some reinsurance to enable them to cope with the possibility of a catastrophic event occurring.

Question 0.20

Imagine you work for an insurance company specialising in selling travel insurance, through travel agents, to parties of over 50's going on skiing holidays in the USA.

Give some examples to explain why your company is likely to want to take out some reinsurance.

8 Glossary items

At the end of each chapter we will include a section like this one which lists the glossary items that have either been introduced in the chapter or are related to the material in the chapter. You will not have met all of the terms given here in the chapter. To study actively you should attempt to explain each of the terms that you have come across and then check your definition against the glossary. You should now read the definitions of the following glossary items:

- Act of God
- Catastrophe
- Catastrophe reserve
- Claim
- Claims equalisation reserve
- Claims handling expenses
- Claims incurred
- Claims reported
- Cover note
- Earned premiums
- Equalisation reserve (provision)
- Event
- Free reserves
- Inception date
- Incurred claims (or claims incurred)
- Insurance certificate
- Insured
- Lapse
- Loss
- Loss expense reserve
- Loss reserve
- Minimum Solvency Margin
- Outstanding claims reserve (OCR)
- Period of unexpired risk
- Rating

- Recoveries
- Reinsurance
- Reinsurer
- Re-opened claim
- Solvency margin
- Solvency ratio
- Technical reserves (provisions)
- Unallocated loss adjustment expenses
- Unearned premium reserve (UPR)
- Unearned premiums
- Unexpired risks reserve (URR)
- Written premiums.

This page has been left blank so that you can keep the chapter summaries together for revision purposes.

Chapter 0 Summary

The existence of general insurance is good for society as a whole and for individuals. Whilst some mutuals do exist, most general insurers are proprietaries which are largely motivated by profit.

On one side of the balance sheet are free reserves and technical reserves. On the other we have all the assets.

Technical reserves (or insurance reserves) might be split into:

Past events:	–	o/s reported claims
	–	IBNR
	–	re-opened claims
	–	claims' handling expenses
Future events:	–	UPR
	–	AURR

Insurers may also hold catastrophe reserves or other claims equalisation reserves.

The claims reserves might be shown as one amount for outstanding claims and one for unexpired risks.

Claims reserves occur because there are reporting delays, settlement delays and premature closure of claims files. Claims reserves are generally larger for long-tail classes of business.

Estimates for outstanding claims reserves are carried out by estimates of individual outstanding claims or by using statistical methods for the totals. Individual estimates can't be used for IBNR!

Claims reserves are estimates. Therefore any work which is based on claims reserves should recognise the uncertainty underlying the estimates. This uncertainty is generally greater for long-tail classes.

UPR is the portion of premiums set aside to cover the claims and expenses for future accounting periods for which premiums have already been received.

URR is a prospective assessment of the amount required as at the accounting date to cover the claims and expenses from the unexpired risks.

AURR is the excess of URR over UPR, subject to a minimum of zero.

Free reserves are the excess of assets over technical reserves. They may also be referred to as free assets, the solvency margin, shareholders' funds or capital employed.

The size of free reserves is an important determinant of:

- the amount of business the company can reasonably write
- the size of risks written
- the amount of risk within the investment strategy
- the need for reinsurance.

The main influences on the investment strategy will be the term, nature and level of uncertainty of the liabilities (these factors are determined mainly by the classes of business written), the size of the free reserves, and legislative factors.

The profit of an insurer is the excess of premiums and investment returns over claims and expenses.

Earned premiums, rather than written premiums, should be used to determine underwriting profit. Similarly, we should use claims incurred rather than claims paid.

Claims incurred is claims paid plus the increase in outstanding claims reserves.

Underwriting profit equals earned premiums less claims incurred less expenses.

The cashflow diagram is a useful way to study the mechanics of a general insurer. The diagram includes all the main monetary flows:

- premiums
- claims
- expenses (including commission)
- investment (in & out)
- reinsurance (in & out)
- dividends (*ie* out to shareholders)
- rights issues (*ie* in from shareholders)
- tax.

Reinsurance can protect insurance companies from various risks that may, otherwise, be too large for them to bear.

Chapter 0 Solutions

Solution 0.1

There are lots of possible ideas, including:

- different estimates of the expected claim amount
- different levels of expenses and profit
- some insurers don't want the business, so quote too high
- others may undercharge, hoping the policyholder will stay for years and that they will make money later
- some may just have done their sums wrong, *eg* underestimated the risk
- different forms of cover may have been requested, *eg*:
  - comprehensive or third party fire and theft only
  - as the only named driver, or possibly with friends as drivers too
  - different excess levels
- quotations could have related to driving in different countries *etc, etc, etc.*

Welcome to Subject F103! This sort of careful question reading plus common sense / lateral thinking and the generation of a lot of relevant ideas is often just what is needed.

Solution 0.2

Some judgement is required in setting values for assets and liabilities. So, for example, when assessing the financial strength of the company a prudent (not realistic) basis may be used.

Also, the balance sheet is a snapshot at a given moment in the past. Circumstances may have changed since the date of the balance sheet.

Solution 0.3

Outstanding reported claims reserve is in respect of settlement delays.

IBNR reserve is in respect of reporting delays.

Re-opened claims are caused by premature closure of a claims file. The cause of the closure is needed to determine whether a reporting or settlement delay is the reason.

Reserves for claims' handling expenses can be in respect of both types of delay.

Solution 0.4

(a) Outstanding claims and unexpired risks.

(b) Outstanding reported and IBNR

or

outstanding reported, IBNR, re-opened claims and claims' handling expenses.

Solution 0.5

Class 1 must be a short-tail class of business (because total claims reserves are relatively low), with little in the way of reporting delays, *eg* household contents.

Class 2 is a long-tail class (because the total claims reserves are a much bigger proportion of premiums), with extensive reporting delays. A class such as employers' liability is possible, where some illnesses may not emerge for many years which will make IBNR significant.

Solution 0.6

UPR is the portion of premiums due or received in respect of policies already taken out, that is, set aside for future accounting periods.

Solution 0.7

(a) R660, *ie* 75% of (1,000 – 120)

(b) R2,362.50 (75% of risk is outstanding at year-end, so the UPR is 75% of 90% of R3,500)

(c) R2,000, *ie* 100% of (2,200 – 200)

(d) R10,000, *ie* 100% of 10,000

Solution 0.8

Whereas UPR is the portion of premium set aside for unexpired risks, the URR is our estimate of how much we need to cover the claims and expenses from unexpired risks.

The URR is probably open to more uncertainty. (We know what premiums we charged, but we don't know what the claims experience will be next year.)

Solution 0.9

(a) Estimates of individual outstanding reported claims.

(b) Statistical estimation of totals.

Use statistical methods for IBNR.

Actuarial input is more likely to be used in statistical estimation of totals.

Solution 0.10

- Outstanding claims reserves (includes IBNR *etc*)
- UPR
- AURR (needed because URR expected to exceed UPR as unprofitable)

If the question had said that the company was writing business very profitably, then we would not have needed an AURR. So the answer would have been:

- Outstanding reported claims reserves
- IBNR
- UPR

Solution 0.11

Higher free reserves result in:

- less need for reinsurance
- greater investment freedom
- greater scope for competitive pricing.

Solution 0.12

Perhaps the accounts were modified because the company revised its view on the unexpired risks. After two months of the new year, the company would know more. Perhaps there was a run of large claims in January or February.

Solution 0.13

This is the same as asking why they need large free reserves:

- it may be a legal requirement
- to meet fluctuation in claims experience
- to support new business
- to protect against unexpected adverse experience (catastrophes, large claims *etc*).

We discuss these ideas in more detail later in the course.

Solution 0.14

- classes of business written, hence nature/term/currency of liabilities
- size of free reserves.

Solution 0.15

- premiums written $= 6 \times 1{,}200 = £7{,}200$
- premiums earned $= 1{,}200/6 \times (0+0+1+3+5+6+6+6+6+5+2) = £8{,}000$
- claims paid = R5,500 (given)
- claims incurred $= 7{,}300 - 6{,}000 + 5{,}500 = £6{,}800$

Solution 0.16

Earned premiums	157	$(= 165 + 75 - 83$ or $165 - (83 - 75))$
Claims incurred	112	$(= 103 + 133 - 124$ or $103 + (133 - 124))$
Expenses	31	
Underwriting	14	

Solution 0.17

- Outstanding reported claims
- IBNR
- Re-opened claims
- Claim handling expenses
- Unearned premium reserve
- Additional reserve for unexpired risks.

The AURR is most likely to be zero. If it is not zero, it indicates that we think that we have recently been writing business on unprofitable terms.

Solution 0.18

This year's pre-tax profits would be increased by R20 million, so assuming that this goes straight into the assessment of tax, we would pay an extra R6 million tax. Post-tax profits would be increased by R14 million.

IBNR might be revised downwards if it included a big allowance for claims that might come through from a particular cause, *eg* employees claiming against their employers for back-ache from sitting at desks. If a court case has just gone through in favour of the employer, then the insurer will give a big sigh of relief and reduce its IBNR.

Solution 0.19

AURR is the excess of URR over UPR, subject to a minimum of zero.

UPR is the portion of premiums which relates to unexpired cover.

Claims incurred is defined as the claims paid plus the increase in outstanding claims reserves.

The main determinants of the investment strategy will be:

- the nature, term and currency of the liabilities
- the relative size of the free reserves

A reserve used to smooth profits from year to year is called a claims equalisation reserve.

The excess of earned premiums over incurred claims and expenses is called the underwriting result (or underwriting profit).

Solution 0.20

It depends critically on how wide the cover provided is, but examples of some potentially scary things, for which reinsurance may help the insurer sleep at night, are:

- One or more whole parties could be affected by the same claim event, *eg:*
  - delayed departure from airport
  - no snow on arrival, or other sub-standard holiday features
  - plane/coach crash
  - avalanche.
- Similarly, if one or more travel agents became bankrupt the insurer might, conceivably, suffer a large loss from many claims.
- One or more of the skiers may suffer injury, with potentially enormous medical expense claims, especially with older skiers (complications?) and especially in the USA.

Chapter 1

Insurance products – background

Syllabus objective

(b) Describe the main types of general insurance product in terms of:

(i) the needs of customers

(ii) the financial and other risks they pose for the general insurer including their capital requirements and possible effect on solvency.

Covered in part in this chapter.

0 Introduction

Before introducing you to the vast range of general insurance products in the following chapter, this chapter gives you an overview of the essential features that distinguish the main types of general insurance products and so help you to identify the crucial aspects that influence the nature and extent of the risk to be covered by each type of insurance.

We will first focus on general insurance principles and introduce the broad categories of insurance products. We will then work through six aspects of insurance cover that will give us a framework to classify the products discussed in the next chapter. These six aspects are: benefits, insured perils, basis for cover, measures of exposure to which premiums are related, claim characteristics, and risk and rating factors. This will be followed by a brief discussion of how different classes present varying levels of risk to the insurer and how capital should be held accordingly.

This chapter will prepare you to absorb the huge amount of information covered in the next chapter!

Reinsurance products are described in Chapters 5 and 6.

1 General insurance principles

Before considering the main types of insurance and reinsurance, it is worth noting some overriding features of all types of insurance. You might recognise some of the following material from Subject A301, however, the material here is *slightly* different.

1.1 Insurable interest

For a risk to be insurable:

- the policyholder must have an interest in the risk being insured, to distinguish between insurance and gambling
- a risk must be of a financial and reasonably quantifiable nature
- the amount payable by the insurance policy in the event of a claim must bear some relationship to the financial loss incurred.

1.2 Insurable risk

Ideally risk events also need to meet the following criteria if they are to be insurable:

- Individual risk events should be independent of each other.

  Reinsurance is available to help cope with situations where risks are not independent. In practice we won't often get strict independence but a low correlation is desirable.

- The probability of the event should be relatively small. In other words, an event that is nearly certain to occur is not conducive to insurance.

  For example, a house would not be insured if it stood on the edge of a crumbling cliff. The premium to cover such a risk would be exorbitantly high.

- Large numbers of similar risks should be pooled to reduce the variance of the average claim size and hence achieve more certainty.

  With a large enough number of similar risks, the law of large numbers reduces the variance of the average claim size. Hence, the insurer will benefit from more predictable claims experience than each of the policyholders would individually. The similar risks should still be independent.

- There should be an overall limit on the liability undertaken by the insurer.

  This would help the risk event meet the above criteria that it must be of a reasonably quantifiable nature.

- Moral hazards should be eliminated as far as possible because they are difficult to quantify, result in selection against the insurer and lead to unfairness in treatment between one policyholder and another.

Question 1.1

What is *moral hazard*?

See also "uberrima fides" below.

- There should be sufficient existing statistical data / information to enable the insurer to estimate the extent of the risk and its likelihood of occurrence.

  We will see later in the course that there are a number of sources of data that might be used if the insurer doesn't "own" any relevant data itself.

However, the fact that these ideal criteria are not always met in practice does not necessarily mean that insurance cannot be found. Insurers may be prepared to underwrite simply to generate income, to build a relationship or develop a new market entrepreneurially. All risks were once insured for the first time.

1.3 Other terms

Before we continue, there are some other important general insurance terms you will need to know. Some of them are covered in this section. Many others are given in the Glossary – remember you will need to know the Glossary definitions for the Subject F103 exam. If you haven't read through the Glossary yet, it is worth skimming through it now to familiarise yourself with the definitions covered.

Uberrima fides

...is Latin for "utmost good faith". This honesty principle is assumed to be observed by the parties to an insurance, or reinsurance, contract. An alternative form is uberrimae fidei: "of the utmost good faith". The principle of honesty underlies all insurance business. For example, misrepresentation or non-disclosure of any material fact in the proposal can make the policy void. Each renewal of a general insurance policy actually constitutes a new proposal, and the insured should disclose to the insurer any material changes during the period covered by an insurance policy.

In reality, the insurer faces a variety of moral hazards because insureds may not abide by this legal principle and, if they do not, it may be hard for the insurer to detect. Here, moral hazard refers to the insured becoming less risk averse after taking out insurance.

Multiple claims

Unlike life insurance policies, many general insurance policies allow the insured to claim as many times as necessary during the period of cover, usually a year, provided by the policy.

Nil claim (or zero claim)

...is a claim that results in no payment by the insurer, because, for example:

- the claim is found not to be valid
- the amount of the loss turns out to be no greater than the excess
- the policyholder has reported a claim in order to comply with the conditions of the policy, but has elected to meet the cost in order to preserve any entitlement to no-claim discount.

Again, unlike life insurance policies, for which the claim event, *eg* death, is fairly clear cut, a significant number of general insurance policies generate claims which are subsequently settled by the insurer with no payment to the insured. This may be, for example, because the insurer is not liable (*eg* the policy wording excludes that type of claim). However, nil claims still invariably result in administrative expenses for the insurer.

Underinsurance

If the contents of your home are worth R100 000 then you should take out a home contents policy with a sum insured of R100 000. However, you may choose a policy with a sum insured of only R80 000 because you have under-estimated the value of your belongings, or because you think the chance of losing more than R80 000 is very small. This is known as underinsurance.

Question 1.2

Why is underinsurance a *hazard* to the insurer?

Average

In order to prevent underinsurance, some property insurance policies where premium rates are based on sum insured contain an average clause. This provides that, if the sum insured is less than the full value of the property at the time of a loss, the insurance payment will only be a proportion of the value of the loss – the same proportion as the sum insured bears to the full value. This is known as the *principle of average*.

Example

If you insured the contents of your house for R100 000 but the actual value of the contents was R150 000 then the principle of average may apply if you make a claim. A claim for R15 000 may result in a payment of only R10 000 because the claim is scaled down by 100 000/150 000.

Warning! The term "average" has different meanings in different contexts within the general insurance world.

In non-marine insurance, the term relates to the practice of reducing the amount of a claim in proportion to the extent of underinsurance.

In marine insurance, the term is generally used to describe damage or loss.

The word *average* derives from a Latin word *havaria* which broadly means "loss". There are many uses of this word within marine insurance. For example, a *general average loss* is a loss resulting from a sacrifice or expenditure made by an individual for the benefit of others at a time of peril, *eg* throwing cargo overboard from a boat to stop it sinking, thereby saving the remaining cargo and the vessel.

First loss

First loss is a form of insurance cover for which the chosen sum insured is restricted, with the insurer's agreement, to a figure less than the full reinstatement-as-new value of the property. The insured therefore has to bear any loss in excess of the sum insured. If the cover is specified as first loss then the principle of average described above does not come into effect.

Subrogation

...is the substitution of one party for another as creditor, with a transfer of rights and responsibilities. It applies within insurance when an insurer accepts a claim by an insured, thus assuming the responsibility for any liabilities or recoveries relating to the claim. For example, the insurer will be responsible for defending legal disputes and will be entitled to the proceeds from the sale of damaged or recovered property.

Subrogation means that the insurer replaces the policyholder in law and acquires all rights and responsibilities in legal matters regarding the loss suffered, be it before or after the claim has been settled.

Example

If you receive a payment from an insurer for replacement of your boat, following serious damage or loss, then the original boat becomes the insurer's property. The insurer may then be able to recover a salvage value, for its own benefit.

Discovery period

...is a time limit, usually defined in the policy wording or through legislative precedent, placed on the period within which claims must be reported. It generally applies to classes of business where several years may elapse between the occurrence of the event or the awareness of the condition that may give rise to a claim and the reporting of the claim to the insurer: for example employers' liability or professional indemnity.

Employers' liability and professional indemnity insurance will be described in the next chapter.

The discovery period prevents claims being made to insurance companies many years after the event that caused the claim. In principle it allows insurance companies to write off IBNR liabilities from a contract once the discovery period has elapsed, although the courts have sometimes overridden this in the past.

The discovery period is often defined in the sunset clause. Both terms relate to the same topic. The discovery period is the actual time limit; the sunset clause is a clause that defines the time limit.

Underwriting

... is the process of consideration of insurance risk on individual policies. This includes assessing whether the risk is acceptable and, if so, the appropriate premium, together with terms and conditions of the cover. In addition to deciding on premium rates to charge, underwriters will specify excesses or exclusions to cover or possibly required improvements to the risk before cover is provided. It may also include assessing the risk in the context of the other risks in the portfolio. The more individual the risk (for example most commercial lines), the more detailed the consideration. For small and standard homogeneous risks, insurers will often provide insurance automatically, without referring the individual risks to the underwriters.

The term is also used to denote the acceptance of reinsurance and, by extension, the transacting of insurance business. For example, an insurance policy is underwrittten by (insured by) insurer A.

1.4 The policy document

The policy document is important. It sets out the terms and conditions under which an insurer is liable to pay insurance claims in specific circumstances and must, therefore, be carefully worded to cover all possible circumstances under which payment will and will not be made. The relationship between the insured and the insurer is governed by the policy document. It is a legal and binding contract and hence subject to contract law.

Policy forms are normally standard for all personal lines business and small commercial policies, in the sense that an insurer will issue the same wording to all policyholders. Items that vary between policyholders will be included in a schedule.

Examples of common items in a schedule are:

- details of vehicle / property / people covered
- excess applied
- any limits to the cover
- exclusions
- time limits (such as hours clause)
- whether or not any optional covers have been taken
- details of insurance premium paid.

An hours clause would be found in some types of reinsurance treaty. This will be explained in Chapter 6.

Larger commercial risks tend to have policies that are individually made for the particular policyholder, possibly assembled from a library of standard clauses.

Question 1.3

What are the aims of having an excess?

Similarly, a deductible is a portion of a loss that is paid by the policyholder. It may be an amount or a percentage. For example, a 5% deductible will restrict the size of any claim payment to 95% of the loss.

Question 1.4

Give a simple example to illustrate the difference between the operation of an excess and a deductible on an insurance policy.

HINT: in the case of an excess, the maximum claim payout is equal to the sum insured, while for a deductible, the maximum payout equals the sum insured less the deductible.

Exclusions

...are clauses in a policy that limit the circumstances in which a claim may be made.

Some examples of common exclusions are:

- self-inflicted injury (for personal-accident benefits)
- dangerous pastimes
- loss resulting from illegal activity by the policyholder *eg* accident while drink-driving
- war, terrorism, civil riot.

Question 1.5

Can you think of some more examples of common exclusions?

Exclusions can apply to certain perils (*eg* terrorism) or particular types of loss (*eg* cash, whatever the peril).

Question 1.6

List the exclusions that are likely to be applied on a private motor policy.

Exclusions are used to avoid payment by the insurer in situations where:

- the policyholder is at an advantage through possessing greater personal information about the likelihood of a claim
- the claim event is largely under the control of the policyholder
- the claim event would be very difficult to verify
- the loss occurs as part of the normal course of events and could be considered to be depreciation, *eg* tires on a car wearing down as the car is driven.

Without an exclusion there would be a very high probability of a claim or it would not be possible to accurately estimate the risk associated with a particular policy.

Exclusions might also be used in other situations where the risk cannot be reliably estimated by the insurer, regardless of whether or not the policyholder has better information, or when the probability of loss is very high. Remember from Section 1.2 that one of the criteria for an event to be insurable is for the probability of the event to be relatively small.

Exclusions are also used where the risk is covered by a third party such as the government (*eg* SASRIA) so as to avoid "double insuring".

SASRIA stands for the South African Special Risks Insurance Association. SASRIA insures extraordinary risks that conventional insurers are reluctant or unable to cover, such as damages arising from civil unrest, terrorism, labour action *etc*. However, war risk is specifically excluded.

Exclusions are also used to limit the scope of the policy to make it more appropriate for a particular target market or to reduce the premium for competitive reasons.

Exclusions are sometimes used to reduce the risk of moral hazard and fraud. For example, theft of a vehicle when the keys have been left in the ignition might be excluded from a motor policy. This reduces the moral hazard of policyholders' carelessness, which might result from the existence of insurance cover.

Indemnity for loss of cash might be excluded from a household contents policy. This reduces the risk of fraudulent exaggeration of loss amounts, as it would be very easy for a policyholder to claim, but difficult to verify, that large sums of cash had been stolen when a burglary has taken place.

Question 1.7

List the reasons for applying exclusions to an insurance policy.

Even though exclusions have a place in making a risk more insurable, they should not be used unnecessarily or with the wrong motives (for example, simply to increase profits for shareholders). Exclusions make the insurance less valuable to policyholders and so should only be applied with good reason. In addition, policyholders should be clearly informed of exclusions so that they are not taken by surprise when a large claim is declined. In some cases insurers have been known to pay claims caused by excluded perils in order to save (or improve) their reputations.

2 Types of product

The types of insurance cover provided by general insurance products can be classified under four main headings:

- liability
- property damage
- financial loss
- fixed benefits.

This section gives a brief overview of these categories of insurance product. They are described in detail in the next chapter.

2.1 Liability

The essential characteristic of liability insurance is providing indemnity where the insured is legally liable to pay compensation to a *third party*.

Examples of liability insurance include:

- employers' liability – where the insurance indemnifies the employer against compensation payable to employees for losses that they suffer as a result of negligence of the employer
- motor third party liability – where the insurance indemnifies the owner of a motor vehicle against compensation payable to third parties for personal injury or damage to their property (*eg* their vehicle)
- product liability – where the insurance indemnifies a manufacturer against compensation to a third party for losses that they suffer as a result of a product fault.

2.2 Property damage

The main characteristic of property damage insurance is providing indemnity to the *insured* for loss of, or damage to, the policyholder's *own* property.

Examples of property damage insurance include:

- motor insurance
- buildings insurance (which includes both residential buildings (houses) and commercial buildings, such as offices, shops and industrial buildings)
- contents insurance.

2.3 Financial loss

Financial loss indemnifies the insured against financial losses arising from certain causes.

Examples of financial loss insurance include:

- creditor insurance – where the policy will make regular loan repayments if the policyholder becomes disabled (so that they cannot work) or otherwise unemployed
- business interruption cover – where the policy will pay out to compensate the policyholder for not being able to conduct their business, *eg* as a result of a fire in the building.

2.4 Fixed benefit

The defining characteristic of fixed benefit insurance is that the benefits are specified, fixed amounts, payable on certain losses occurring, which may or may not be enough to compensate the policyholder for the full loss incurred.

An example is personal accident insurance, where the insured receives a fixed payment on suffering a specified injury, *eg* the loss of a limb.

2.5 Combining categories of insurance

Insurance policies may comprise elements of one or more of these types of cover.

Example – comprehensive motor insurance

A typical comprehensive motor insurance policy will provide cover for:

- compensation for personal injury to third parties and damage to their property
- compensation for loss of or damage to the insured's vehicle
- fixed benefits in the event of defined categories of personal accident to the insured.

Therefore, a typical motor policy may comprise elements of liability, property and fixed benefit cover.

Example – household contents insurance

A typical policy covering household contents will provide cover for the financial loss, property damage and liability of the insured (and any member of the insured's family living at the same address) to third parties.

Therefore a household contents policy may comprise elements of property and liability cover.

Question 1.8

Give an example of how, under a household contents policy, the insured may be liable to a third party.

Policies that are likely to be combined as a single product are described further in Chapter 2.

2.6 The customer

Personal lines and commercial lines business

General insurance may be sold to both individuals and businesses.

Insurance products sold to individuals are known as *personal lines* business. They include private motor, domestic household, personal accident and travel insurance.

Insurance products sold to businesses are known as *commercial lines* or *group business*.

Supported policies

Policies for small businesses often include all types of cover the business needs apart from motor; appropriately, they are called "supported policies".

Question 1.9

List the types of cover a small retailer might require as part of a "supported policy".

3 Cover provided

For each of the four main types of insurance, the features will be discussed in the following sections under six headings:

- benefits
- insured perils
- basis for cover
- measures of exposure to which premiums are related
- claim characteristics
- risk factors and rating factors.

In the next chapter, the products are discussed under the headings of the main types of cover that they provide.

Any unusual words or phrases, for example *risk factors* used in the above paragraphs will be explained fully later in this chapter.

The following *general* comments relate to these six headings.

3.1 Benefits

The benefits provided by an insurance policy will vary between types of insurance and between insurers. Typically, the intention is to provide the insured with money to cover his or her financial loss as a result of an insured event, although policies that provide benefits in kind are also possible (for example, the provision of a courtesy car under a motor policy while your car is being repaired).

Question 1.10

Describe the benefits you would expect to receive for each of the following claims:

- loss of luggage whilst on holiday
- loss of a finger
- loss (to your vehicle and injury to yourself) as a result of a car accident.

In some territories, certain insurance cover is compulsory.

3.2 Insured perils

A *peril* is a type of event that may cause losses, *eg* theft or flood. In virtually all types of insurance, it would be impossible to list all possible perils against which a policyholder might wish to be protected. Claims can result from a very large number of perils; not all of them will be currently apparent and not all of them will be standard to every insurance product on the market.

The perils are also likely to vary by country. For example, in some countries it is more likely (or necessary) for perils such as volcanic activity or stampeding animals to be included in the cover.

The precise form of the cover provided in respect of any insured peril may vary between insurers, and the benefits provided may be defined in any one of a number of ways.

Exam Tip

The examiners will expect candidates to apply some common sense to extend the examples or groupings given for the products mentioned in this chapter and the following chapter.

3.3 Basis for cover

This section describes the basis on which different types of cover may be written. Insurance policies may be written as *losses-occurring* policies or *claims-made* policies. In this course, you will also come across the *risks-attaching* basis, but this is used mainly for reinsurance and will be discussed in the reinsurance section of the notes.

Losses-occurring policy

A losses-occurring policy is a policy providing cover for losses occurring in the defined period no matter when they are reported. Note that a losses-occurring policy may also be referred to as a "claims-occurring policy". Cover is provided if the loss occurs while the insurance policy is active.

Claims-made policy

A claims-made policy covers all claims reported to an insurer within the policy period irrespective of when they occurred. Note that a claims-made policy may also be referred to as a "claims-reported policy". Even if the claim event happened while the insurance policy was not active, it will still be paid if the policy is in force when the claim is reported.

Question 1.11

An individual purchases a one-year motor insurance policy from Cars 'R' Us on 1 January 2011. The following year, he buys another one-year policy from Cars 4 You.

On 27 December 2011, the individual has an accident, which causes significant damage to his car. He decides to wait until the New Year to report the claim.

Which insurer should the individual contact if the policies are written on a:

(a) losses-occurring basis

(b) claims-made basis?

Which basis do you think is more common for this type of insurance?

Question 1.12

What characteristics of claims might make a claims-made basis appropriate?

Question 1.13

What is the key problem for an employer in switching insurance from an insurer giving cover on a claims-made basis to an insurer giving cover on a losses-occurring basis?

3.4 Measures of exposure to which premiums are related

An exposure measure is an indication of the level of risk a policy presents to the insurer. This section discusses the underlying principles involved in choosing exposure measures. More specific comments on the various measures used for different insurance classes are given later in the chapter. As you read the Course Notes think actively about how the practical choices made have been influenced by the principles.

One of the objectives of the insurer when setting premium rates is to charge a premium that accurately reflects the amount of risk. The *pure risk premium* is the premium required to cover the expected claim amount only. No allowance is made for expenses or profit. For example, if a particular policy gives rise to a claim of R100,000 with a probability of 10% and no claim otherwise, the pure risk premium would be R10,000. The *actual premium* charged would then need to cover this level of risk and also include an allowance for expenses, profit and investment income and any other loadings.

Selection, anti-selection

If an insurer does not charge premiums that accurately reflect the amount of risk, the insurer may suffer from selection (strictly called anti-selection in this context). If in the example above the insurer charged a premium based on a risk premium of R12,000, they may not get the business if other more accurate insurers used a risk premium of R10,000. On the other hand, if they allowed for only R8,000 they might get lots of business but make a loss!

In general, insurers who fail to charge premiums that reflect the amount of risk run the danger of getting little business (premiums too high) or lots of loss-making business (premiums too low). Assessing the amount of risk involved with a particular policy is a critical aspect of an insurer's work.

Question 1.14

Do the dangers of selection still exist if all insurers charge the same premiums?

Exposure

In practice, insurance proposals do not come with neat little labels stating the probability of claim and the expected cost per claim. The amount of risk underlying an individual policy is often largely unknown. In fact, the amount of risk is *never* known exactly.

For the purpose of setting premiums, insurance companies try to determine measures that give an indication of how much risk there is within each policy. These measures are called *measures of exposure*.

In practice, the chosen measure of exposure should meet two key criteria:

(a) It should be a good measure of the amount of risk, allowing for both the expected frequency of claim and the expected severity of claim (*ie* the average claim amount). In other words, the total expected claim amount should be proportional to the exposure.

(b) It should be practical. This criterion embraces several aspects. The measure should be objectively measurable and should be easily obtainable, verifiable and not open to manipulation.

There are rarely perfect measures of exposure that completely define the amount of risk underlying each policy. For most classes in fact, the exposure measure used is a basic principal indicator of risk. Given a measure of exposure, risk can be further classified by rating factors. These are discussed further in Section 3.6.

In some types of insurance there is a degree of choice as to the measure of exposure, as it will not be immediately obvious which reliable and measurable factor bears the closest relationship to the expected claim amounts. Examples of measures used in some classes are given in the next chapter.

An exposure measure isn't just a factor that is used to calculate a premium. It is a measure, which when added over all policies, gives an indicator of the "volume of business" or the total amount of risk. As such, the expected total claim amount should be proportional to the exposure. Clearly the best measure of exposure is then the expected claim amount on each policy, but exposure should also be a simple measure that is verifiable *etc.* The number of policies always has this property but there may be another quantifiable factor on each policy that works better.

Question 1.15

Give another possible exposure measure, other than the number of policies, that would give a reasonable indicator of the total level of risk on any portfolio of business.

3.5 Claim characteristics

As discussed in the introductory chapter, delays exist from the claim incident until the final settlement of the claim. These delays can be broken down into reporting and settlement delays. The delays arise because several things need to be confirmed before a claim can be settled:

- whether or not there has been a loss
- whether or not the insured is liable (and by implication whether the insurer is liable). Even if the insured is liable, the claim paid by the insurer may be reduced if negligence by the insured has contributed to the loss.
- the amount of the loss (and claim settlement amount).

Claim characteristics refer to the amount that becomes payable for a given claim and to the ways in which and speed with which the claims:

- originate
- are notified
- are settled and paid
- are, on occasion, reopened.

Claim characteristics also refer to the frequency with which claims are made. For some lines of business, such as private motor insurance, claims occur with a far higher frequency than other lines, such as various liability classes.

When assessing claim characteristics, it is therefore necessary to consider:

- delays (reporting, settlement *etc*) and hence whether claims are short-tail or long-tail claims
- claim frequency
- claim severity / amount (allowing for accumulations, catastrophes *etc*).

Claim frequencies and claim costs are often discussed in terms of claim frequency and claim cost distributions respectively. These are just statistical distributions for claim frequency and individual claim cost.

All of these features have implications for the assessment of risk borne by the insurer.

3.6 Risk factors and rating factors

The fact that exposure measures are never perfect measures of the amount of risk means that there is scope for refinement of the premium even after applying the exposure measure. An example will help to illustrate the point.

Example

Consider a special class of insurance whereby policyholders who bang their heads on doorframes or low ceilings of homes are entitled to an insurance payment. The worse the injury, the more the payment.

What exposure measure should we use to determine premiums? There are several candidates, but let's suppose that we decide to use the policyholder's height as the basis for setting premiums. Our measure of exposure would then be centimetres. Exposure measures often incorporate time units to reflect the fact that policies for two years present twice the risk to the insurer and should be charged twice the premium of one-year policies. Hence our exposure measure is *centimetre-years*. If the premium is R0.10 per centimetre-year, a policyholder of height 175*cm* would be charged an annual premium of R17.50.

Question 1.16

Do you think that centimetre-year is the *best* exposure measure to use? If not, explain why and suggest an alternative. Remember, be creative! Don't be scared to think of new ideas... This is a skill you must practise if you want to do well in Subject F103.

In this example, our insurance company may still be exposed to the possibility of selection. The premium rating structure has done nothing to incorporate allowances for the following factors:

- the non-linearity of the relationship between height and risk
- short-sighted people may hit their heads more often
- clumsy people may hit their heads more often
- people who move around quickly will hit their heads harder
- people living in homes with low doorframes and ceilings will hurt themselves more often.

These further considerations of risk are called *risk factors*. Note that the exposure measure itself is also a risk factor. Risk factors are any factors that have a bearing on the amount of risk.

To prevent selection, the insurer must try to incorporate these factors into the premium rating process. If our 175*cm* policyholder turned out to be short-sighted, clumsy, fast and the inhabitant of a 16th Century cottage, the premium might be increased from R17.50 to, say, R40 each year.

Risk factors will depend on precisely the cover provided, but the factors applicable in most cases are given in the next chapter.

Sometimes direct use of the risk factors in the rating process is not practical (*eg* the risk factors may not be easily measured). In these cases, other factors that are more easily identified may be used as proxies for the underlying risk factors. The expression for the factors actually used in the premium rating process is *rating factors*.

Rating factors will be either objectively measurable risk factors or other factors that can be used as reliable proxies for the risk factors. Where credible exposure and claims data exist, experience rating can be used to take account of residual risk factors. Past experience is essentially used as a rating factor in experience rating.

This is saying that we can use the actual claims experience of the insured in the past to help set an appropriate premium for the future. For example, the number of claims you have made on your motor policy is likely to affect your insurance premium. Experience rating is discussed later in the course.

Note that in some countries, certain rating factors are not allowed to be used by law. For example, the European Court of Justice recently ruled that a person's sex can no longer be used to calculate insurance premiums.

You may hear the term *underwriting factors* used by some practitioners. There are some differences in how this term is used with some taking it as synonymous with rating factors. However most take it to mean rating factors plus subjective factors that, although they cannot be measured, the underwriter takes into account in setting premiums or policy conditions. A subjective factor in our head-banging example might be how accident-prone the person appeared to be.

3.7 Combining exposure measures, risk factors and rating factors

The following statements follow on from the discussion above:

(a) The more heterogeneous the class of insurance and the types of risk covered, the greater the number of risk factors needed to identify or define the amount of risk.

If, for example, we were dealing with a class of business where all the risks were identical, there would be a single premium rate that applied to all policyholders. In this case there would be no additional rating factors.

At the other extreme is a class of insurance like private motor where the risks are very heterogeneous. The amount of risk will vary from one policyholder to another according to a great number of risk factors. We will see later that for motor insurance, many rating factors are used to calculate the premium.

(b) The better the measure of exposure in identifying the amount of risk, the lesser the importance of other rating factors to quantify the risk not accounted for by the exposure measure.

(c) The choice of rating factors will depend on the choice of exposure measure.

Sometimes an exposure measure used in practice does not satisfy the ideal property of proportionality exactly. The exposure measure can be used as a rating factor as well. A real-life example that you will see is domestic property insurance in which the size of the property (*ie* the sum insured) is taken as the exposure measure.

For contents insurance the main peril is theft but the sum insured includes the value of items that are rarely stolen, such as carpets, curtains, the toilet brush *etc*. If the value of the goods likely to be stolen, as a proportion of the total sum insured, tends to decrease as the total sum insured increases then the expected loss increases less than proportionately with the sum insured. Therefore an insurer might use sum insured as a rating factor as well as an exposure measure.

It may do this by charging different rates for different bands of sum insured. An example is shown in the following table.

Sum insured band	*Premium rate per 1,000 sum insured*
0 – 10,000	18.6
10,001 – 20,000	17.5
20,001 – 30,000	16.9
> 30,000	16.7

In one sense, the exposure measure is always a "rating factor" as it always affects the premium. However, "rating factor" is usually used to mean a factor that affects the premium rate, hence these comments.

In the above example, the insurer should be careful when interpreting total exposure as an indication of the level of risk, because the level of risk will depend on the mix between policies with high and low sums insured.

The rating factors used in practice will vary between different insurers as they attempt to find a competitive edge. The more common rating factors for household insurance, some of which have been justified by statistical analysis, are given in the next chapter.

Question 1.17

(a) What are the main criteria in the choice of an exposure measure?

(b) What is the difference between a risk factor and a rating factor?

(c) Why are rating factors needed?

(d) What is the difference between a rating factor and an underwriting factor?

Question 1.18

Under what circumstances would an insurer's underwriters not look at the risk and rating factor details for new policy proposals?

4 How does the insurer's risk vary by class?

Some classes of business cause insurers more risk and uncertainty than others because of the nature of the risks involved and the claims that can arise from those risks.

4.1 Homogeneity of risks

Where there is a lack of homogeneity of risks within a class of business, there is greater risk to the insurer.

Even within a given rating category, exposures can be very variable and dissimilar.

In commercial buildings insurance, for instance, properties can vary considerably by size, construction and value. Moreover, you may have a mixture of properties, ranging from small shops to large chemical factories.

You can therefore have policyholders with very different risk potential within the same rating category. This will be reflected in the subsequent claims experience, and its inherent variability. This will be particularly true for some of the liability classes.

For certain other classes, the risks within each rating category tend to be more homogeneous, and the experience will therefore tend to be more predictable from year to year. Private motor is an example of this, due to the large number of rating factors used to categorise risks. Some insurers also insure vast numbers of (independent) cars, which reduces the relative variability of the experience, and so also increases the predictability.

4.2 Non-independence of exposures

The variability is increased where exposures are not independent, as this can lead to an accumulation of risk. For example, if the majority of policyholders in a household insurance portfolio live in a certain area of the country, there will be a disproportionate claim cost if there is a local catastrophe. If the book has exposures spread across the country (and so more independent geographically), the claim cost will not be affected so greatly by a local catastrophe.

Some classes will lend themselves more to independence than others. For example, a personal motor insurance portfolio should have a reasonable spread of exposures (because motor insurance tends to be sold nationally), whereas creditor insurance (which pays claims when debtors default) will be heavily linked to the state of the economy and unemployment levels (which affects the number of debtors defaulting).

4.3 Changing risk

Another feature leading to risk uncertainty is that the nature of the risk may change over time (during a particular policy year and in succeeding years).

Examples include:

- a change of fire precautions within a building
- a change of drivers or location under a motor policy
- a change in economic conditions under a mortgage indemnity policy.

In each example above, the insurer's risk portfolio will change over time from that originally written, leading to difficulties in pricing and managing that portfolio.

In some cases a change in the underlying risk should be notified to the insurer by the policyholder. For example, a motor policyholder should inform the insurer if he or she moves house; this is a rating factor. This is a condition set out by the insurer. In extreme cases, failure to notify the insurer could make the cover void.

Changes in background conditions, such as economic conditions, would not normally need to be notified because they are not specific to any policyholder.

Some classes of risk vary more than others in this respect. Employers' liability can also fluctuate markedly in certain years, due to the turnover of employees, or through business acquisitions. Other classes of risk can be fairly stable in the short term.

Question 1.19

How stable would the risk be for a typical simple industrial buildings and contents policy (with no business interruption cover) for a manufacturing company?

4.4 How do claim characteristics affect risk?

Numbers of claims

In general insurance, as distinct from life assurance, there is often no limit to the number of claims that can arise from a policy while it is in force.

Some classes, such as motor and household contents, have a relatively high claim frequency, with sometimes 30% or more of policies having a claim each year. Other types of cover can have much lower claims frequency, particularly commercial classes with high excesses.

Examples of such commercial classes include public and product liability and commercial buildings.

Claim cost

When the basis of cover is indemnity, rather than fixed benefit, the cost of a claim from any given policy cannot be predetermined and is often very variable.

While there will often be a maximum sum insured stated (or implied) in the policy, relatively few claims will be settled for that maximum sum. The usual principle of general insurance is to indemnify the insured for any losses or claims made upon him or her. Most claims will therefore be for only a portion of the maximum cover, depending on the circumstances of the incident.

For most classes, a large proportion of claims will be for small amounts and there will be only a small number of large claims. The precise distribution of claim amounts will, however, vary greatly by class, in particular between property and bodily injury claims, and also year by year.

When a probability distribution is used to represent the distribution of the sizes of claims in a class of business it is conventional to use highly skewed distributions with no theoretical upper limit, such as lognormal or Pareto.

Risks / policies are not all identical even within the same class of business and each risk has its own claim cost distribution. However, risks are often too small for their claims to yield useful information individually so their experience is aggregated to derive parameters of the claim cost distributions when the risks are homogenous enough and attritional (many small claims as opposed to few large claims). The shape of these claim cost distributions depends on risk characteristics demonstrated by different classes of business and the insured's risk profile, among other factors.

Claim inflation

Where a class is exposed significantly to the risk of inflation, any unexpected change in inflation, for whatever reason, will affect the risk profile of that business.

Different classes of business are affected by inflation in different ways:

- Property insurance responds mostly to the cost of property, and claims will tend to increase in line with general inflation, although repair costs can be linked to earnings.

- A large proportion of motor claims cost is for the repair of vehicles, and will be affected by the level of earnings since these determine labour costs.

- Liability classes are often subject to higher levels of inflation, especially on personal injury claims, as there is a trend to more generous compensation in many markets. However, this may arise in steps rather than as a continuous process of inflation, as landmark legal judgements are handed down or legal reform comes into effect.

Delay patterns

An insurer's ability to manage a general insurance account is further complicated, and hence the degree of risk increased, by the length of time that it takes for claims to emerge, to be reported and to be settled.

Claim delays can arise for various reasons, for example:

- a delay between the incident occurring and the policyholder becoming aware of it, *eg* the time between a burglary occurring in a property and the policyholder returning home to discover it

- a delay between the insured becoming aware of the loss and reporting it, *eg* the policyholder may be slow to report a claim amount if it is quite small

- a delay before sufficient details of the incident can be gathered to assess the value of the claim

- a delay until an injured party's condition stabilises to the extent that assessment of damages is appropriate, *eg* to assess whether the injured party will recover or is now permanently disabled

- delay in agreeing the actual value at which the claim is to be settled, and the payment of this amount to the insured.

The typical extent of such delays will differ according to the class of business.

Bodily injury cases tend to have the longest delay tails, owing to the contentious issues of many of the claims involved, often with the need for legal proceedings. This may be worsened by the greater likelihood of latent claims or claims for industrial disease where the delay from event to reporting can be considerable.

For example, some liability claims relating to disease and pollution have taken decades to emerge. In many cases, the insurers were largely ignorant of the potential risks at the time that cover was given. Such claims are known as *latent claims*. The possibility of latent claims increases the level of risk for insurers.

By contrast, property damage classes have a much shorter delay tail, and hence in this respect a lower degree of risk, since the losses are more immediately apparent and can usually be valued reasonably accurately by a competent assessor.

Until all claims have been settled from a given exposure period, you are uncertain both as to the number of such claims and, more importantly, their cost. This will have consequences for setting reserves when drawing up your accounts, and for evaluating future rating needs.

Also, while claims are outstanding they will be subject to increases in cost due to inflation, sudden jumps in court awards, changing legislation and indirect taxes. This further complicates your ability to estimate future claim settlement costs.

Question 1.20

One of your student colleagues says that for motor third party cover, liability claims are long tailed and property claims are short tailed. Do you agree?

Variability of experience

Depending on the class involved, the numbers of claims can vary according to such features as unusually bad weather, the economic situation and catastrophes.

Some classes are more susceptible than others to individual claims that are large enough to affect the results of the whole class.

The pattern of claims arising within a year for any given class will rarely, if ever, equate with the theoretical claims cost distribution for that class. One or more very large claims or a single event leading to a large number of claims can easily swamp the normal (or most likely) claims cost in that year.

Accumulations

The insurer can be exposed to accumulations of risk if the portfolio is unbalanced. There is a possibility of many claims arising from a single event or a single cause.

Some classes of business are particularly subject to accumulations of risk.

Property classes are prone to catastrophes: external events that affect a large number of policies at the same time, possibly causing mainly small claims, but in aggregate giving rise to a very large total loss. The most important examples are extreme weather, earthquakes and civil disturbance.

Such accumulations tend to be based on single events affecting a number of risks in the same geographic region.

However, such accumulations need not be single incidents, but rather an underlying cause; for example, a very dry summer may cause a large number of subsidence claims, although there is no single event to link them.

Subsidence is a peril that is commonly covered under household insurance. This is where the ground caves in or "sinks" beneath the house.

Other forms of accumulation are not necessarily based on geographical concentration, *eg* for creditor insurance, there may be many claims triggered by high unemployment.

Liability insurance is less susceptible to large single incident accumulation losses, but a single cause may give rise to a large number of claims. The most obvious example is exposure to asbestos, which has given rise to claims under liability policies that are expected to exceed any single event catastrophe.

Fraudulent claims

Certain classes are more exposed than others to the risk that the insured will make false or invalid claims, or exaggerate the amount claimed following a loss. Often, it will be difficult or uneconomic for the insurer to check whether the claims are genuine or not. At the extreme such false claims could include arson and embezzlement. The rate of fraudulent claims has been observed to increase in times of economic hardship.

Examples of fraudulent claims under personal lines cover can include:

- Motor: a policyholder, with third-party, fire and theft cover (motor insurance excluding accident cover), suffers non-claimable damage to the insured vehicle. The policyholder then drives the vehicle to a remote spot, destroys it by fire and claims under the fire section of the policy.
- Household contents: claims are made for loss of fictitious articles, or the values are exaggerated.
- Buildings: claims are made for defective roofs, which are really due to natural wear and tear.
- Buildings: after a genuine insured loss, a builder may offer to add the amount of the insurance excess to his invoice. The insurer then unwittingly pays the full amount of the actual repair cost.

Under commercial lines of business, examples can include:

- Buildings: the insured deliberately sets fire to the insured premises because the business is losing money, and the insured stock is actually of little value.
- Liability: malicious or extravagant claims are made by third parties because they have seen people with valid claims receive substantial court awards.
- Financial loss: embezzlement, fraud or falsification of accounts is carried out by the insured, in order to exaggerate a loss.

In all cases, these risks tend to be greatest during periods of economic downturn and depression. The insured sees the insurer as an illegal means of recovering losses that may threaten the insured's own financial position.

Question 1.21

If you were the owner and manager of a general insurance company, what would you do to try to reduce the fraudulent claims against you?

5 Capital requirements and impact on solvency

General insurers require resources beyond those needed to cover their technical liabilities in respect of the business they have written, as discussed in the introductory chapter. If the number or cost of claims is greater than the reserves held to meet the claims, then the solvency margin (free reserves) will be needed to pay the claims.

Question 1.22

What are the reasons for a general insurer holding free reserves?

Determining the capital that a general insurer ought to hold to cater adequately for the risks associated with the business it transacts is a complex issue.

Generally, for two classes where the same amount of business has been written (measured by premium income), the capital requirements should be larger for the class with the greater uncertainty and variability in its future claims experience and in the run-off of reserves.

For example, the longer the tail of the business written the greater the uncertainty and hence, other things being equal, the more capital will be required. In addition, the more prone the class is to large individual claims or accumulations (even if short-tailed), the more capital will be required.

In setting its capital requirements, beyond those specified by law, the general insurer will need to take into account the uncertainty and variability of the business it writes.

Question 1.23

Rank the following classes in decreasing order of uncertainty and variability of future claims experience:

- employers' liability
- household contents
- motor liability.

When considering its capital requirements a general insurer will need to consider each class of business individually. However, its overall capital requirement will be more important. An insurer that writes a variety of classes of business with a good spread of risks is likely to be exposed to less overall uncertainty than one that writes limited classes of business in a limited market due to the principle of diversification.

You will probably already be familiar with the principle of diversification of investments. Holding equities, fixed interest bonds and property is usually considered less risky than just holding property. This principle can also be applied to the liabilities too. An insurer that writes lots of different classes of business is exposed to less risk compared with an insurer that concentrates on one class.

6 Glossary items

Having studied this chapter you should now read the following Glossary items:

- Accumulation of risk
- Claim cohort
- Deductible
- Discovery period
- Expiry date
- Exposure
- Exposure unit/measure
- First loss
- Knock-for-knock agreement
- Latent claims
- Line
- Long-tailed business
- Moral hazard
- Nil claim
- No-claim discount (NCD)
- Peril
- Personal lines
- Protected NCD
- Rating factor
- Retroactive date
- Risk factor
- Risk premium
- Salvage
- Short-tailed business
- Subrogation
- Sunset clause
- Uberrima fides
- Underinsurance
- Underwriter
- Underwriting
- Underwriting factor
- Zero claim.

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Chapter 1 Summary

General insurance principles

For a risk to be insurable the policyholder should have an interest in the risk, the risk should be quantifiable and the amount payable must bear some relationship to the financial loss incurred.

Ideally, risk events should:

- be independent
- have low probability of occurring
- be pooled with similar risks
- have an ultimate liability
- avoid moral hazards.

In addition, there should be sufficient data to enable the insurer to estimate the size of the risk and likelihood of occurrence.

Principles underpinning an insurance contract include assessing the insurable risk, the details of the proposal form and contract itself, identifying an insurable interest and *uberrima fides*.

Exclusions are used to avoid payments by the insurer for a variety of reasons.

Types of product

The generic types of general insurance cover:

- liability to third parties
- property damage
- financial loss
- fixed benefits.

Cover provided

The benefits usually aim to indemnify the insured for any financial losses suffered as a result of an insured event, although fixed benefits may sometimes be provided. A peril is a type of event that may cause losses, *eg* theft, flood. Policies may be written on a losses-occurring or a claims-made basis.

The exposure measure is the principal measure of risk for an individual policy. Premiums will be set according to the measure of exposure.

The claims characteristics refer to the ways in which and speed with which they originate, are notified, are settled and paid and are, on occasion, reopened. Claim frequency and amount are also relevant. Claims characteristics vary by class.

Risk factors are any factors that have a bearing on the amount of risk. *Rating factors* are factors that are actually used in the premium rating process. Rating factors are either measurable risk factors or proxies for the underlying risk factors (*ie* where it is not practical to use the true risk factor).

Underwriting factors are rating factors, together with subjective factors that cannot be measured, but will still be taken into account when setting premiums / policy conditions.

Selection against the insurer may occur where an insurer's premium rating structure does not reflect the underlying risks, especially if premiums differ from those offered by the rest of the market.

How risk varies by class

Some classes of business cause insurers more risk and uncertainty than others because of the nature of the risks involved and the claims that can arise from those risks. Factors that affect the level of risk and uncertainty include:

- homogeneity of risks
- non-independence of risks
- changing risks
- numbers of claims
- claim cost
- claim inflation
- delay patterns
- variability of experience
- accumulations
- fraudulent claims.

Capital requirements and solvency

General insurers will be required to hold capital over and above their technical reserves. This capital is known as solvency capital.

Generally, the capital requirements will be larger for a class with a greater uncertainty and variability in its future claims experience.

Chapter 1 Solutions

Solution 1.1

Moral hazard is defined in the Glossary as the risk that an insured may act differently because of being insured, *ie* the policyholder may become less risk averse. For example, a policyholder may start to leave spare keys under the doormat after taking out household contents insurance because they feel less concerned about possible adverse consequences.

Solution 1.2

An insurer will base its premium rates on the expected claim amounts. This will take into account the expected frequency of claims and the expected size of the claims.

The higher the sum insured the higher the expected size of claims. Therefore if a policyholder quotes a sum insured lower than the actual value of the contents, there is a risk that the premiums will be inadequate.

Solution 1.3

An excess:

- reduces the amount of each claim (by the excess)
- reduces the number of claims (all claims less than the excess are eliminated)
- in particular eliminates the small claims just above the excess, where the policyholder may feel it's not worth claiming and results in expense savings
- arguably encourages policyholders to be more careful and so helps prevent claims
- may allow the company to reduce premiums and so make them appear more competitive.

Solution 1.4

Suppose we have two policies. Policy A has an excess of R500 and policy B has a deductible of R500. The policies are identical in all other ways. The policies have a sum insured of R10,000.

For any claim less than the sum insured of R10,000 both policies pay the same amount to the insured, *ie* claim less R500.

The amount paid by the insurer on the two policies is different if the claim exceeds the sum insured. Suppose the claim is R15,000.

Policy A pays R10,000. Policy B pays R9,500 (*ie* the amount is reduced by the deductible).

An easy way to remember this is that for a deductible, the claim is calculated subject to the limit of the sum insured and then the deductible is taken off to determine the amount paid by the insurer. While for an excess, the excess if first taken off the loss, and then of payout is determined based on the remaining loss subject to the sum insured limit.

So in the above example with a loss of R15,000:

Deductible of R500: first limit to sum insured => claim of R10,000. Then take off deductible => claim payout = R9,500.

Excess of R500: first reduce loss by excess => claim of R14,500. Then limit to sum insured => claim payout = R10,000.

Solution 1.5

- nuclear or radio-active risks
- earthquakes
- unseaworthiness of vessels
- loss of money and documents

Solution 1.6

- certain specified uses, *eg* for business (unless explicitly allowed), racing
- depreciation, wear and tear, or damage to car tyres
- where there was an element of illegality, *eg* the driver did not hold a driving licence or was under the influence of alcohol or drugs
- insured's personal accident benefits where the insured is very old
- losses arising in consequence of earthquakes, war, riot or civil commotion

Solution 1.7

Exclusions might be used:

- to avoid payment by the insurer in situations where:
  - the policyholder is at an advantage through possessing greater personal information about the likelihood of a claim
  - the claim event is largely under the control of the policyholder
  - the claim event would be very difficult to verify
  - loss occurs as part of the normal course of events, and could be considered to be depreciation
- where the risk cannot be reliably estimated by the insurer, regardless of whether or not the policyholder has better information
- when the probability of loss is very high
- the risk is covered by a third party such as the government
- to limit the scope of the policy to make it more appropriate for a particular target market
- to reduce the premium for competitive reasons
- to reduce the risk of moral hazard and fraud.

Solution 1.8

Cover may be provided in respect of visitors' belongings that may for example be damaged in a fire. Also the insured may be indemnified for personal liability arising out of accidents to members of the public somehow caused by the property of the insured, *eg* a garden fence falling on a pedestrian.

Solution 1.9

Other than motor (which is not usually included in "supported policies", a small retailer might require cover to:

- compensate employees for accidents occurring due to negligence of the employer (employers' liability and personal accident)
- compensate third parties, *eg* customers, for accidents occurring in the shop / on the shop premises (public liability)
- protect against damage to the shop (commercial buildings cover)
- compensate for lost revenues should the shop be unable to trade (business interruption cover)
- protect against loss of or damage to stocks while in the shop (moveable property (contents) cover)
- protect against loss of or damage to stocks while in transit (goods in transit cover)
- protect against bad debts by suppliers of goods / materials (credit insurance)
- protect against bad debt by customers buying goods on trade credit (credit insurance)
- protect against financial losses due to dishonest actions of employees (fidelity guarantee insurance)
- pay any legal expenses as a result of legal proceeding being initiated against the shop or the shop needing to initiate legal expenses against another party (legal expenses cover).

Don't worry if you didn't get all (or even nearly all!) of these points. However, hopefully by the time you've finished reading the next chapter, it won't seem like such a tall order!

Solution 1.10

Loss of luggage whilst on holiday

Your insurance is likely to cover you for the cost of the luggage, subject to any limits that may apply. This is an example of the benefit being money to cover financial loss as a result of an insured event.

Loss of a finger

Your insurance is likely to provide a fixed benefit that is intended to go (at least) some way towards compensating you for the loss. It is usually impossible to quantify exactly how much the payment should be.

Loss (to vehicle and self) as a result of a car accident

Your insurance is likely to cover you for the cost of damage to your vehicle and will also compensate you for your discomfort or inconvenience. The former should be fairly straightforward to determine (as it is should cover the financial loss incurred). The latter may be more complicated: the insurance policy may specify the amount of the payment, which would depend upon the type of injury, or alternatively the payment may have to be determined by the courts.

Solution 1.11

(a) The accident occurred when the individual was insured by Cars 'R' Us. Therefore for a losses-occurring basis, the individual should contact Cars 'R' Us to report the claim.

(b) The individual is reporting the claim while the insurance cover is being provided by Cars 4 You. Therefore for a claims-made basis, the individual should contact Cars 4 You to report the claim.

A losses-occurring basis seems more sensible, as this is not affected by when the individual chooses to report the claim. In other words, under this basis, the individual cannot *choose* which insurer should pay the claim.

Solution 1.12

A claims-made basis may be appropriate when it is not clear when the loss actually occurred. This might be true for certain types of liability classes, where the loss emerges gradually over time, *eg* deafness caused by continual exposure to loud noises at work under an employers' liability product.

Solution 1.13

There is the potential for a gap in the cover. For example, suppose, as an employer, we switch on 1/1/09 from a policy on a "claims-made" basis to a policy on a "losses-occurring" basis. Then on 2/1/09 we discover that our foreman, Bert, who suffered an injury at work last year which appeared to have completely healed, has had a major relapse and is instituting proceedings for compensation.

We cannot claim for this under our current policy, since the event occurred last year. We cannot claim for it under our previous policy either, because the claim was not reported last year.

Solution 1.14

Yes. If insurance is optional, policyholders may select against the insurance market. Those least likely to claim may choose not to purchase insurance and vice versa.

Solution 1.15

Premiums. The total premium should be a good indicator of the total risk on a portfolio of business. Alternatively sum-insured will give an indication of the total risk. An advantage of using sum-insured is that it can be compared between successive years because it is not influenced by premium rates.

Solution 1.16

Probably not. The reasons why include:

- The risk does not increase linearly with the exposure measure. For example, a child whose height is 110*cm* is no more likely to hit their head than one whose height is 90*cm* (and possibly less likely, if they are a couple of years older).
- It is not very practical. It would not be easy to verify (cheaply) and will be continuously increasing for the young.
- A better measure of exposure is probably person-year. It is much more practical and when all other factors are constant, it will be proportional to the expected claim amount.

Solution 1.17

(a) An exposure measure should be:

- a good measure of the amount of risk (*eg* doubling the exposure measure should double the amount of risk)
- measurable
- easily obtainable and objectively verifiable
- not capable of manipulation.

(b) A *risk* factor is a factor that affects the level of risk for a particular policy.

A *rating* factor is a factor used in the rating process, either because it is a measurable risk factor or because it is a proxy for a risk factor.

(c) Rating factors are needed because different policies have different levels of risk and because the exposure measure is rarely good enough by itself to gauge the level of risk.

(d) An *underwriting factor* is one that is used to determine the premium, terms and conditions for a policy. It may be a rating factor or some other risk factor that is accounted for in a subjective manner by the underwriter. Remember that rating factors must be measurable, verifiable *etc.*

Solution 1.18

- the potential claim amount is very small
- risks are very homogeneous, so standard book rates apply to all risks

Solution 1.19

Manufacturing companies are unlikely to change the nature of their business markedly during any given year, although in the longer term they may do so. The value of the stocks and output may vary, however, depending on the economic climate and the time of year.

Overall, the risk will be fairly stable unless stock levels are significant and variable.

Solution 1.20

Not quite. Many liability claims involve property damage only (for example, if you accidentally scrape against somebody else's car in a car park). These claims will also be relatively short tailed (although there may be some delay whilst you argue whose fault it was). The student has therefore confused the term *liability* with *bodily injury*, a common mistake. This will be discussed in more detail in Chapter 2.

Solution 1.21

Who knows what you may have dreamt up! Doing unspeakable things to the body, or family, of anyone you catch probably wouldn't go down too well. Things that insurers have tried include:

- making the policy wording as tight as possible, and reviewing it regularly in the light of market and judicial changes
- devising contracts which minimise the risks, *eg* minimum and indexed sums insured for household contents policies
- working together with others to try to identify and punish persistent offenders
- random spot checks on claims, even smaller ones. An extension of this is to use fraudulent claims identified in the past and statistical techniques to inform the decision of which claims to do spot checks on.
- having repairs done by a small number of approved firms (rather than at the choice of the claimant)
- insisting on the police being involved before paying out on a theft claim
- publicity to advise against it, *eg* "It's a crime to ..." and "Look what happened to this fraudster ...".

Solution 1.22

- it may have to by law
- to guard against catastrophes / accumulations / latent claims
- to guard against lower than expected investment return
- to give more investment freedom
- to guard against higher than expected expense or expense inflation
- to guard against failure of a third party, for example a reinsurer or broker
- to reduce the need for reinsurance
- to attract new business
- to demonstrate financial strength, *eg* to regulators, shareholders, analysts

Solution 1.23

employers' liability, motor liability, household contents

Motor liability has a longer tail than household contents because of the occasional bodily injury claim.

