

# Subject SP2

## CMP Upgrade 2022/23

### CMP Upgrade

This CMP Upgrade lists the changes to the Syllabus, Core Reading and the ActEd material since last year that might realistically affect your chance of success in the exam. It is produced so that you can manually amend your 2022 CMP to make it suitable for study for the 2023 exams. It includes replacement pages and additional pages where appropriate.

Alternatively, you can buy a full set of up-to-date Course Notes / CMP at a significantly reduced price if you have previously bought the full-price Course Notes / CMP in this subject. Please see our 2023 *Student Brochure* for more details.

We only accept the current version of assignments for marking, *ie* those published for the sessions leading to the 2023 exams. If you wish to submit your script for marking but only have an old version, then you can order the current assignments free of charge if you have purchased the same assignments in the same subject in a previous year, and have purchased marking for the 2023 session.

This CMP Upgrade contains:

- all significant changes to the Syllabus objectives and Core Reading
- additional changes to the ActEd Course Notes and Assignments that will make them suitable for study for the 2023 exams.

## **0 Changes to the Syllabus**

There are no changes to the Syllabus Objectives.

# 1 Changes to the Core Reading and ActEd text

This section contains all the *non-trivial* changes to the Core Reading and ActEd text.

Throughout the course, references to 'his or her' have been amended to 'their'.

## Chapter 5

### Section 1

The last paragraph of ActEd text on page 11 has been amended as follows:

How the asset share moves after inception will depend primarily on how the four major components of premiums, renewal expenses, investment income and cost of life cover all balance out. In the example above, premiums and investment income were greater than the other items and so the asset share increased.

### Solution 5.3

The solution to part (v) has been rewritten as follows:

The excess of the death benefit paid out over the individual asset share represents a loss to the cohort. This loss would be divided between the remaining policyholders and deducted from their asset share. (Similarly, if the death benefit were less than the individual asset share, the resultant profit would be split between the remaining policyholders and added to their asset shares).

## Chapter 7

### Section 2

The last sentence of the third paragraph of ActEd text on page 7 has been deleted. The fourth paragraph of ActEd text has also been deleted.

## Chapter 13

### Section 2

The fourth paragraphs of ActEd text on page 4 (just above the Example) has been amended as follows:

This excess of units facilitates the management of the fund, and so is also often referred to as the 'management box' or 'manager's box'. On some days there may be more policyholders selling units, while on other days there may be more policyholders buying units. If the company varies the number of units it owns in the box, it can reduce the need to cancel or create units each day.

The final line of ActEd text at the bottom of page 5 has been deleted.

## Section 6

The diagram on page 12 has been updated. Replacement pages are attached.

The fourth bullet point in the first ActEd list on page 13 has been amended as follows:

- multiply the appropriation price by 100/95 (assume a 5% initial charge)

The fourth bullet point in the second ActEd list on page 13 has been amended as follows:

- multiply the expropriation price by 100/95

### Solution 13.1

The bullet points at the end of the solution at the bottom of page 19 have been amended as follows:

- offer price: the appropriation price (on an offer basis) or expropriation price (on a bid basis), plus initial charges
- bid price: the appropriation / expropriation price.

### Solution 13.3

The results for 1.7.2021 at the top of page 21 have been amended as follows:

The expropriation price per unit is:  $\frac{0.98 \times 1,794}{460} = 3.822$

so the bid price on the bid basis is 3.82 after rounding.

The appropriation price per unit is:  $\frac{1.03 \times 1,856.8}{460} = 4.1576$

so the bid price on the offer basis is 4.16 after rounding.

## Chapter 16

### Section 3

The following ActEd text has been added to the solution on page 17:

### Distribution channel

The remuneration of the distribution channel could affect the design. For example the low initial allocation rate of Design A might better match an initial commission structure.

## Chapter 25

### Section 2

The question at the bottom of page 17 and the solution at the top of page 18 have been deleted. The last ActEd paragraph on page 17 before the question and the first ActEd paragraph on page 18 below the solution have been updated as follows:

The arrangement can also be an advantage to the reinsurer. For example, on unit-linked business, an original terms arrangement would normally leave the reinsurer with a significant investment risk, because it would have to match the insurer's unit fund. By depositing back reserves it will avoid this investment risk.

Also, in the case of an international reinsurer, depositing back may avoid any problems with having to invest in an unfamiliar market.

### Section 3

The first paragraph of ActEd text on page 20 has been replaced by the following:

Risk premium reinsurance will be particularly effective as only the sum at risk needs to be reinsured. The sum at risk will be the excess of the death benefit over the unit fund.

## 2 Changes to the X Assignments

### Overall

There have been minor changes throughout the assignments, including changes to mark allocations.

More significant changes are listed below.

### Assignment X3

#### Question X3.2

The number of marks for Question X3.2 has reduced to 6.

#### Solution X3.2

On page 2, the first point under the heading 'Other aspects of the calculation' has been deleted.

#### Solution X3.3

On page 4, the second point in the solution to part (iii) has been amended to:

The increase in sales might lead to an increase in premiums received. [½]

#### Question X3.4

The number of marks for Question X3.4 has increased to 15.

#### Solution X3.4

A number of changes have been made to Solution X3.4. Replacement pages are attached.

#### Solution X3.6

The third point in the solution to part (i) has been split into two points as follows:

... and possibly for different premium sizes (as any per policy charges would reduce the unit fund by proportionately more for small policies) ... [½]

... and for different ages and gender (as the guarantee does not apply on early death). [½]

The ninth, tenth and eleventh points in the solution to part (i) have been amended as follows:

If a risk neutral (or market-consistent) calibration were being used:

- The parameters of the unit growth rate distribution would be chosen to replicate the market prices of actual financial instruments as closely as possible. [½]
- It is most important that the model could reproduce ten-year put options on both European and North American equities as this is the financial instrument that the guarantee resembles most closely. [½]
- The expected return would be the risk-free rate, regardless of which fund was being considered. However, the volatility would differ between the funds. [½]

The ninth and tenth points on page 9 in the solution to part (i) have been amended as follows:

If a real world calibration were being used:

- The charges would be accumulated in each simulation in a similar way to the projection of the unit fund, although the charges would be held in the non-unit fund and so would be invested in different assets requiring a different set of parameters. [1]
- The charges would then be set so that their accumulated value exceeded the guarantee cost in a large number of simulations, say 90%. [½]

### Solution X3.7

The fifth and sixth points on page 12 in the solution to part (i)(b) have been amended as follows:

Lower fund growth leads to higher sums at risk, producing higher mortality charges and even lower net fund growth after charges ... [½]

... so it is possible that the unit fund could go negative as a result ... [½]

... and the policyholder could continue with a negative fund (ie borrowing from company to pay for life cover) until the ten-year premium review, ... [½]

... and then lapse, resulting in significant losses for the company. [½]

## Assignment X5

### Question X5.6

The first two paragraphs of the question have been rewritten as follows:

A proprietary life insurance company operates in a country where it is estimated that between 5% and 10% of adults are sick with disease XXX, and this figure is still gradually growing. The disease currently has a mortality rate of 5% per annum and there is currently no cure.

The company writes significant amounts of term assurance, which represents about 15% of its business by new premium income. All its contracts are non-unitised and have guaranteed premiums.

All of the company's policies currently have an exclusion clause, such that a claim is disallowed if the cause of death is found to be disease XXX.

### Solution X5.6

All references to HIV and AIDS have been changed to disease XXX.

The fifth point in the solution has been amended to:

Disease XXX causes a large number of deaths in this country, and so the potential losses could be very large. [½]

The two points beneath the first bullet point list on page 10 have been amended to:

The exclusion could have been much less than 100% effective ... [½]

... as the cause of death might not be stated as XXX, eg if the policyholder had not been tested for the disease prior to death. [½]

The last bullet point on page 10 has been amended to:

- the proportion of persons with XXX in the population was lower in the past as the number of infections is still growing (although approximate adjustment may be made for this). [½]

The third point on page 11 has been amended to:

It may be, for example, that the subsets of the population targeted have low infection rates. [½]

The last point on page 11 has been amended to:

The company could try to underwrite more severely to exclude all people who are currently infected with XXX (assuming the legislation allows this). [½]

The first three points on page 12 have been amended to:

An undesirable consequence is that the level of underwriting required could be unpopular (the company might have to ask all applicants to have blood tests) ... [½]

... and expensive. [½]

The company would still have to pay XXX-related claims for policyholders that contract the disease after underwriting. [½]

The company might introduce shorter term contracts allowing it to re-underwrite for XXX on renewal, ... [½]

... although again this would be expensive. [½]

### **Solution X5.9**

The first four points in the solution to part (i) have been broken down into the following eight points:

Without reinsurance, some cases may be too large for the company to insure which could seriously impair the marketability of the product. [½]

Using reinsurance will pass some of the mortality risk to the reinsurer. Therefore, large cases may be accepted and the excess above a certain level reinsured. [½]

Reinsuring a higher proportion of larger risks (by using individual surplus, say) will reduce claims volatility and help produce more stable profits ... [½]

... which will help meet its shareholders' expectations if the company is a proprietary. [½]

Catastrophe excess of loss reinsurance will be needed where there is a significant concentration of risk ... [½]

... which is often the case with group business, where for example, an explosion in a head office building may lead to many non-independent claims. [½]

Since reinsurance reduces risk, it can be used to help a company expand more quickly, without increasing the risk beyond acceptable levels ... [½]

... which may be useful for a small company or a company writing a new class of business where future volumes are hard to predict. [½]

The first point in the solution to part (ii) has been broken down into the following two points:

The most important reason is that the terms of the treaty are likely to require it ... [½]

... as the expected claims experience for the reinsurer is heavily dependent on the level of underwriting in place. [½]

The last point in the solution to part (ii) now has one mark instead of half a mark.

## **Assignment X6**

### **Question X6.4**

In the first paragraph of the question, the two references to a pure endowment have been changed to an endowment assurance.

### 3 Other tuition services

In addition to the CMP you might find the following services helpful with your study.

#### 3.1 Study material

We also offer the following study material in Subject SP2:

- Flashcards
- Revision Notes
- ASET (ActEd Solutions with Exam Technique) and Mini-ASET
- Mock Exam and AMP (Additional Mock Pack).

For further details on ActEd's study materials, please refer to the *2023 Student Brochure*, which is available from the ActEd website at **ActEd.co.uk**.

#### 3.2 Tutorials

We offer the following (face-to-face and/or online) tutorials in Subject SP2:

- a set of Regular Tutorials (lasting a total of three days)
- a Block (or Split Block) Tutorial (lasting three full days)
- an Online Classroom.

For further details on ActEd's tutorials, please refer to our latest *Tuition Bulletin*, which is available from the ActEd website at **ActEd.co.uk**.

#### 3.3 Marking

You can have your attempts at any of our assignments or mock exams marked by ActEd. When marking your scripts, we aim to provide specific advice to improve your chances of success in the exam and to return your scripts as quickly as possible.

For further details on ActEd's marking services, please refer to the *2023 Student Brochure*, which is available from the ActEd website at **ActEd.co.uk**.

### 3.4 Feedback on the study material

ActEd is always pleased to get feedback from students about any aspect of our study programmes. Please let us know if you have any specific comments (*eg* about certain sections of the notes or particular questions) or general suggestions about how we can improve the study material. We will incorporate as many of your suggestions as we can when we update the course material each year.

If you have any comments on this course, please send them by email to **SP2@bpp.com**.

## Initial charges

When units are allocated to policyholders, companies may want to make an additional charge as a contribution to meeting other management expenses and any commission payments and as a contribution to profits. This initial charge is an addition to the appropriation price.

The offer price could then be taken as equal to the appropriation price plus the initial charge and the bid price as equal to the appropriation price.

This initial charge may also be referred to as a 'bid / offer spread'.

## Rounding

It is normal to quote prices to a certain number of decimal places. This could be done by rounding the offer price up and the bid price down, for example, which rounds in favour of the insurance company. Alternatively, rounding the offer price down and the bid price up rounds in favour of the customer.

Actual practice varies, although there has been a general trend away from systematic rounding against the customer.

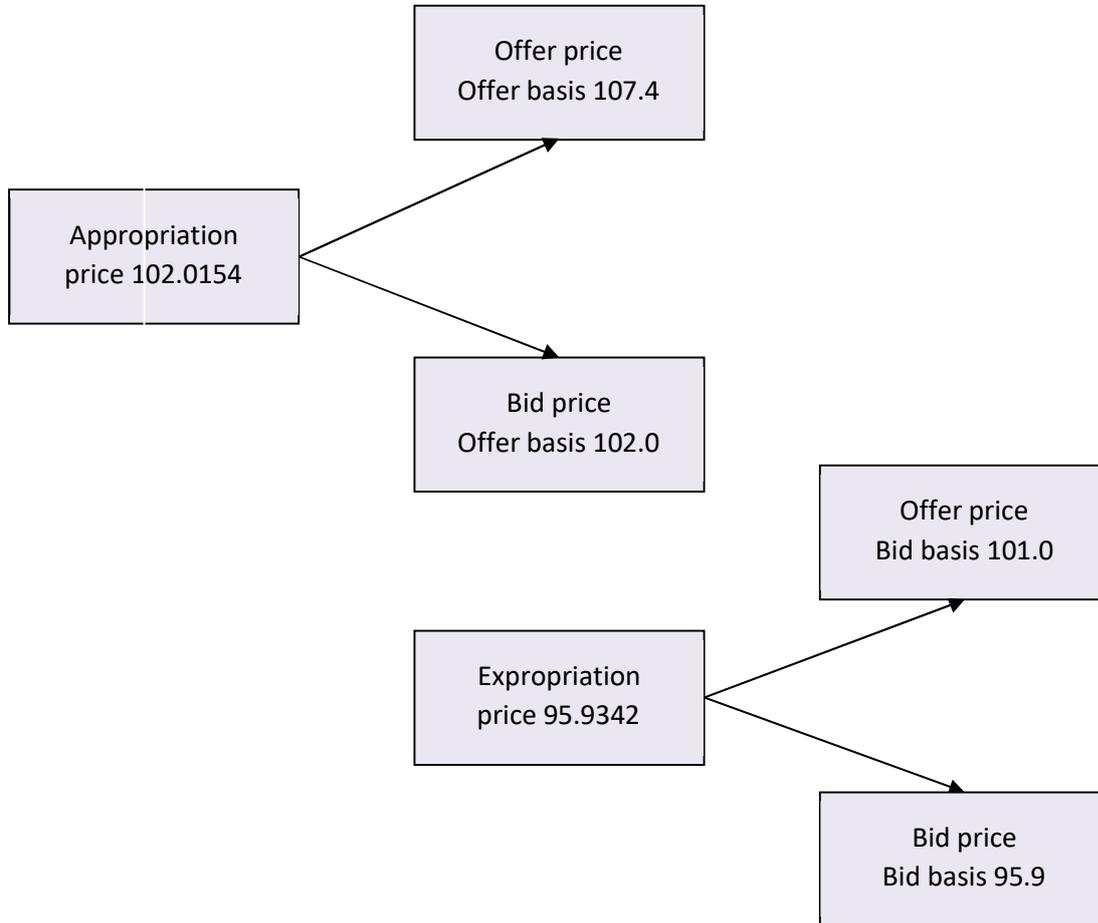
### 6.3 Offer and bid prices when pricing on a bid basis

Consider next the situation, again with daily pricing, where for a particular fund on a particular day the number of units being surrendered exceeds that being allocated.

As fund units must be cancelled, pricing should be on a bid basis, with offer and bid prices being derived from the expropriation price. The rest of the process follows exactly that for deriving offer and bid prices when pricing on an offer basis, but using the expropriation price.

## 6.4 Numerical example

The diagram below gives one hypothetical example of how the various different prices *might* compare. An explanation is given on the next page. Prices are in pence per unit.



## Solution X3.4

*This topic is covered in Chapters 15 and 16.*

### **Steps in pricing and design**

The key steps are as follows:

#### **Step 1 – Assimilate marketing information:** [½]

- age, gender, socio-economic group of policyholders [½]
- risk appetite of policyholders [½]
- preferred funds (*eg* equities, property, bonds, mixed) [½]
- ethical preferences (*eg* sustainable investments) [½]
- why the product is bought [½]
- competitors' charging structures [½]
- average premium, term, sum assured [½]
- how the product is sold [½]
- information shown on quotations [½]
- level of underwriting. [½]

#### **Step 2 – Determine assumptions for:** [½]

- economic basis (investment returns, inflation, tax, expenses) [1]
- supervisory reserving basis and solvency capital requirement [½]
- demographic factors (mortality, persistency rates) [½]
- risk discount rate and profit criterion. [½]

#### **Step 3 – Determine appropriate model points:** [½]

- look at age, gender, term, premium size, sum assured. [1]

#### **Step 4 – Perform profit-test:** [½]

- start with a charging structure [½]
- project unit fund ... [½]
- ... allowing for unit cashflows, *ie* premiums plus investment return less charges [½]
- project non-unit fund ... [½]
- ... allowing for non-unit cashflows, *ie* charges plus investment return less expenses [½]
- project supervisory profit, by allowing for supervisory reserves [½]
- allow for any supervisory capital requirement [½]
- allow for any taxes payable [½]

- compare profit measure (*eg* net present value) against profit criterion [½]
  - repeat for different charging rates until profit criterion met. [½]
- Step 5 – Perform model office projections:** [½]
- Perform projections for whole company, ... [½]
- ... showing projected assets and liabilities (to investigate capital requirements)... [½]
- ... and embedded values (to show profitability). [½]
- This will allow for:
- a moving picture of sales volumes [½]
  - economies of scale [½]
  - impact of volumes on charging structure [½]
  - impact of volumes on mortality and underwriting [½]
  - impact of sales on other products. [½]
- Step 6 – Consider the risks:** [½]
- Perform sensitivity testing by varying the experience parameters ... [½]
- ... and modify product design if results appear too volatile. [½]
- Step 7 – Amend charging structure:** [½]
- Repeat steps 4 to 7 until the charging structure is found that should maximise profit, without putting undue risk or capital requirements on the company. [1]
- [Maximum 15]

### Solution X3.5

*This topic is covered in Chapters 15 and 16. It might also be helpful to refer back to Chapter 7 for a reminder of the contribution method.*

(i) **Modelling the bonus distributions**

Program in the dividend formula so that it will calculate the correct annual dividend per policy (*ie* per model point) in each future projection year. [½]

It must be dynamic, the projected dividend varying with the projected actual interest, expense and mortality experience, for each homogeneous grouping. [1]

The valuation basis for these elements will need to be included so that the model can calculate the difference between actual and expected. [½]

It will be sensible to include, as a parameter in the model, the proportion of the surplus emerging each year which is distributed to policyholders. [½]

[Maximum 2]