# Subject CA1

## Corrections to 2015 study material

***Comment***

This document contains details of any errors and ambiguities in the Subject CA1 study materials for the 2015 exams that have been brought to our attention. We will incorporate these changes in the study material each year. We are always happy to receive feedback from students, particularly details concerning any errors, contradictions or unclear statements in the courses. If you have any such comments on this course please email them to CA1@bpp.com.

You may also find it useful to refer to the Subject CA1 threads on the Actuarial Discussion Forum. (You can reach the Forums by clicking on the "Online Learning" button on the ActEd homepage and then clicking on "Discussion Forums", or by going to www.acted.co.uk/forums/.)

### *Important note*

This document was last revised significantly on 17 March 2015. The date on which any subsequent corrections have been added is noted below.

### *Question and Answer Bank Part 2*

A marking schedule has been added to the solutions to questions 2.15 to 2.17. Please find the pages with the marking schedules at the end of this document.

### *ASET*

***April 2011, Paper 1, Question 7***

In the question, the probability of Scenario B should be 50% (rather than 59%).

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# *Part 2 – Solutions*

## *Solution 2.15*

*Customer needs*

Consider whether the contract will meet the needs of the target market. [½]

*Level and form of benefits*

Linking the return to a well-known equity index is innovative and may improve marketability. [1]

*Onerousness of guarantees*

Need to assess the likely cost of the guarantee, a stochastic model is likely to be most suitable. [1]

*Profitability*

Annuity rates should be set so that the company meets its required profit criterion. [½]

*Marketability*

On the one hand, the guarantee makes the contract more marketable than an equivalent contract without a guarantee. [½]

However, the complexity of the guarantee may make the contract difficult to understand and hence less marketable. [½]

Consider whether expected sales volumes will be sufficient for the company to make an adequate contribution to fixed expenses and profits. [½]

*Competition*

The contract design and annuity rates should be compared with those offered by competitors. [½]

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*Regulatory requirements*

Any regulatory requirements, *eg* solvency requirements should be taken into account. [½]

*Financing requirements*

Additional capital will be required to cover the guarantee. [½]

The company may seek to minimise how onerous the guarantee is, particularly if capital resources are scarce, for example by: [½]

- giving a lower initial annuity [½]
- introducing a maximum percentage increase in income in any one year. [½]

*Investment choices to back the contract*

The company will need to consider whether to use derivatives or a replicating basket of equities to match the index. [½]

*Risk characteristics*

The key risks of the product must be identified and quantified. [½]

For example:

- increasing longevity
- lower than expected investment returns
- higher than expected expenses.

[½ each, maximum 1]

There is a risk of anti-selection, *ie* policyholders with better than average mortality may be more likely to take out this contract. [½]

The risks are exacerbated since the contract is new and the company will have no past data or experience relating to this contract. [½]

*Cross-subsidies*

Consider whether cross-subsidies will be allowed, and the additional risk this introduces if the business mix is different from expected. [½]

*Consistency with other contracts*

Consider the annuity products currently sold by the company, the new contract should be consistent, both in design and pricing in order to reduce administrative requirements. [½]

*Administrative systems*

The contract is potentially expensive to administer, consider how to minimise costs and load appropriately in the premium. [½]

[Maximum 11]

## *Solution 2.16*

*Customer needs*

Consider whether this contract will meet the needs of investors. [½]

It may be suitable for some investors, *eg* those who want a long-term investment to hedge against oil prices. [½]

*Level and form of benefit*

Need to clarify exactly which oil price to use and the date on which it will be taken for determining the coupons and redemption payment. [½]

*Onerousness of the guarantee*

The guarantee (of providing coupons and a redemption payment linked to oil prices) should not be too onerous for an *oil company* to meet as its earnings should also be linked to oil prices. [1]

*Marketability*

Linking the contract to oil prices is an innovative feature. [½]

Investors may be attracted to this bond as it is likely to provide diversification from other, more traditional bond investments. [½]

In addition, the long term nature of the bond, 30 years, may be attractive to potential investors with long-term liabilities to match, in particular if there are not many other very long-term bonds available in the market. [1]

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*Competition*

Consider how competitors are raising finance and the cost of their borrowing. Has this approach to raising finance been tried by other companies? [½]

*Regulatory requirements*

Consider any regulatory requirements or constraints. [½]

*Financing requirements*

Compare the cost of borrowing by this method with more conventional methods, to determine which is cheapest. [½]

Stochastic models of interest rates and oil prices may help with the comparison, but the price of oil is subject to great volatility. [½]

*Risk characteristics*

There is a risk that the oil price increases faster than expected or is very volatile. [½]

There may be a currency risk if oil is priced in a different currency to the provider's. [½]

*Administration systems*

The contract will not be simple to administer as the company will need to keep track of the oil prices in order to determine bond repayments. [½]

[Maximum 7]

### *Solution 2.17*

*Note you need to outline changes to reduce cost **and** volatility.*

*Level and form of benefits*

- Switch from final salary to a defined contribution scheme or set up a hybrid of defined contribution and final salary (reduces volatility). [½]
- Reduce the pension accrual rate (reduces cost). [½]
- Increase the normal retirement age (reduces cost). [½]
- Change from using final salary to career average salary (reduces volatility and cost). [½]
- Integrate the scheme benefits with any State provision (reduces cost). [½]

*Options and guarantees*

- Limit the provision of any "costly" options (reduces cost and volatility). [½]
- Make some benefits discretionary rather than guaranteed, *eg* pension increases (reduces cost if discretionary benefits are not always paid and volatility due to greater control). [½]

*Benefits taken early*

- Review the events on which a benefit is payable, *eg* on ill health, early retirement (reduces cost). [½]

*Contract conditions*

- Review eligibility requirement, *eg* introduce a minimum starting age and/or waiting period (reduces cost). [½]

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*Method of financing the benefits/risk characteristics*

- Consider "buying out" some of the existing liabilities with an insurance company, *eg* using deferred and immediate annuities. This will reduce risk but the cost of doing so may be unacceptable (reduces volatility). [1]
- Ensure any risk benefits are purchased from the cheapest insurer (reduces cost). [½]
- Review the funding method adopted (reduces volatility). [½]
- Consider using the existing surplus to reduce the employer's contributions (reduces short-term cost). [½]

*Asset choice when the benefits are funded*

- Review investment policy to maximise return subject to an acceptable degree of risk (reduces cost). [½]
- Review diversification of assets (reduces volatility). [½]
- Review asset types held (reduces cost and volatility). [½]
- Consider using an asset-liability model to look at any asset-liability mis-match (reduces volatility). [1]

*Contribution pattern*

- Increase the employees' contribution rate (reduces employer costs). [½]

[Total 10]