

Letter to Prospective Customers, from Jacob McCoy and Ben Wacker:

The ACE manual was designed with the intent of clarifying complex text (and problems) with explanations in plain-English. This is accomplished via clear and concise summaries of each chapter, author's commentaries for the most difficult ("Greek") material, ACE original problems, and more in-depth explanations and answers to some of the problems that are in the book. The study guide has calculations and practice problems integrated with the outline to facilitate learning.

We would also like to put in a plug for the ACE seminar. This will be an excellent opportunity for you to enhance your understanding of the syllabus. We will walk through book examples, outline key material, walk through old exam problems, and present ACE SOA type problems. If you are reading GAAP, Stat, or IFRS and you feel like you are reading Greek, you might consider purchasing a live or online seminar. The ACE seminar will give a framework for understanding how each text fits into the syllabus and will help give a consolidated summary that cuts out redundancy in the material. The seminar will combine similar texts so you can learn/review the syllabus in a reasonable amount of time. If you are interested in attending the seminar, contact the actuarialbookstore.com or actexamdriver.com. Space is limited.

Please contact us with any questions at acestudyguide@yahoo.com

ACE CSP USA Study Guide – Sample Chapter

An Approach for Measurement of the Fair Value of Insurance Contracts

- 1) Abstract and Background
 - a) Both the IASB and FASB believe that all insurance assets and liabilities should be valued at “fair value”
 - b) There is no active market with reliable transaction prices for insurance products, which makes calculating fair value (FV) challenging
 - c) This study note will look at two examples (GIC and 20-year term product) and develop a method for calculating FV
- 2) Definitions
 - a) The IASB and the FASB has two similar (but not identical) definitions of FV
 - b) These definitions will converge in the future
- 3) Fair Value Estimates
 - a) SFAS 157 hierarchy of inputs
 - i) Level 1 à quoted prices for identical assets or liabilities in the principal market
 - ii) Level 2 à quoted pricing for similar assets or liabilities or identical assets and liabilities that are not in an active market
 - iii) Level 3 à Unobservable inputs

The above hierarchy is review from other study notes, nothing new here.

- b) The goal is to use as many level 1 inputs as possible, if those are not available, then use level 2, lastly level 3 can be used if nothing else is available

- 4) Day 1 Values
 - a) Day 1 Values = Entry Values
 - b) Insurance liabilities should consider the insurer specific premium
 - c) This will result in no gain/no loss at time of sale
 - d) The authors of this study note develop formulas based on this method

- 5) Day 2 Values
 - a) Day 2 Values = Exit Values
 - b) Insurance liabilities should NOT consider the insurer specific premium
 - c) This might result in a gain/loss at time of sale
 - d) SFAS 157 specifically cites exit values as a preferred method

- 6) The Principal Market
 - a) Principal market = the market with the most volume of transactions
 - b) Examples of possible markets
 - i) Business to consumer market (i.e., entry prices)
 - ii) Business to business market (i.e., exit prices)
 - (1) Reinsurance quotes
 - (2) Merger and acquisitions
 - (3) Life settlements
 - c) Unit of account
 - i) Should fair value consider whether contracts are grouped into portfolios or valued on a contract by contract basis? (*The authors of this study note say the two methods should be equivalent.*)

The study note discusses some pro and cons of each market. If there was an exit market with a large amount of transactions, this would be preferable, but there is no such market. The entry market has a large volume of transactions, but this does not represent the lowest price since insurers can increase premiums above the fair value. The authors do not propose a solution, but they do develop formulas based on entry values.

In theory the exit approach and the entry approach will return the same value. This assumes the insurance market has perfect competition.

7) Accounting Model Criteria

This section will discuss how an accounting model should be judged. A good accounting model would meet all of these criteria.

- a) Consistency between entry and exit approaches
- b) A consistent accounting model for all types of products and features

- c) A consistent accounting model for all types of contracts (assets, liabilities, insurance, and investment, etc)
 - d) Consistency with accepted economic pricing methodologies (most assumptions and inputs to fair value should be non-entity-specific)
 - e) Consistency with other account standards
 - f) Consistency of unit of account (the size of a block of business should not impact the fair value)
 - g) Should use inputs and assumptions from active markets (when available)
- 8) A Proposed Approach
- a) This section will develop formulas to calculate risk premium and FVL
 - b) Products
 - i) Funding agreement-backed note issuance program (FANIP)
 - (1) Most people call these GICs
 - (2) The insurer receives a premium upfront
 - (3) In return, the insurer will guarantee a rate of return
 - ii) 20-year term life insurance
 - (1) The insurer receives level premiums
 - (2) In return the insurer will pay the face amount if the insured dies
 - c) FANIP formula
 - i) The below formula equates the initial premium to the discounted asset and liability cash flows.

$$Pr em = \sum_{t=1}^n ACF_t / (1 + S_t + ED_t + RP)^t = \sum_{t=1}^n LCF_t / (1 + S_t + CS)^t$$

- ii) Notation
 - (1) S = LIBOR spot rate
 - (2) LCF = Liability cash flow
 - (3) CS = Credit spread / non-performance risk
 - (4) ED = expected default losses
 - (5) RP = risk premium

The formula above can be used to solve for the implied risk premium in a GIC. The liability cash flow, premium, spot rates, and credit spreads are all assumed to be known.

If you wanted to target a specific risk premium, this could also be a way to price.

- d) 20-year term formulas
 - i) The below formula equates the PV of premiums to the PV of death benefits

$$\sum_{t=1}^n Pr em_t / (1 + S_t + RP)^t = \sum_{t=1}^n EDB_t / (1 + S_t + CS)^t$$

- ii) Notation
 - (1) EDB = Expected death benefit

iii) Other notes

- (1) The premium is coming from the policyholder, so no default risk is needed
- (2) If you use expected lapses and death rates, you can solve for the implied risk premium

iv) The below formula can be used to calculate the fair value of liability

$$LIAB_y = \sum_{t=y}^n EDB_t / (1 + S_t + CS)^t - \sum_{t=y}^n Pr em_t / (1 + S_t + RP)^t$$

Nothing new here. This is just PV of benefits less PV of premiums. Now you need to discount at the spot rate plus the risk margin.

9) Generalizing the Model to Handle Acquisition Costs

The prior formulas did not recognize acquisition costs. This section will develop new formulas.

a) FANIP Formula

- i) The below formula will show how to incorporate acquisition costs. Simply subtract them from the initial premium.

$$Pr em - AcqCost = \sum_{t=1}^n LCF_t / (1 + S_t + CS)^t$$

b) 20-year term formulas

- i) The below formula shows how to incorporate acquisition costs. Once again, simply subtract them from the PV of premiums.

$$\sum_{t=1}^n Pr em_t / (1 + S_t + RP)^t - AcqCost = \sum_{t=1}^n EDB_t / (1 + S_t + CS)^t$$

- ii) To truly have a fair value, the acquisition costs need to be “market consistent”

The assumptions the authors are using are not consistent with reality. If the insurance market was perfect, any company having a lower price would get all of the business. But we know that there are a lot of other factors that go into the purchasing decision besides price.

10) Term Life Example of the Proposed Approach

- a) This section will show the results of a sample term product
- b) See appendix for details on this example

This is a good example to look at, but don't try to match the numbers. There are a number of factors which the authors don't give you, including:

- *The authors make assumptions about how spot rates will change in the future. These assumptions are not given in the study note.*
- *Mortality rates are carried out to more decimal places than what is shown in the appendix.*
- *Spot rates are carried out the more decimal places than what is shown in the appendix.*
- *Year 3 lapse rate is actually 9.5%, not 10% which is shown in the appendix.*

The SOA could test a 5-year term product and ask you to do the same calculations.

11) Evaluating the Risk Premium

- a) The previous example assumed the risk premium remained constant
- b) In reality, risk premium will fluctuate over time (the FVL should use CURRENT estimates)
- c) Factors which may lead to the change in risk premium:
 - i) Turnover in market participants
 - ii) Change in prices due to change in competitive environment
 - iii) Change in the volume or mix of business sold
 - iv) Change in reinsurance environment
 - v) New risk transfer mechanisms
 - vi) Change in mortality/morbidity risk
 - vii) Significant changes in other assumptions, such as persistency
- d) Risk premium will not be the same across all product types
- e) In general, the risk premium for a term life product should be stable

12) The Application of Nonperformance Risk in Determination of Liabilities

- a) Key point of this section **à** should FVL reflect the company's own credit spread for non-performance risk?
- b) Implication **à** an insurer with higher default risk would calculate a lower liability
- c) There are people that argue for and against this issue

13) Minimum Cash Value Floor

- a) Key point of this section **à** should the FVL be floored at the cash value?
- b) The authors do not think the FVL should be floored at the CV, reasons:
 - i) If there was an exit market transaction, the price of the liability would not be floored at the CV
 - ii) Flooring the FVL assumes that all policyholder exercise their option
- c) The FVL should represent all cash flows (including CV payments) but not assume that all policyholders lapse

14) Consistency with SFAS 157

- a) The method described in this paper is consistent with the “market approach” discussed in SFAS 157
- b) The inputs are level 3

15) Appendix

- a) Once again, this could be an exam question if it were a 5-year term product

Example #1

You are pricing a Funding Agreement Backed note issuance program (FANIP) with the following parameters and assumptions.

- Premium = 1,000
- LIBOR = 5% (assume flat yield curve)
- Company credit spread = 1.00%
- Maturity = 5 years
- Expected default costs = 0%
- Spread on assets = 2%
- Asset is a zero coupon bond

What is the risk premium? What are the insurer’s profits?

Solution

Given the simplicity of this product, you don’t have to do any calculations. However, to illustrate the formulas in the text, see below.

$$Pr em = \sum_{t=1}^n ACF_t / (1 + S_t + ED_t + RP)^t = \sum_{t=1}^n LCF_t / (1 + S_t + CS)^t$$

$$LCF_5 = 1,000.00 * (1 + 0.05 + 0.01)^5 = 1,338.23$$

$$ACF_5 = 1,000.00 * (1 + 0.05 + 0.02)^5 = 1,402.55$$

Since there is only one asset cash flow and one liability cash flow, the summation formulas above simplify to:

$$1,402.55 / (1 + 0.05 + RP)^5 = 1,338.23 / 1.06^5$$

$$\Rightarrow (1 + 0.05 + RP)^5 = 1,402.55 / 1,000.00 = 1.402551731$$

$$\Rightarrow RP = 0.02$$

The risk premium = 2.0%

The insurer profits equals the RP less the credit spread = 1.0%