
SOCIETY OF ACTUARIES
Foundations of CFE Exam

Exam CFEFD

AFTERNOON SESSION

Date: Wednesday, April 29, 2015

Time: 1:30 p.m. – 3:45 p.m.

INSTRUCTIONS TO CANDIDATES

General Instructions

1. This afternoon session consists of 5 questions numbered 9 through 13 for a total of 40 points. The points for each question are indicated at the beginning of the question. Questions 9-12 pertain to the Case Study.
2. Failure to stop writing after time is called will result in the disqualification of your answers or further disciplinary action.
3. While every attempt is made to avoid defective questions, sometimes they do occur. If you believe a question is defective, the supervisor or proctor cannot give you any guidance beyond the instructions on the exam booklet.

Written-Answer Instructions

1. Write your candidate number at the top of each sheet. Your name must not appear.
2. Write on only one side of a sheet. Start each question on a fresh sheet. On each sheet, write the number of the question that you are answering. Do not answer more than one question on a single sheet.
3. The answer should be confined to the question as set.
4. When you are asked to calculate, show all your work including any applicable formulas.
5. When you finish, insert all your written-answer sheets into the Essay Answer Envelope. Be sure to hand in all your answer sheets because they cannot be accepted later. Seal the envelope and write your candidate number in the space provided on the outside of the envelope. Check the appropriate box to indicate morning or afternoon session for Exam CFEFD.
6. Be sure your written-answer envelope is signed because if it is not, your examination will not be graded.

Tournez le cahier d'examen pour la version française.

CASE STUDY INSTRUCTIONS

The case study will be used as a basis for some examination questions. Be sure to answer the question asked by referring to the case study. For example, when asked for advantages of a particular plan design to a company referenced in the case study, your response should be limited to that company. Other advantages should not be listed, as they are extraneous to the question and will result in no additional credit. Further, if they conflict with the applicable advantages, no credit will be given.

****BEGINNING OF EXAMINATION****

Afternoon Session
Beginning with Question 9

Questions 9 – 12 pertain to the Case Study.
Each question should be answered independently.

9. (6 points) The Vietombia Finca Palmilera Project, VFPP, (Exhibit 5 of the case study) is the largest of 21 capital financing projects that Frenz plans to undertake this year.

(a) (2 points) Critique the appropriateness of the discount rate used to value the VFPP.

Frenz would like to assure equity investors that this project reflects its management's long-term orientation.

(b) (1 point) Describe three factors that investors should look for that would commonly be found in companies with a long-term horizon.

Frenz has agreed to exchange \$10 million with a Vietombia bank for *Rubiaceae* in one year to pay for the production facility. The Vietombia bank is concerned with fluctuations in the exchange rate between the dollar and the *Rubiaceae*, and would like to hedge its foreign exchange risk. Assume the following:

- Spot exchange rate is 0.700 *Rubiaceae* / \$
- One-year forward rate of 0.717 *Rubiaceae* / \$
- One-year Vietombia spot interest rate is 3.453%
- One-year U.S. spot interest rate is 1.000%

(c) (3 points)

- (i) Demonstrate how the Vietombia bank can execute a currency hedge using a cash-and-carry strategy. Show your work.
- (ii) Contrast the advantages of hedging using a forward contract versus a cash-and-carry strategy for the Vietombia bank.

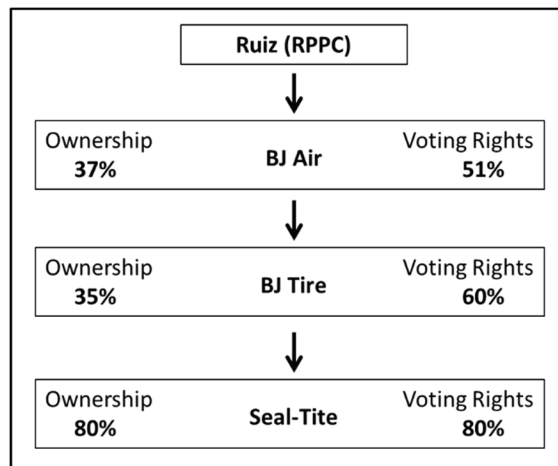
**Questions 9 – 12 pertain to the Case Study.
Each question should be answered independently.**

10. (9 points) Blue Jay Air (BJ Air) has decided to make Blue Jay Tire (BJ Tire) its sole provider of airplane tires.

(a) (2 points)

- (i) Identify the strategy used by BJ Air when purchasing BJ Tire.
- (ii) Describe the primary benefit to BJ Air of having BJ Tire as its sole supplier.
- (iii) Explain whether BJ Air's strategy is beneficial to BJ Air's minority shareholders.

Assume BJ Tire acquires Seal-Tite, one of its suppliers, through a stock purchase. The chart below shows the resulting ownership structure and voting rights between the three companies and RPPC.



10. Continued

- (b) (3 points)
- (i) Describe two capital structures that allow a shareholder to own less than 50% of a company and control over 50% of the voting rights.
 - (ii) Explain the primary advantage of these structures to the controlling shareholder.
 - (iii) Calculate the percent of any Seal-Tite dividends Ruiz will receive, ignoring taxes on dividends. Show your work.
 - (iv) Describe the primary concern a minority shareholder in Seal-Tite would have with this organizational structure.

One of Seal-Tite's primary risks is fire in its manufacturing plant. To protect against the risk, BJ Tire instructed Seal-Tite to consider a one-year business interruption insurance policy. It has narrowed its options to Policy I and Policy II.

Assume the following:

	Policy I	Policy II
Company Surcharge Above Actuarially Fair Price	15%	15%
Face Amount of Coverage	\$30M	\$60M
Insurance Company Assumed Risk of Loss	3.0%	3.5%

- Risk-Free rate of 6%
- Expected market return of 9%
- Beta of plant fire insurance is -1.5

- (c) (2 points)
- (i) Describe the three main frictions that cause an insurance company's premium to be greater than the actuarially fair price.
 - (ii) Calculate the premiums for Policy I and Policy II.
- (d) (2 points) Determine which policy, if either, Seal-Tite should purchase assuming the following actual risks of loss due to fire:
- (i) 5.0%. Show your work.
 - (ii) 4.5%. Show your work.

**Questions 9 – 12 pertain to the Case Study.
Each question should be answered independently.**

11. (9 points)

- (a) (2 points) Contrast the traditional and modern approaches to operational risk management.
- (b) (1 point) Describe the three elements of a “Black Swan” event, according to Nassim Taleb, the author of *The Black Swan*.

Michael Tan, CFO of Blue Ocean P&C Company, is very concerned that Jay Brown’s reserving model (case study section 5.2.4) is not robust enough to analyze critical risks in the fast developing personal solar energy industry. “There are so many unknowns,” Tan complains, “We don’t know what we don’t know.”

- (c) (1 point) Defend the statement: “A Black Swan event is relative to knowledge.”
- (d) (2 points) Explain four improvements to Brown’s reserving model that could help to move rare events from “Black Swans” to “Large-Scale, Large-Impact Rare Events.”

Jack Tavares, Chief Risk Officer of Blue Jay Tire, testified in a deposition concerning the Smallville, Arizona, Tire Explosion Case (case study section 3.3) that the event was a true “Black Swan.” Tavares stated that nobody could have foreseen the combination of stressed conditions that contributed to the tire’s failure: A 300-mile trip at high speed through 115-degree desert heat.

- (e) (2 points) Support the plaintiff’s attorney’s statement that, “Although the failure of the Blue Jay tire was catastrophic for the Franklin family, it was definitely not a ‘Black Swan’ event.”
- (f) (1 point) Explain why a traditional operational risk approach would have been unlikely to mitigate the circumstances leading to the Smallville, Arizona, Tire Explosion Case.

Questions 9 – 12 pertain to the Case Study.
Each question should be answered independently.

- 12.** (8 points) You are a consultant hired to review RPPC Dynasty Corporation’s Risk Management Framework as applied to Darwin.
- (a) (3 points)
 - (i) Describe four characteristics that cause model risk for Darwin.
 - (ii) Evaluate Darwin’s exposure to each characteristic.
 - (b) (2 points) Evaluate the potential impact on shareholder value from Darwin’s individual variable annuity (IVA) business due to the following market risks:
 - (i) Rho
 - (ii) Delta
 - (iii) Vega
 - (iv) Gamma

Tim Jones, Darwin’s hedge manager, recently released the following statement:

“Our complex IVA stress testing showed increased earnings sensitivity to interest rate movements leaving us no option but to increase the hedge and reduce our exposure. After extensive analytical research, my team and I have increased the interest rate hedge to cover 90%, instead of 50%, of IVA rho risk.”

- (c) (2 points) Critique the statement made by Mr. Jones from the perspective of:
 - (i) Darwin’s IVA business
 - (ii) RPPC’s Risk Management Framework
- (d) (1 point) Recommend three improvements to RPPC’s Risk Management Framework.

13. (8 points) The CFO of Wright Life Insurance Company has contacted you, a consulting actuary, regarding economic capital and the market cost of capital.

(a) (1 point) Define the following terms:

- (i) Market consistent value of liabilities (MVL)
- (ii) Solvency capital requirement (SCR)
- (iii) Market value margin (MVM)

(b) (1 point)

- (i) List the five components of MVL.
- (ii) Identify which components of MVL may be valued using available market prices.

The CFO provides the following information:

- Wright has sold 100 3-year term policies and each has 10,000 face value and 500 single premium.
- The swap rate is 3% in all years.
- Expected benefits, including death claims and expenses, are 15,000 payable at the end of each year.
- The initial SCR for non-hedgeable risks is 6,364.
- Wright uses the present value of benefits for projecting future SCR.
- The market cost of capital (MCoC) for all risk capital is 10% of SCR.

(c) (4 points) Calculate the time 0 MVL for Wright's term insurance business. Show your work.

13. Continued

The CFO has asked you to perform a sensitivity analysis on MVM.

- (d) *(1 point)* Explain the impact the following scenarios will have on MVM:
 - (i) Increased expected mortality
 - (ii) Increased operational risk
 - (iii) Greater asset-liability mismatch
 - (iv) Lower corporate income tax rate
- (e) *(1 point)* Recommend whether Wright should vary MCoC by risk in its economic capital calculation. Support your recommendation.

****END OF EXAMINATION****
Afternoon Session

USE THIS PAGE FOR YOUR SCRATCH WORK