
SOCIETY OF ACTUARIES
Foundations in CFE Exam

Exam CFEFD

AFTERNOON SESSION

Date: Wednesday, April 30, 2014

Time: 1:30 p.m. – 3:45 p.m.

INSTRUCTIONS TO CANDIDATES

General Instructions

1. This afternoon session consists of 5 questions numbered 10 through 14 for a total of 40 points. The points for each question are indicated at the beginning of the question. Questions 10-14 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.
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.

Written-Answer Instructions

1. Write your candidate number at the top of each sheet. Your name must not appear.
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 10

Question 10 pertains to the Case Study.
Each question should be answered independently.

10. (9 points)

- (a) (1 point) Provide two reasons, other than meeting day-to-day needs, why a company holds cash.
- (b) (2 points)
 - (i) Describe the cash conversion cycle.
 - (ii) Calculate the cash conversion cycle for Blue Jay Tire for 2012. Show your work.
- (c) (2 points) Blue Jay Tire's rubber supplier offers terms of 1/10, Net 15. Blue Jay Tire's current practice is to make payment on day 3.
 - (i) Assess Blue Jay Tire's current accounts payable practice.
 - (ii) Recommend an optimal accounts payable strategy. Justify your recommendation.

Blue Jay Tire has three financing options for its permanent working capital need of \$10 million:

- I. Laughing Falls Bank offers a 1-year unsecured loan at a 15% APR with a compensating balance requirement of 10% in an interest bearing account with a 1% APR.
- II. Laughing Falls Bank also offers a 3-month secured loan at an 8% APR, using Blue Jay Tire's inventory, stored in an independent warehouse, as collateral. The warehouse charges a 1% upfront fee on the loan amount.
- III. Blue Jay Tire can issue \$10 million of 3-month commercial paper and receive \$9.7 million upfront.

10. Continued

(d) (4 points)

- (i) Calculate the effective annual rate of return for each of the three financing options. Show your work.
- (ii) Describe one disadvantage for each of the three financing options.
- (iii) Recommend a financing option assuming the following environment: a steep yield curve, short-term rates unlikely to spike in the near future, and declining credit quality of Blue Jay Tire. Justify your recommendation.

*Question 11 pertains to the Case Study.
Each question should be answered independently.*

- 11.** (7 points) In order to reduce its risk exposure to coffee bean price volatility, Frenz Corporation is evaluating an exclusive coffee bean production agreement with the government of Vietombia.

Frenz follows the RPPC standards for calculating economic capital.

- (a) (1 point) Calculate Frenz Corporation's change in internal required capital due to the reduction in its exposure to coffee bean price volatility if it enters the production agreement. Show your work.
- (b) (1 point) Explain why fully allocating Frenz's firm-wide risk capital across its businesses is likely to be suboptimal if Frenz enters the production agreement and considers the new Vietombia operation a separate business.
- (c) (1 point) Identify three other considerations when evaluating this production agreement.

As an alternative to the production agreement, Frenz is considering reducing its exposure to coffee bean price volatility by hedging with exchange-traded Arabica coffee bean futures.

- (d) (2 points)
 - (i) Describe two common mistakes to avoid when hedging commodity price risk.
 - (ii) Assess the applicability of each mistake in part (i) to Frenz's situation.
 - (iii) Recommend how Frenz can lessen the impact of each mistake in part (i). Justify each recommendation.

Assume that the resulting exposure to coffee price volatility after implementing the coffee bean production agreement or using futures is the same.

- (e) (2 points)
 - (i) Contrast the two risk management strategies.
 - (ii) Recommend which risk management strategy Frenz should pursue. Justify your recommendation.

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Question 12 pertains to the Case Study.
Each question should be answered independently.

- 12.** (6 points) Blue Ocean is considering 12-month stop-loss reinsurance for its Atlantic Ocean marine exposure, available with the following terms:

Maximum covered loss	\$1.25 billion
Deductible	\$1 billion
Premium	\$10 million

- (a) (1 point) Define the reinsurer's payment to Blue Ocean in terms of claim loss, maximum covered loss and deductible.

Another alternative available to Blue Ocean is to hedge its risk using exchange-traded call options written on the Marine Claims Service (MCS) loss index. You are given the following information:

- The MCS loss index represents the sum of insured losses in the Atlantic Ocean region divided by \$5 billion.
- Option premium and settlement are quoted in points. One point equals \$200.
- The bid-ask spread on MCS options is zero.

The following call options are available on the Atlantic Ocean MCS loss index:

Call Option	Loss Development Period	Index Value	Option Premium
#1	12 months	10.0	2.10
#2	12 months	12.5	1.99
#3	12 months	15.0	1.93

The CFO, Michael Tan, asks you to compare traded MCS options to the stop-loss reinsurance quote.

- (b) (3 points) You construct a hedge strategy using call options that replicates the stop-loss reinsurance payment.
- (i) Calculate the number of MCS option contracts needed. Show your work.
 - (ii) Calculate the cost of the strategy. Show your work.

12. Continued

(c) (2 points)

- (i) Contrast stop-loss reinsurance with hedging using traded call options.
- (ii) Recommend an optimal hedge strategy. Support your recommendation.

Question 13 pertains to the Case Study.
Each question should be answered independently.

- 13.** (11 points) RPPC Dynasty needs to inject capital into Blue Jay Air in order to lease a fleet of planes for a new international route. RPPC Dynasty would like to maintain its current overall debt-to-value ratio but will make exceptions when other leverage policies are more appropriate for a specific project.
- (a) (3 points) You are preparing a report on the leasing plan for Blue Jay Air's CFO.
- (i) Identify the three main methods of valuing levered investments.
 - (ii) Describe the most appropriate circumstance for using each method.
 - (iii) Recommend the most flexible method for valuing the leasing plan. Justify your recommendation.
- (b) (4 points) Assume RPPC Dynasty will fund this project while maintaining its constant debt-to-value ratio.
- (i) Recommend the appropriate debt cost of capital for evaluating this project. Justify your recommendation.
 - (ii) Recommend the appropriate equity cost of capital for evaluating this project. Justify your recommendation.
 - (iii) Calculate the value of the project to RPPC Dynasty. Show your work.

13. Continued

- (c) (2 points) Assume RPPC decides to finance the project by initially borrowing \$300 million and grading down the debt based on the fixed debt schedule below.

End of Year	0	1	2	3	4	5
Debt Outstanding (in \$ millions)	300	240	180	120	60	0

- (i) Calculate the value of the interest tax shield using the fixed debt schedule. Show your work.
- (ii) Calculate the value of the project using the fixed debt schedule. Show your work.
- (d) (1 point) Evaluate which of the following is more sensitive to interest rate volatility.
- (i) The constant debt-to-value leverage policy in part (b).
- (ii) The fixed debt schedule leverage policy in part (c).

RPPC Dynasty is currently in the process of its annual credit rating review and is expecting an upgrade. Funding for the project will need to be finalized before the credit rating announcement.

- (e) (1 point) Explain how the expected upgrade to the credit rating affects your current valuation of the project.

Question 14 pertains to the Case Study.
Each question should be answered independently.

- 14.** (7 points) Darwin's hedge manager, Tim Jones, built a liability model to perform attribution analysis on the VA business and produced the following results:

Time (t)	Market movement at $t = 1$	Liability (\$ million)
0	N/A	200.0
1	Equity index up 1.0%	205.0
	Yield curve up 1.0%	203.0
	Both equity index and yield curve up 1.0%	207.8

The delta and gamma contributions on the equity-only sensitivity were +\$4.1 and +\$0.8 million respectively.

- (a) (1 point) Calculate the following for the VA liabilities. Show your work.
- (i) The contribution of the higher-order Greeks for the equity sensitivity
 - (ii) The cross term between the equity and interest sensitivities

After Jones gained confidence in his liability model, he needed to measure hedge effectiveness and is considering the following approaches:

- I. Backtesting
- II. Stochastic-on-stochastic
- III. Value at Risk
- IV. Stress testing

He prefers an approach that meets the following three criteria:

- (A) Not very computationally intensive
- (B) Looks at extreme real-world scenarios
- (C) Provides the likelihood of a bad outcome

14. Continued

- (b) (4 points)
 - (i) Evaluate each of the four approaches using each of Jones's three criteria.
 - (ii) Recommend an approach that Jones should use to measure hedge effectiveness. Justify your recommendation.
- (c) (2 points) Describe two improvements for managing Darwin's VA risk, based on the information provided in the case study and in light of the lessons that VA writers learned from the 2007 – 2008 financial crisis.

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

USE THIS PAGE FOR YOUR SCRATCH WORK