Foundations of CFE Exam

Exam CFEFD

MORNING SESSION

Date: Tuesday, April 28, 2020
Time: 8:30 a.m. – 11:45 a.m.

INSTRUCTIONS TO CANDIDATES

General Instructions

1. This examination has a total of 100 points. It consists of a morning session (worth 60 points) and an afternoon session (worth 40 points).

   a) The morning session consists of 7 questions numbered 1 through 7.

   b) The afternoon session consists of 4 questions numbered 8 through 11.

   The points for each question are indicated at the beginning of the question. Questions 1 – 6 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.

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Tournez le cahier d’examen pour la version française.

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Exam CFEFD-Front Cover

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
Morning Session

Questions 1 – 6 pertain to the Case Study.
Each question should be answered independently.

1. (*11 points*) Blue Jay Tire (BJT) has decided to proceed with its expansion plans. You have been hired as a consultant to analyze several aspects of its expansion (Case Study Section 3.3).

BJT management is considering developing their own capabilities to enter the construction equipment and agricultural tires market. They have asked you to analyze whether BJT should purchase or lease the machines needed.

(a) (*1 point*)

(i) Describe two provisions of a lease agreement that create a non-tax lease.

(ii) Describe the tax consequences to each of the lessor and lessee of a true tax lease and a non-tax lease.

BJT has received two 10-year lease proposals detailed below.

	Lease Proposal A	**Lease Proposal B**
Level Annual Lease Payment	$1,750,000 (years 1-5) $2,000,000 (years 6-10)	$1,800,000
Annual Maintenance Expense Savings*	$120,000	$100,000
Salvage Value	$800,000	$500,000
Tax Treatment	True Tax	True Tax

**Realized at the end of the year*

- BJT will return the machine at the end of the lease.
- BJT can borrow at 8%.
- BJT has a 20% tax rate.

(b) (*2 points*) Determine whether BJT should accept lease proposal A or lease proposal B based on expected cost. Show your work.

1. Continued

(c) (*1 point*) Explain two reasons why BJT might choose to lease rather than buy the machine.

If BJT proceeds with developing its own capabilities, it forecasts earnings of $35 million per year.

In addition, for the next two years, BJT has the option at the beginning of each year to increase production levels at a cost of $4 million.

- The probability of a favorable year is 30% for the first year. Conditions in the second year will match the realized conditions of the first year.
- If BJT decides to increase production levels for year 1:
  - BJT receives $12 million at the end of the year under favorable conditions.
  - BJT loses $3 million at the end of the year under unfavorable conditions, and BJT will revert to original production levels for year 2.
- If BJT decides not to increase production levels for year 1, it can still increase for year 2.
- The annual risk-free rate is 3%.

(d) (*2 points*) Calculate the value of BJT's option to defer the production level decision. Show your work.

Changes in the political climate have led to the renegotiation of existing global trade agreements. The potential for new agricultural trade agreements creates greater uncertainty for BJT.

(e) (*1 point*) Evaluate qualitatively the impact of ongoing trade renegotiations on the value of BJT's option.

Question 1 continued on the next page.

1. **Continued**

As an alternative to developing its own capabilities for specialty tires, BJT is considering the acquisition of True North Tire Company (TNT) (Case Study Section 3.3). If acquired, BJT expects earnings of $36 million per year from TNT.

Assume earnings are realized at the end of the year. Assume purchase and acquisition costs are amortized into BJT's earnings estimate.

If TNT is acquired, BJT expects to incur $7 million in one-time acquisition related costs. All acquisition costs would be paid using a 90-day bank loan with a $40,000 origination fee, 15% APR (compounded quarterly), and a 5% compensating balance requirement.

(f) (*2 points*)

(i) Calculate the effective annual rate (EAR) of the proposed bank loan. Show your work.

(ii) Recommend an alternative short-term financing method for BJT.

(g) (*2 points*) Recommend whether BJT should acquire TNT or develop its own capabilities to expand into the construction equipment and agricultural tires market. Justify your recommendation.

Questions 1 – 6 pertain to the Case Study.
Each question should be answered independently.

2. (*8 points*) Mrs. Julia Reich, the Chief Risk Officer (CRO) of RPPC Dynasty Corporation, wants to understand the impact to the risk margin required to manage the Darwin Life (Case Study Section 7.6) business on an ongoing basis, given the following scenarios:

I. Corporate tax rates increase from 21% to 35%.
II. A Darwin Life data vendor suffers a highly publicized data breach.
III. Investment risk in the general account portfolio backing the new ULSG product increases.
IV. Darwin acquires Snappy Life Insurance Company (Case Study Section 8).

(a) (*2 points*) Assess the likely impact to a market value margin (MVM) calculation for each of I-IV.

A member of the Board of Directors comments, "MVM's 'one-year shock' method is not appropriate for setting margins for longer duration businesses such as life insurance."

(b) (*1 point*) Critique the Board member's comment.

Darwin wants to estimate the capital required for the new ULSG product for sales in 2018-2020. As part of that, management assumes a $200,000 MVM for ULSG sales over the next three years. Darwin has assumed the following:

- ULSG premium is 50% of current projected UL first-year premium
- Present value of ULSG claims and surrenders are 10% of ULSG premium
- Solvency Capital Requirement (SCR) for each of the next three years is 8% of the present value of claims and surrenders
- 3% annual swap rate (flat yield curve)

(c) (*3 points*) Calculate the cost of capital charge implied in Darwin's MVM assumption. Show your work.

(d) (*2 points*) Recommend three changes to Darwin's MVM estimation approach. Justify your recommendation.

Questions 1 – 6 pertain to the Case Study.
Each question should be answered independently.

3. (*10 points*) Darwin Life (Case Study Section 7) is focused on improving the efficiency and discipline of its underwriting operations. At a recent meeting, Darwin executives made the following statements:

I. John Clark (Chief Risk Actuary): "Let's continue to focus on distribution and product development because that's where we add the most value."

II. Jane Smith (CRO): "We must maintain autonomy as we enhance our underwriting operations."

III. Alexis Marino (CFO): "I'm confident in our ability to manage costs as the company grows."

IV. Brandon Kaladin (CEO): "We must reduce dependence and uncertainty as Darwin grows."

(a) (*2 points*) Determine which organizational theory each executive's statement (I-IV) represents. Justify your answer.

Darwin is considering the following alternatives to improve its underwriting efficiency:

A. Purchase Snappy Life (Case Study Section 8)
B. Outsource underwriting operations

(b) (*2 points*) Evaluate which alternative each executive (I-IV) would pursue based on their statements above. Justify your answer.

Darwin has decided to perform further analysis of Snappy Life.

(c) (*3 points*)

(i) Describe three risks associated with Snappy Life that may influence the decision to purchase.

(ii) Recommend actions to address the risks identified in (i).

Darwin has performed a valuation of Snappy Life and calculates the purchase price as the present value of future earnings.

(d) (*2 points*) Critique the valuation approach.

Darwin has concerns about the reliability of Snappy's financials due to its M-score.

(e) (*1 point*) Describe two issues in Snappy's financials to support Darwin's concern.

Questions 1 – 6 pertain to the Case Study.
Each question should be answered independently.

4. (*7 points*) Darwin has proceeded with the acquisition of Cyber LTC (Case Study Section 7.7.2).

LTC products have investment, longevity, and morbidity risks as well as the standard anti-selection and privacy risks inherent in all insurance products. Therefore, Darwin is evaluating its options to manage risk and optimize capital through reinsurance or securitization.

(a) (*2 points*) Sketch a risk transfer and diversification flow-chart of the insurance, reinsurance, and securitization markets from Darwin's perspective.

Jane Smith, Darwin's CRO, has asked you to provide information to develop an efficient risk management strategy regarding the LTC product.

(b) (*1 point*) Identify three non-hedgeable risks in the new LTC product.

(c) (*2 points*) Recommend whether reinsurance or securitization would be a more efficient risk mitigation or transfer strategy based on the product's non-hedgeable risks. Justify your recommendation.

Cyber LTC allows policyholders, doctors, and care-givers to submit all information via a web-portal. Darwin is concerned about exposure to data breaches.

(d) (*2 points*) Compare and contrast reducing data breach exposure through strengthening Darwin's IT security or purchasing a cyber insurance policy.

Questions 1 – 6 pertain to the Case Study.
Each question should be answered independently.

5. (*9 points*) A large earthquake hits the small coastal Alaskan town of Moose Hoof. The only road into town is blocked by fallen debris and the dock facilities are damaged, limiting access to vital supplies for the local population. Local businesses do not have supplies or the ability to take payments. The medical clinic does not have power. Because it is such a small town, Moose Hoof understands that it will need help from the private sector to become fully operational again.

The mayor of Moose Hoof issues the following statement:

> "Relief efforts are underway, but we have no idea how much the relief will cost. There's no way to even estimate that."

(a) (*1 point*) Critique the mayor's statement.

The Alaskan government has approached SEA (Case Study Section 9) asking for assistance in the disaster recovery.

(b) (*2 points*) Describe the steps to estimate the cost of the recovery effort from SEA's perspective.

SEA's owner, Bill Otterwein, is willing to commit $1 million to Moose Hoof's recovery as long as he can be 95% confident that $1 million will be sufficient. SEA collects data of eight other disaster recovery efforts:

Recovery	**Total Cost ($000)**
1	200
2	250
3	400
4	600
5	650
6	750
7	900
8	1,500

(c) (*1 point*) Determine whether SEA would assist given the data above and Otterwein's budget. Justify your response.

5. Continued

SEA agrees to assist in the effort by lending its fleet to bring supplies to Moose Hoof. However, halfway through the effort, new perfect information emerges confirming it will cost SEA a total of $1.5 million to complete the recovery effort.

(d) (*2 points*) Describe three reasons why SEA would consider assisting at a higher amount than its original budget.

Gilroy Clyde, RPPC's CEO, would like RPPC's subsidiaries to assist SEA's Moose Hoof recovery. In a memo to the Board of Directors explaining his desire to get involved in the recovery effort, Clyde states:

> "Involvement with SEA will provide valuable insight into the company's operations for potential acquisition purposes."

(e) (*1 point*) Evaluate Clyde's statement.

(f) (*2 points*)

- (i) Identify three functions of RPPC companies that could be useful in reducing the risk of failure of the recovery effort.
- (ii) Describe how each function in (i) could improve the likelihood of success of the recovery effort.

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Questions 1 – 6 pertain to the Case Study.
Each question should be answered independently.

6. (*8 points*) BJA (Case Study Section 2) is looking into acquiring SEA (Case Study Section 9). Management wants to understand how the post-acquisition structure of SEA would affect BJA's consolidated financial position given the fluctuation of foreign exchange rates. The 2018 net operating statement and balance sheet of SEA are analyzed assuming:

- The acquisition occurs on January 1, 2018.
- All balance sheet items in SEA are recorded at fair value.
- BJA acquires SEA by paying cash in Canadian dollars equal to SEA's equity on the acquisition date.

You are given:

Foreign Exchange rate as of	**USD to CAD**
January 1, 2018	1.23
December 31, 2018	1.36
Average 2018	1.30
Weighted average rate when plant and equipment and inventories were acquired	1.34

(a) (*4 points*) Calculate items (A)-(AE) in the following 2018 Net Operating Statement and Summary of Balance Sheet for SEA if SEA is acquired by BJA with USD as SEA's functional currency. Show your work.

Question 6 continued on the next page.

6. **Continued**

Net Operating Statement	2018 (pre-acquisition) (in CAD 000s)	Translated Amount (post-acquisition) (in USD 000s)
Passenger revenues	7,235	(A)
Freight, charters, aircraft sales, and other	3,685	(B)
Total operating revenues	10,920	(C)
Operating expenses:		
Salaries, wages and benefits	3,058	(D)
Aircraft fuel	2,457	(E)
Aircraft maintenance, material, repairs, and other	3,362	(F)
Depreciation and amortization	393	(G)
Other operating expense	1,194	(H)
Total operating expenses	10,463	(I)
Operating income	457	(K)
Interest expense, net	-123	(L)
Income (loss) before income taxes	334	(M)
Income tax benefit (expense)	-117	(N)
Net income (loss) before translation G/L	217	(O)
Translation gain/(loss)		(P)
Net income (loss)		(Q)

6. **Continued**

Summary of Balance Sheet	**2018 (pre-acquisition) (in CAD 000s)**	**Translated Amount (post-acquisition) (in USD 000s)**
Cash and Short-Term Investments	1,179	(R)
Accts. Receivable	890	(S)
Inventory	1,600	(T)
Total Current Assets	3,669	(U)
Property, Equipment, and Other Assets	2,883	(V)
Assets	6,552	(W)
Current Liabilities	2,532	(X)
Long Term Debt	1,365	(Y)
Total Liabilities	3,897	(Z)
Capital	1,000	(AA)
Retained Earning	1,655	(AB)
Owner Equity	2,655	(AC)
Translation Adjustment		(AD)
Total Equity		(AE)

(b) (*2 points*) Explain the implications to BJA's net operating statement and balance sheet if SEA is acquired as a subsidiary of BJA with CAD being SEA's functional currency rather than USD.

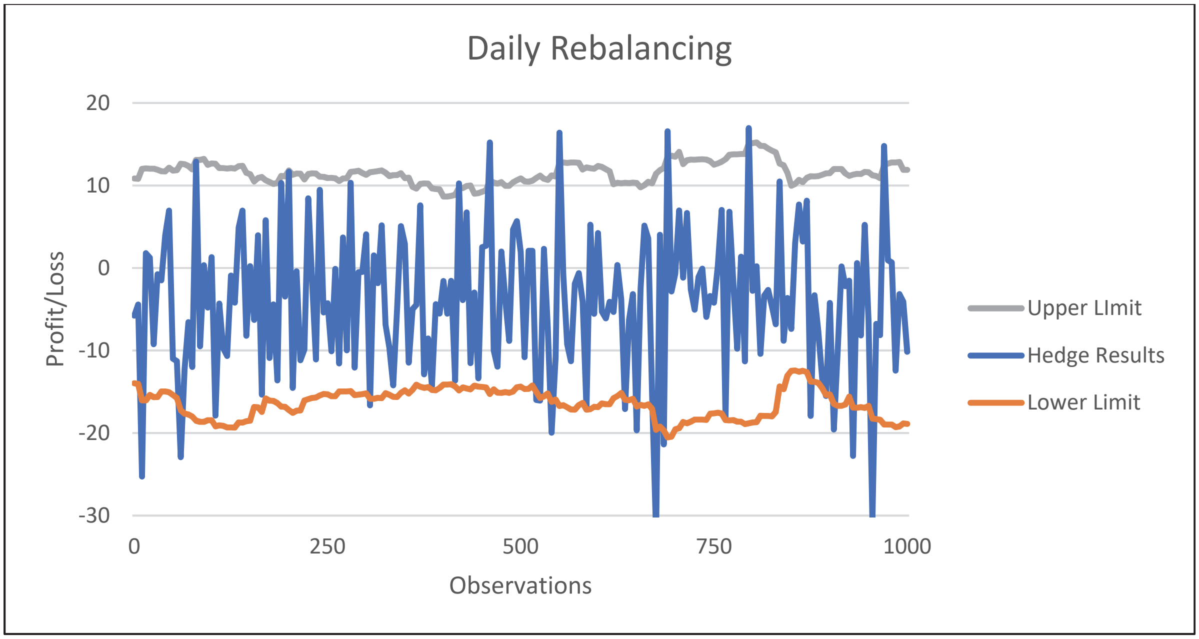
(c) (*2 points*) Describe the disclosure requirements for BJA's financial reports if it acquires SEA.

7. (*7 points*) You are evaluating a new hedging program for your individual variable annuity block of business. There are two approaches:

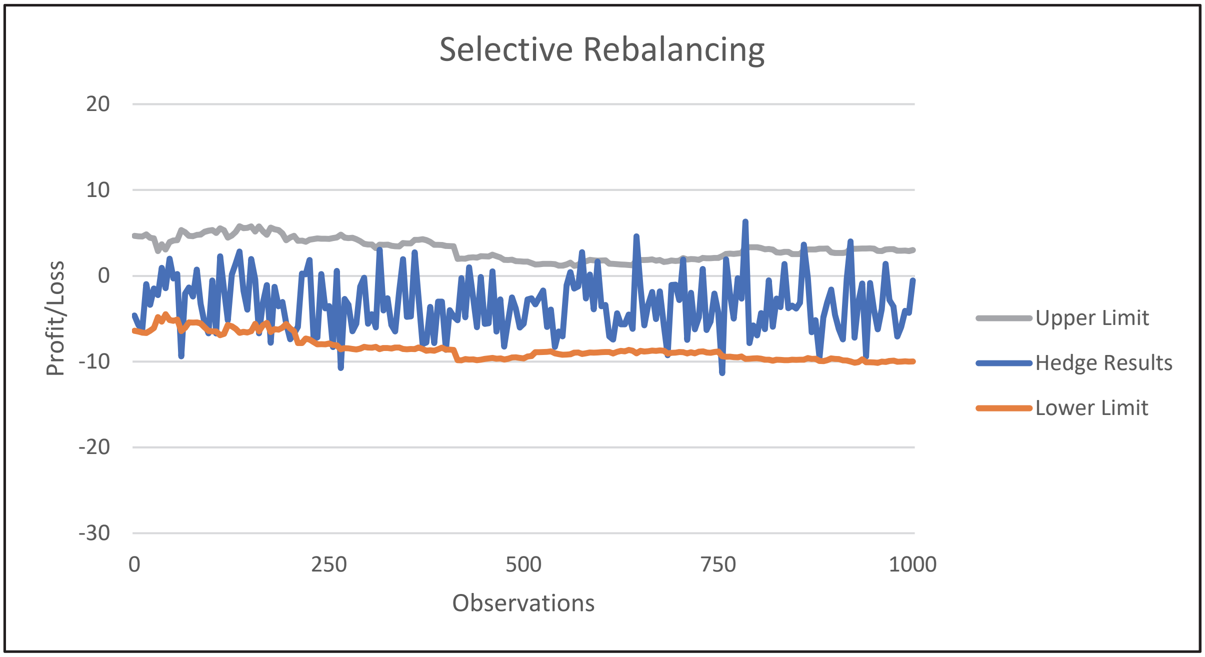
I. Daily hedge rebalancing to minimize exposure to portfolio losses.

II. Selective rebalancing, to reduce costs, triggered when interest rates have moved more than 50bps from the last rebalancing.

You demonstrate how the proposed programs would have performed over the past 1,000 trading days by performing a backtest. Hedge gain/loss results net of fees for the backtests are shown below.



7. **Continued**



(a) (*2 points*) Evaluate the backtesting results of each of the two hedge approaches independently and in comparison to each other.

Question 7 continued on the next page.

7. Continued

You have extracted the following data from your backtesting.

	Daily rebalancing	Selective rebalancing
Observations	1,000	1,000
Exceedances	17	7

X exceedances per 1,000 observations	6	7	8	….	16	17	18
F(X)	0.65%	0.85%	1.25%		96.3%	97.5%	98.0%

You are considering the following test methods:

A. Binomial
B. Rosenblatt
C. Berkowitz

(b) (*3 points*)

(i) Recommend one of the above test methods (A-C) to perform using the information above. Justify your recommendation.

(ii) Determine if the model is accepted or rejected at the 1% level for each hedge approach (I-II) based on your recommended test method in (i). Justify your response.

(c) (*2 points*) Explain two issues with the hedge approaches that may not be apparent from the backtesting results.

****END OF EXAMINATION****
Morning Session

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