FNCE10002 Principles of Finance
Semester 1, 2019

Capital Budgeting I
Tutorial Questions for Week 8

*This tutorial is divided into two parts. The answers to the questions in Part I need to be submitted at the **beginning** of your tutorial. All answers must be **handwritten** and in **original** (photocopies/emails will not be accepted). Please follow the instructions on the Tutorial Hand-in Sheet available on the LMS via the Tutorials link. The answers to questions in Part II do not need to be submitted and will be discussed in your tutorial. Please make sure that you have worked through these questions and are prepared to discuss them if called upon by your tutor.*

Note that questions flagged as "EXM" are past exam questions that I've used in this subject or subjects similar in scope to this subject, while those flagged as "TXT" are sourced from the textbook. Detailed answers to the questions in Part II will only be provided in tutorials. Brief answers may be provided via the LMS after a time lag. This policy is in place to ensure that you attend your tutorials regularly and receive timely feedback from your tutor. If you are unsure of any answer you should check with your tutor, a pit stop tutor, online tutor or me.

Part I: Answers to be Submitted to Your Tutor

A. Problems

A1.[EXM] You are deciding between two mutually exclusive investment opportunities. Both require the same initial investment of \$10 million. Project A will generate \$2.0 million per year (starting at the end of the first year) forever. Project B will generate \$1.5 million at the end of the first year and the cash flows will then grow at a rate of 2% per annum forever.

a) Which investment has the higher *IRR*?

b) Which investment has the higher *NPV* when the required rate of return is 7%?

c) For what values of the required rate of return does picking the higher *IRR* project give the *same* decision as the *NPV* method? (*Hint:* Set the *NPV*s equal to each other and solve for the required rate of return.)

$NPV_A = NPV_B$

d) Using your analysis in part (c) and the incremental *IRR* rule which investment would you choose when the required rate of return is 7%? At what required rate of return would your decision change and why?

A2.[TXT] The cash flows associated with three independent projects (in millions) are as follows:

Net Cash Flows	Project Alpha	Project Beta	Project Gamma
Year 0	−$1,500,000	−$400,000	−$7,500,000
Year 1	$300,000	$100,000	$2,000,000
Year 2	$500,000	$200,000	$3,000,000
Year 3	$500,000	$200,000	$2,000,000
Year 4	$400,000	$100,000	$1,500,000
Year 5	$300,000	−$200,000	$5,500,000

a) Calculate the payback period of each investment.

b) Which investments does the company accept if the cut-off payback period is three years? What if the cut-off is four years?

c) Which one of these projects is a project that almost certainly should be *rejected*, but might be accepted if the company uses the payback period method? *Explain*.

d) Which one of these projects almost certainly should be *accepted* (unless the company's discount rate is very high), but might be rejected if the company uses the payback period method. *Explain*.

e) What is the maximum number of internal rates of return that each project can have and why?

Part II: Submission of Answers Not Required

B.   Short Answer Questions and Case Study

B1.[TXT] Answer each part separately.

a) For a firm that uses the *NPV* method to make investment decisions, what are the consequences if the firm mis-estimates shareholders' required returns and consistently applies a discount rate that is "too high"? What about the case where the discount rate is "too low"? *Explain*.

$$NPV = \sum_{t=1}^{N} \frac{C_t}{(1+r)^n} - I_0$$

[handwritten: r↑ NPV↓ → they may reject the projet; r↓ NPV↑]

b) Why is the *NPV* method considered to be theoretically superior to all other capital budgeting methods? Reconcile this result with the prevalence of the use of *IRR* in practice. How would you respond to your CFO if she instructed you to use the *IRR* technique to make capital budgeting decisions on projects with cash flow streams that alternate between inflows and outflows (that is, positive and negative cash flows)? *Explain*.

[handwritten: directly]
[handwritten: IRR has drawback → n sign change mostly n IRR]
[handwritten: { independent project / mutually exclusive project]
[handwritten: IRR percentage easy to compre]

c) Under what circumstances will the *NPV* and *IRR* methods provide different capital budgeting decisions? What are the underlying causes of the differences often found in the ranking of mutually exclusive projects using *NPV* and *IRR*? *Explain*.

[handwritten: difference in timing and the scale]

B2. Refer to the case study related to the market's interpretation of *NPV* covered in class where we examined Microsoft's takeover of LinkedIn in 2016. Suppose Microsoft announces that because of its inability to fully integrate LinkedIn into its Office software/cloudware it has decided to sell its LinkedIn operations at a significantly lower value compared to the US$26 billion it had paid in 2016. How do you think the market would react to this decision and why? *Explain*.

[handwritten: NPV is high → people buy → price increase → NPV↓]
[handwritten: depend on what people believe]

C.   Multiple Choice Questions

For each question pick the *most reasonable* response based *only* on the information provided.

C1.[EXM] You have analyzed an investment project which has a conventional cash flow pattern. If the initial outlay and all the net cash flows are doubled what is the *most likely* effect on the project's net present value and internal rate of return?

(handwritten: b)

(handwritten: $\sum_{t=1}^{N} \frac{c_t}{(1+r)^t} - I_0.$)

a) Both the *IRR* and *NPV* would increase.
b) The *IRR* would stay the same and the *NPV* would increase.
c) The *IRR* would increase and the *NPV* would stay the same.
d) Both the *IRR* and *NPV* would stay the same.

(handwritten: for NPV $= \frac{2C_0}{(1+r)^n} - 2I_0$)

(handwritten: for IRR: $\frac{2C_0}{(1+r)^n} - 2I_0 = 0$)

C2.[EXM] Which of the following items of information is *least likely* to be necessary for evaluating an investment project?

(handwritten: c)

(handwritten: $\frac{C_0}{(1+r)^n} - I_0 = 0$ unchanged)

a) The project's initial cash outlay.
b) The project's life.
c) The project's internal rate of return.
d) The project's required rate of return (or discount rate).

(handwritten: use NPV rather than IRR)

(handwritten: $\sum_{t=1}^{N} \frac{cf}{(1+r)^t} - I_0 \to (a)$)

C3.[EXM] Which of the following statements about the payback period method of project evaluation are *most likely* to be **true**?

(handwritten: d)

(handwritten: b.)

I.   It is very rarely used by managers in the "real" world.
II. It tends to discriminate against projects with long development periods.
III. It tends to discriminate against projects with large net cash flows later in their lives.

a) I and II only.
b) II and III only.
c) I and III only.
d) I, II and III.

Questions C4 and C5 are based on the following information.

A project has an initial outlay of $50,000 and its expected net cash flows are $12,000 per year for the next eight years. The project is to be evaluated using a required rate of return of 12% p.a.

C4.   The project's net present value is **closest** to:

(handwritten: c)

a) –$40,433.
b) –$9,612.
c) $9,612.
d) $40,433.

(handwritten: $NPV = \frac{C}{r}\left(1 - \frac{1}{(1+r)^n}\right) - I_0$)

(handwritten: $= \frac{12000}{12\%}\left(1 - \frac{1}{1.12^8}\right) - 50,000$)

C5.   The project's internal rate of return is **closest** to:

(handwritten: d)

a) 9.5%.
b) 11.3%.
c) 14.6%.
d) 17.3%.

D.   Problems

D1.[EXM] Kaimalino Properties (KP) is evaluating six real estate investments. Management plans to buy the properties today and sell them five years from today. The following table summarizes the initial outlay and the expected sale price for each property, as well as the appropriate discount rate based on the risk of each venture.

Project	Initial Outlay	Discount Rate	Expected Sale Price in Year 5
Mountain Ridge	$3,000,000	15.0%	$18,000,000
Ocean Park Estates	$15,000,000	15.0%	$75,500,000
Lakeview	$9,000,000	15.0%	$50,000,000
Seabreeze	$6,000,000	8.0%	$35,500,000
Green Hills	$3,000,000	8.0%	$10,000,000
West Ranch	$9,000,000	8.0%	$46,500,000

(handwritten, right margin) PI
← 1.967
← 1.502
← 1.7611
← 3.027
← 1.2686
← 2.5163

KP has a total capital budget of $18,000,000 to invest in the properties.

a) Calculate the *NPV* and *IRR* of each investment.

b) Given its budget of $18,000,000, which properties should KP choose and why?

c) Explain why the profitability index method *cannot* be used if KP's budget were $12,000,000 instead. Which properties should KP choose in this case and why?

a)

$$NPV = \frac{P}{(1+r)^5} - I_0$$

for MR $\quad NPV = \frac{18}{(1+15\%)^5} - 3 = 5.9\ b$

for OPE $\quad NPV = \frac{75.5}{(1+15\%)^5} - 15 = 22.53\ b$

for Lakeview $\quad NPV = 15.85\ b$

for Seabreeze $\quad NPV = 18.16\ b$

for GH $\quad NPV = 3.8058\ b$

for WR $\quad NPV = 22.647\ b$

$$NPV = \frac{P}{(1+IRR)^5} - I_0 = 0 \qquad IRR = \left(\frac{P}{I_0}\right)^{\frac{1}{5}} - 1$$

for MR $\;IRR > 43\%$
for OPE $\;IRR = 38.15\%$
for Lakeview $\;IRR = 60.9\%$

for Seabreeze $\;IRR = 42.7\%$
for GH $\;IRR = 27.24\%$
for WR $\;IRR = 38.88\%$

(b). Seabreeze   6000000
        ↓
     WR   9000000
        ↓
     MR   3000000

(c   12 - 6 - 9 < 0

combine PI method

maybe $6 on Seabreeze
       $3   on Green Hillion
          $3 on MR.