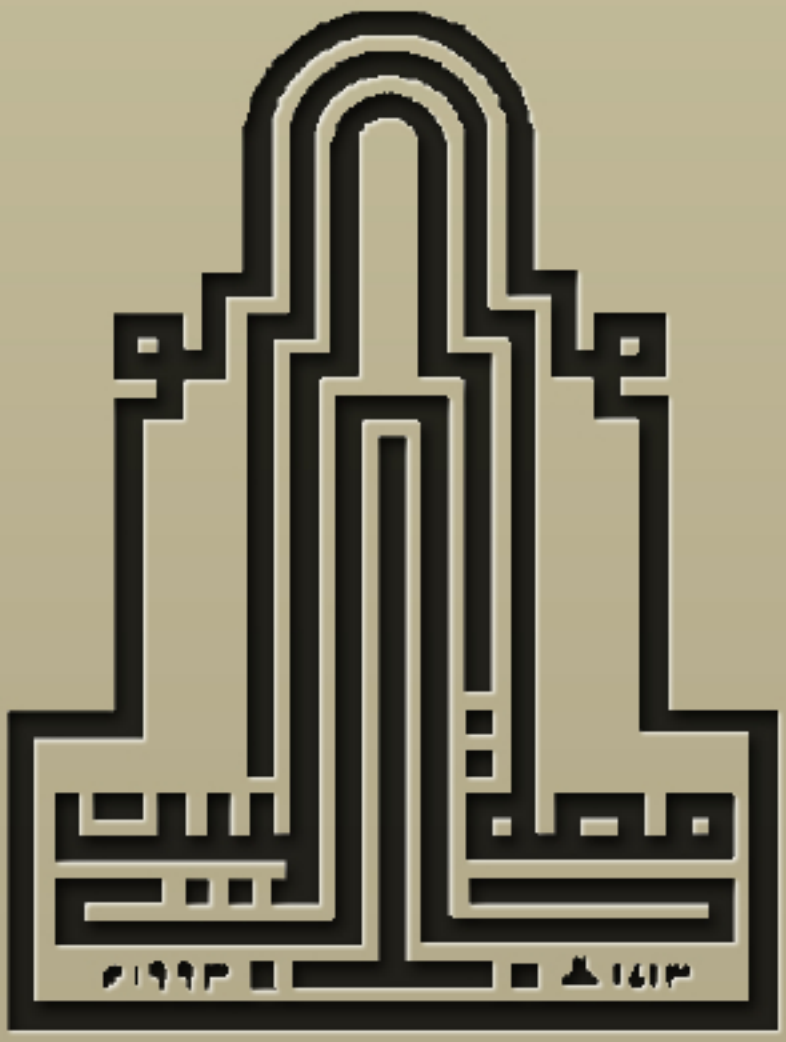
مكتبة

”خُذْ وأعطِي“

الإلكترونية

جامعة آل البيت " كلية الإقتصاد "

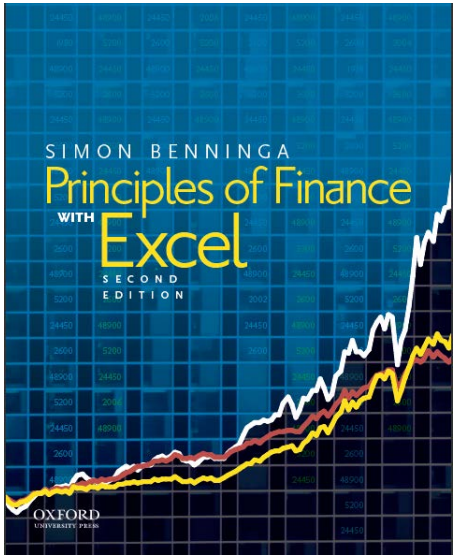
مجموعة طلابية تسعى لتوفير كل ما يلزم طلاب
كلية إدارة المال والاعمال من مواد وشروحات واسئلة بصورة الكترونية



Principles of Finance with Excel, 2nd edition

Instructor materials

Chapter 4
Capital budgeting



What is “Capital Budgeting”

- Two big questions:
- **“Yes-No”**: Should you invest money today in a project that gives future payoffs?
- **“Ranking”**: How to compare mutually-exclusive projects? If you have several alternative investments, only one of which you can choose, which should you undertake?

Other issues

- Sunk costs. How should we account for costs incurred in the past?
- The cost of foregone opportunities.
- Salvage values and terminal values.
- Incorporating taxes into the valuation decision. This issue is dealt with briefly in Section 4.7. We return to it at greater length in Chapters 4-6.

NPV and IRR

- The two basic capital budgeting tools
- Note: We usually prefer NPV to IRR, but IRR is a handy tool

"Yes-No" and NPV

- NPV rule: A project is worthwhile if the NPV > 0

$$NPV = CF_0 + \frac{CF_1}{(1+r)^1} + \frac{CF_2}{(1+r)^2} + \ldots + \frac{CF_N}{(1+r)^N} \begin{matrix} > \\ = \\ < \end{matrix} 0?$$

- According to the NPV rule:
  - If NPV > 0, project is worthwhile
  - If NPV < 0, project should not be undertaken

Technical notes

- CF_0 is usually negative (the project cost)
- CF_1, CF_2, … are usually positive (future payoffs of project)
- CF_1, CF_2, … are expected or anticipated cash flows
- r is a discount rate appropriate to the project's risk (see Chapter 6)

"Yes-No" and IRR

- IRR rule: A project is worthwhile if the IRR > discount rate

$$CF_0 + \frac{CF_1}{(1+IRR)^1} + \frac{CF_2}{(1+IRR)^2} + \ldots + \frac{CF_N}{(1+IRR)^N} = 0$$

- According to the IRR rule:
  - If IRR > r, then the project is worthwhile
  - If IRR < r, project should not be undertaken

Basic “Yes-No” example

	A	B	C
1	**YES-NO WITH NPV AND IRR**		
2	Discount rate	12%	
3			
4	**Year**	**Project cash flow**	
5	0	-1000	
6	1	300	
7	2	400	
8	3	500	
9	4	600	
10	5	100	
11			
12	NPV	380.68	<-- =B5+NPV($B$2,B6:B10)
13	IRR	26.47%	<-- =IRR(B5:B10)

This project is worthwhile by both NPV and IRR rules:

- ❑ NPV > 0
- ❑ IRR > discount rate of 12%

Basic "Ranking" example

	A	B	C	D
1	**RANKING TWO PROJECTS WITH NPV AND IRR**			
2	Discount rate	12%		
3				
4	**Year**	**Project A**	**Project B**	
5	0	-1000	-800	
6	1	200	420	
7	2	400	100	
8	3	600	300	
9	4	300	600	
10	5	100	200	
11				
12	NPV	171.92	363.05	<-- =C5+NPV($B$2,C6:C10)
13	IRR	19%	29%	<-- =IRR(C5:C10)

"Yes-No": Both projects are worthwhile

- ❑ NPV_A, $NPV_B > 0$
- ❑ IRR_A, $IRR_B >$ discount rate of 12%

"Ranking": If you can choose only one project, B is preferred by both NPV and IRR

- ❑ $NPV_B > NPV_A$
- ❑ $IRR_B > IRR_A$

Summing up

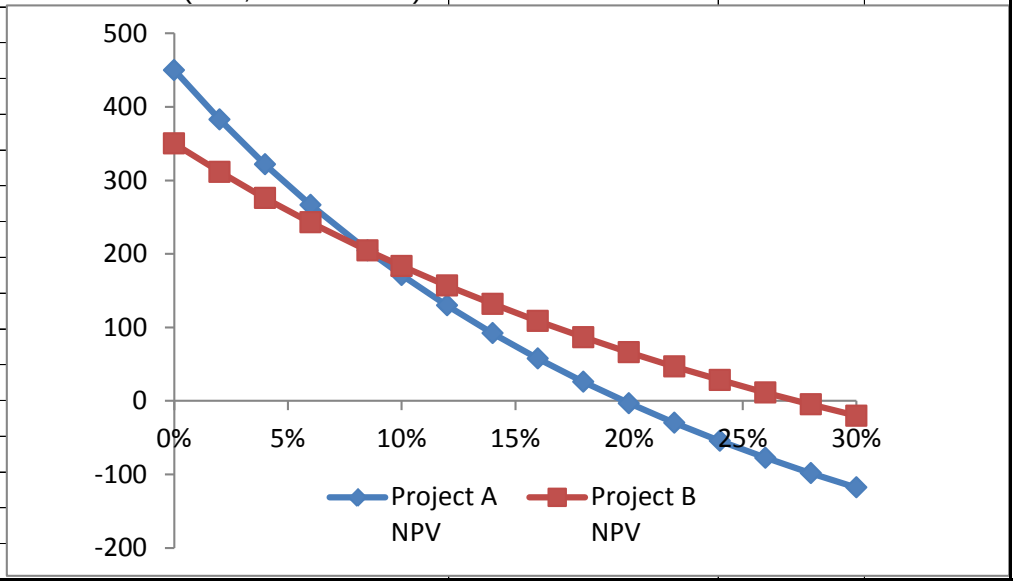
	"Yes or no": Choosing whether to undertake a single project	"Project ranking": Comparing two mutually exclusive projects
NPV criterion	The project should be undertaken if its NPV > 0.	Project *A* is preferred to Project *B* if NPV(A) > NPV(B).
IRR criterion	The project should be undertaken if its IRR > *r*, where *r* is the appropriate discount rate.	Project *A* is preferred to Project *B* if IRR(A) > IRR(B).

	A	B	C	D
1	**NPV AND IRR CAN SOMETIMES GIVE CONFLICTING RANKINGS**			
2	Discount rate	6%		
3				
4	**Year**	**Project A**	**Project B**	
5	0	-500	-500	
6	1	100	250	
7	2	100	250	
8	3	150	200	
9	4	200	100	
10	5	400	50	
11				
12	NPV	266.60	242.84	<-- =C5+NPV(B2,C6:C10)
13	IRR	19.77%	27.38%	<-- =IRR(C5:C10)

In this example:

- Both A and B are worthwhile by both NPV and IRR criteria
- If discount rate = 6%
  - A is preferred to B by NPV rule
  - B preferred to A by IRR rule

	A	B	C	D	E	F	G
15	TABLE OF NPVs AND DISCOUNT RATES						
16		Project A NPV	Project B NPV				
17	0%	450.00	350.00	<-- =$C$5+NPV(A17,$C$6:$C$10)			
18	2%	382.57	311.53	<-- =$C$5+NPV(A18,$C$6:$C$10)			
19	4%	321.69	275.90				
20	6%	266.60	242.84				
21	8.5128%	204.58	204.58				
22	10%	171.22	183.49				
23	12%	129.85	156.79				
24	14%	92.08	131.84				
25	16%	57.53	108.47				
26	18%	25.86	86.57				
27	20%	-3.22	66.00				
28	22%	-29.96	46.66				
29	24%	-54.61	28.45				
30	26%	-77.36	11.28				
31	28%	-98.39	-4.93				
32	30%	-117.87	-20.25				
33							
34							



- IRR_A is always < IRR_B: By IRR rule, B is always preferred to A
- For discount rates < 8.5128%: $NPV_A > NPV_B$ (ranking conflict)
- For discount rates > 8.51285: $NPV_A < NPV_B$ (no ranking conflict)

When IRR and NPV conflict, **use NPV**

- Why: IRR gives the rate of return
- NPV gives the wealth increment

$$NPV = \underbrace{CF_0}_{\text{Cost of project}} + \underbrace{\frac{CF_1}{(1+r)^1} + \frac{CF_2}{(1+r)^2} + \ldots + \frac{CF_N}{(1+r)^N}}_{\text{Value today of future project cash flows}}$$

Incremental wealth:
How much does the project's net value add to your wealth?

Back to last example: Calculating the crossover point

	A	B	C	D	E
1	**CROSSOVER POINT: $IRR_A = IRR_B$ compute IRR of differential cash flows**				
2	Discount rate	6%			
3					
4	**Year**	**Project A**	**Project B**	**Project A - Project B**	
5	0	-500	-500	0	<-- =B5-C5
6	1	100	250	-150	<-- =B6-C6
7	2	100	250	-150	<-- =B7-C7
8	3	150	200	-50	<-- =B8-C8
9	4	200	100	100	<-- =B9-C9
10	5	400	50	350	<-- =B10-C10
11					
12	NPV	266.60	242.84		
13	IRR	19.77%	27.38%	8.5128%	<-- =IRR(D5:D10)

Crossover point is the IRR of the differential cash flows (column D)