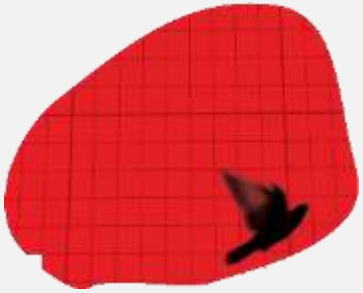

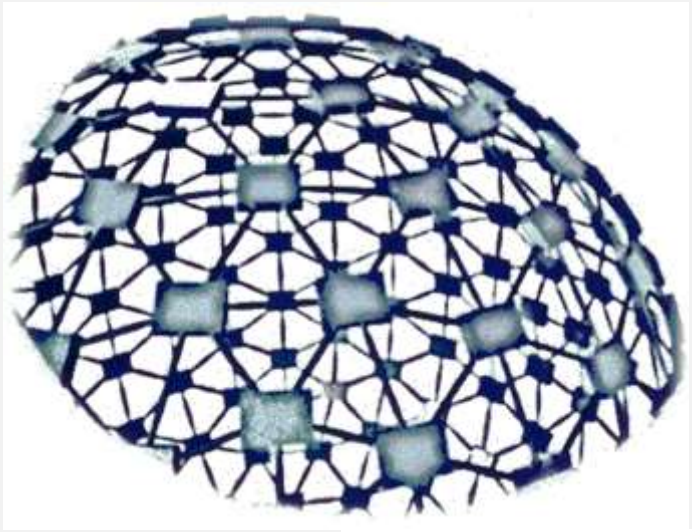

جامعة جدة
University of Jeddah

Performing Financial Analysis

جامعة جدة
University of Jeddah

Lecture Main Quistions/ key terms

- *Financial Analyses*
- *Benefits (inflow)*
- *Costs (outflow)*
- *Cash Flow (= benefits - costs)*

- *Net Present Value **NPV***
- *Return on Investment **ROI***
- *Internal rate of return **IRR***
- *Payback period*

Entrance

- *A **dollar** earned **today** is worth more than a dollar earned five years from now*
  - *That's called "**Time value of money** principle"*

- ***What is Present Value (PV)?***
- *we discount the money from the future to the present to see how much it is worth today using an appropriate **discount rate***

- ***Discount rate** is called **opportunity cost** of **cost of capital***

Entrance

- *Let*

  PV: *Present Value* ***FV****: Future Value*

  k: *Discount Rate* ***n:*** *time (years)*

$$\text{Discount Factor} = \frac{1}{(1+k)^n}$$

PV = FV * Discount Factor

Entrance

- *Let*

PV: *Present Value* **?** ***FV****: Future Value = 2000$*

k: *Discount Rate = 10%* ***n:*** *time (years) = 3*

$$\text{Discount Factor} = \frac{1}{(1+k)^n} = \frac{1}{(1+0.1)^3}$$

PV = FV * Discount Factor

Entrance

- *Let*

PV: *Present Value* **?** ***FV****: Future Value = 2000$*

k: *Discount Rate = 10%* ***n:*** *time (years) = 3*

$$\text{Discount Factor} = \frac{1}{(1+k)^n} = \frac{1}{(1+0.1)^3}$$

PV = FV * Discount Factor

$$PV = \frac{2000}{(1+0.1)^3} = 1502.6\$$$

Discounted value

Performing Financial Analyses

- *Financial considerations are often an important consideration in selecting projects*
  - *Regardless of current economics*
- *Primary methods for determining the projected financial value of projects*
  - ***Net present value** (NPV) analysis*
  - ***Return on investment** (ROI)*
  - ***Payback analysis***

Net Present Value Analysis (NPV) (Definition)

- *Method of calculating the expected net monetary **gain** or **loss** from a project by discounting all expected future cash inflows and outflows to the present point in time*

  - ***NPV** (discounted cash flow: time value of money)*
  - *Projects with a **positive** NPV should be considered if financial value is a key criterion*
  - *Projects with **higher** NPVs are preferred*

Net Present Value Analysis

(Concept with example)

	A	B	C	D	E	F	G
1	Discount rate	10%					
2							
3	PROJECT 1	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	TOTAL
4	Benefits	$0	$2,000	$3,000	$4,000	$5,000	$14,000
5	Costs	$5,000	$1,000	$1,000	$1,000	$1,000	$9,000
6	Cash flow	($5,000)	$1,000	$2,000	$3,000	$4,000	$5,000
7	NPV →	$2,316					
8		Formula =npv(b1,b6:f6)					
9							
10	PROJECT 2	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	TOTAL
11	Benefits	$1,000	$2,000	$4,000	$4,000	$4,000	$15,000
12	Costs	$2,000	$2,000	$2,000	$2,000	$2,000	$10,000
13	Cash flow	($1,000)	$0	$2,000	$2,000	$2,000	$5,000
14	NPV →	$3,201					
15		Formula =npv(b1,b13:f13)					
16							
17							

Note that totals are equal, but NPVs are not because of the time value of money

FIGURE 4-4 Net present value example

Net Present Value Analysis (calculations)

- *NPV calculations*
  1. *Determine estimated **costs** and **benefits** for the life of the project and the products it produces*
  2. *Determine the **discount rate***
  3. ***Calculate** the net present value*
- *Important considerations*
  - *Some organizations refer to the investment year or years for project costs as Year 0 and do not discount costs in Year 0*
  - *Discount rate can vary, often based on the **prime rate** and other economic considerations*
  - *Costs can be entered as negative numbers and can be listed first (and then benefits)*

$$NPV = \sum_{t=1}^{n} \frac{NCF_t}{(1+k)^t} - NCF_0$$

NCF_0 = initial cash outlay on project
NCF_t = net cash flow generated by project at time t
n = life of the project
k = required rate of return

Net Present Value Analysis (NPV) (**Calculations – Example 1**)

$$NPV = \sum_{t=1}^{n} \frac{NCF_t}{(1+k)^t} - NCF_0$$

NCF_0 = initial cash outlay on project
NCF_t = net cash flow generated by project at time t
n = life of the project
k = required rate of return

Alternative	Initial Investment	Annual Cash flows 1	2	3	Net Income for 3 Years
A	-2000	0	0	4500	2500
B	-2000	2000	2000	100	2100

- Assume a **10%** interest rate.
  (AKA discount rate; hurdle rate; cost of capital)

$NPV_A = -2000 + 4500 / 1.1^3$

$= -2000 + 3380.85 = 1380.85$

Net Present Value Analysis (Calculations - Example 2)

NPV= Discounted benefits- Discounted costs

Discount rate	**8%**					
Assume the project is completed in Year 0			**Year**			
	0	**1**	**2**	**3**	**Total**	
Costs	140,000	40,000	40,000	40,000		
Discount factor	1	0.93	0.86	0.79		
Discounted costs	**140,000**	**37,200**	**34,400**	**31,600**	**243,200**	
Benefits	0	200,000	200,000	200,000		
Discount factor	1	0.93	0.86	0.79		
Discounted benefits	**0**	**186,000**	**172,000**	**158,000**	**516,000**	
Discounted benefits - costs	(140,000)	148,800	137,600	126,400	**272,800**	← **NPV**
Cumulative benefits - costs	(140,000)	8,800	146,400	272,800		
ROI →	**112%**					
	Payback in Year 1					

FIGURE 4-5 JWD Consulting net present value and return on investment exa

$$\text{Year 0 : discount factor} = 1/(1+0.08)^0 = 1$$

$$\text{Year 1 : discount factor} = 1/(1+0.08)^1 = 0.93$$

$$\text{Year 2 : discount factor} = 1/(1+0.08)^2 = 0.86$$

$$\text{Year 3 : discount factor} = 1/(1+0.08)^3 = 0.79$$

Return on Investment ROI

- *Calculated by subtracting the project costs from the benefits and then dividing by the costs*

$$\text{ROI} = (\text{total discounted benefits-total discounted costs})/\text{discounted costs}$$

$$\text{ROI} = (516{,}000 - 243{,}200)/243{,}200 = 112\%$$

- *The higher the ROI, the better*
- *Many organizations have a required rate of return*
  - ***Minimum acceptable rate of ROI for projects***

- ***Internal rate of return*** *(IRR) can be calculated by finding the* ***discount rate that makes the NPV equal to zero.***

- *Discount rate is called opportunity cost of cost of capital*

Return on Investment ROI

$$\text{ROI} = (\text{total discounted benefits-total discounted costs})/\text{discounted costs}$$

$$\text{ROI} = (516{,}000 - 243{,}200)/243{,}200 = 112\%$$

Discount rate	**8%**					
Assume the project is completed in Year 0			**Year**			
	0	**1**	**2**	**3**	**Total**	
Costs	140,000	40,000	40,000	40,000		
Discount factor	1	0.93	0.86	0.79		
Discounted costs	**140,000**	**37,200**	**34,400**	**31,600**	**243,200**	
Benefits	0	200,000	200,000	200,000		
Discount factor	1	0.93	0.86	0.79		
Discounted benefits	**0**	**186,000**	**172,000**	**158,000**	**516,000**	
Discounted benefits - costs	(140,000)	148,800	137,600	126,400	**272,800**	← **NPV**
Cumulative benefits - costs	(140,000)	8,800	146,400	272,800		
		↑				
ROI →	**112%**					
	Payback in Year 1					

FIGURE 4-5 JWD Consulting net present value and return on investment example

Payback Analysis (1 of 3)

- *Payback period is the amount of time it will take to recoup, in the form of net cash inflows, the total dollars invested in a project*
  - *Determines how much **time** will elapse before **accrued benefits overtake accrued and continuing costs***
  - *Payback occurs when the **net cumulative discounted benefits equals the costs***
  - *Many organizations have requirements for the length of the payback period of an investment*

Payback Analysis (2 of 3)

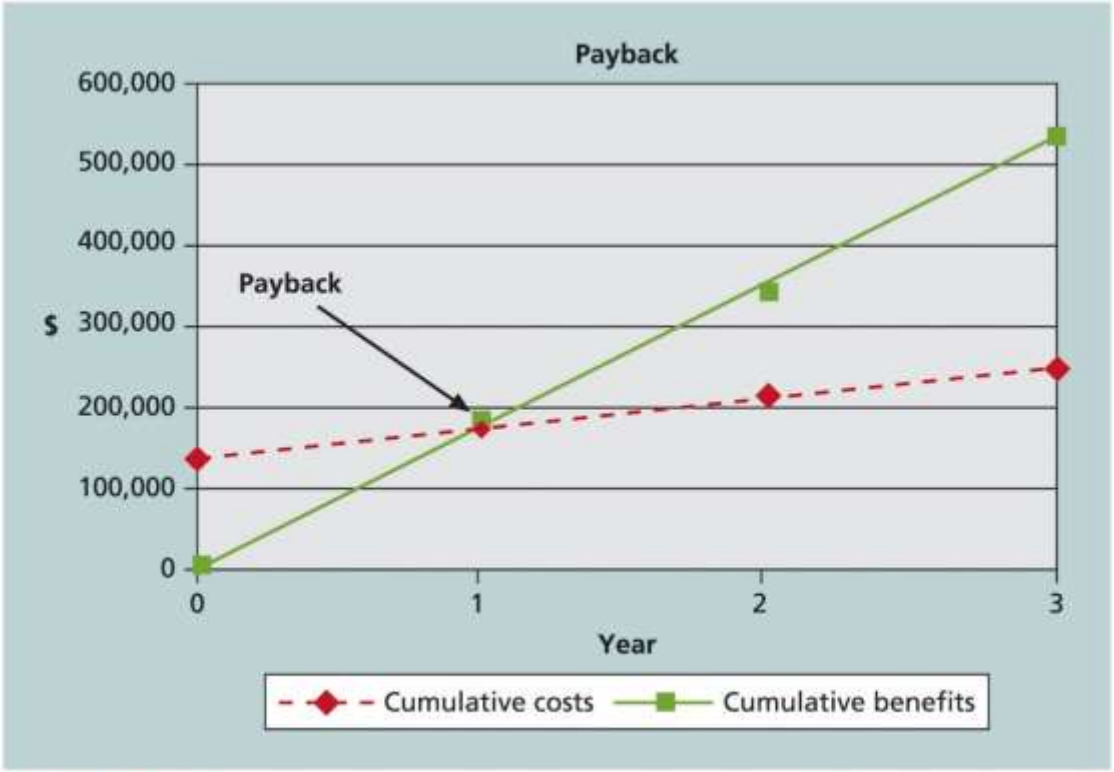

FIGURE 4-6 Charting the payback period for the JWD Consulting project

Payback Analysis (3 of 3)

Discount rate	**8%**					
Assume the project is completed in Year 0			**Year**			
	0	**1**	**2**	**3**	**Total**	
Costs	140,000	40,000	40,000	40,000		
Discount factor	1	0.93	0.86	0.79		
Discounted costs	**140,000**	**37,200**	**34,400**	**31,600**	**243,200**	
Benefits	0	200,000	200,000	200,000		
Discount factor	1	0.93	0.86	0.79		
Discounted benefits	**0**	**186,000**	**172,000**	**158,000**	**516,000**	
Discounted benefits - costs	(140,000)	148,800	137,600	126,400	**272,800**	← **NPV**
Cumulative benefits - costs	(140,000)	8,800	146,400	272,800		
		↑				
ROI →	**112%**					
	Payback in Year 1					

FIGURE 4-5 JWD Consulting net present value and return on investment example

Test your understanding

Financial Analysis for Project

Discount rate	8.00%					
Assume the project is completed in Year 0			Year			
	0	1	2	3	Total	
Costs	140,000	40,000	40,000	40,000		
Discount factor						
Discounted costs						
Benefits	0	200,000	200,000	200,000		
Discount factor						
Discounted benefits						
Discounted benefits - costs						← **NPV**
Cumulative benefits - costs						
ROI →						

Payback in Year 1