

Project Analysis:

Suppose we want to prepare a set of pro forma financial statements for a project for Norma Desmond Enterprises. In order to do so, we must have some background information. In this case, assume:

- a. Sales of 10,000 units/year @ \$5/unit.
 - b. Variable cost/unit is \$3. Fixed costs are \$5,000/year. Project has no salvage value. Project life is 3 years.
 - c. Project cost is \$21,000. Depreciation is \$7,000/year. The project is financed with retained earnings.
 - d. Investment in net working capital is \$10,000. The NWC investment occurs at the beginning of the project, and it is assumed that all of NWC is converted into cash at the end of the project.
 - e. The firm's required return is 20%. The tax rate is 34%.
1. Calculate the project's Payback, NPV, and IRR (base-case).
 2. Scenario analysis: Suppose the company believes that all of its estimates (sale quantity, price, variable cost/unit, and fixed cost) are accurate within ± 10 percent. What are the best-case NPV and IRR? Worst-case NPV and IRR?
 3. Sensitivity analysis: Evaluate the sensitivity of the company's base-case NPV to changes in price. Calculate the project's NPV assuming a 10% price decline.
 4. Break-even analysis: find the quantity for (a) accounting break-even ($NI=0$); (b) cash break-even ($OCF=0$); (c) financial break-even ($NPV=0$)?

Solutions:

1) Base-Case Scenario

Step 1: Construct the Pro Forma Income Statement

Pro Forma Income Statements	
Sales	\$50,000
Var. costs	30,000
Fixed costs	5,000
Depreciation	<u>7,000</u>
EBIT	\$8,000
Taxes (34%)	<u>2,720</u>
Net income	<u>\$5,280</u>

Where: Sales=sales quantity x price per unit = 10,000 x 5 = \$50,000

Variable costs = sales quantity x variable cost per unit = 10,000 x 3 = \$30,000

Depreciation = total project cost \div life of the project in years = 21,000/3 = \$7,000
(Applicable only when depreciation is straight-line to zero)

Step 2: Calculate OCF:

$OCF = EBIT + Depreciation - Taxes = 8,000 + 7,000 - 2,720 = \$12,280$

Step 3: Calculate Cash Flows over the life of the project.

	0	1	2	3
OCF		\$12,280	\$12,280	\$12,280
NWC Sp. -\$10,000				\$10,000
Cap. Sp. <u>-\$21,000</u>				
Total	-\$31,000	\$12,280	\$12,280	\$22,280

Step 4: Calculate the project's NPV, IRR and Payback

$$NPV = 12,280/1.20^1 + 12,280/1.20^2 + 22,280/1.20^3 - 31,000 = \$655$$

IRR = 21% (by trial and error, or using a financial calculator)

Payback = 2.3 years

2) Best-case scenario:

Step 1: Calculate the best-case variables:

Sales quantity = 10,000 (1+10%) = 11,000 units

Price = 5 (1+10%) = \$5.5 /unit

Variable cost per unit = 3(1-10%) = \$2.7/unit

Fixed cost = 5,000 (1-10%) = \$4,500

Step 2: Construct the Best-case Pro Forma Income State

Best-Case Pro Forma Income Statement

Sales	\$60,500
Var. costs	29,700
Fixed costs	4,500
Depreciation	<u>7,000</u>
EBIT	\$19,300
Taxes (34%)	<u>6,562</u>
Net income	<u>\$12,738</u>

Step 3: Calculate OCF:

$$OCF = EBIT + Depreciation - Taxes = 19,300 + 7,000 - 6,562 = \$19,738$$

Step 4: Calculate the project's cash flows:

	0	1	2	3
OCF		\$19,738	\$19,738	\$19,738
NWC Sp. -\$10,000				\$10,000
Cap. Sp. <u>-\$21,000</u>				
Total	-\$31,000	\$19,738	\$19,738	\$29,738

Step 5: Calculate the project's Best-case NPV and IRR:

NPV = \$16,364.77; IRR = 49.33%; Payback = 1.57 years

Worst-Case Scenario:

Step 1: Calculate the Worst-Case Variables:

Sales quantity = 10,000 (1-10%) = 9,000 units

Price = 5 (1-10%) = \$4.5/unit

Variable cost per unit = 3 (1+10%) = \$3.3/unit

Fixed cost = 5,000 (1+10%) = \$5,500

Step 2: Construct the Worst-Case Pro Forma Income Statement

Worst-Case Pro Forma Income Statement

Sales	\$40,500
Var. costs	29,700
Fixed costs	5,500
Depreciation	<u>7,000</u>
EBIT	-\$1,700
Taxes (34%)	<u>-578</u>
Net income	<u>-\$1,122</u>

Step 3: Calculate the project's OCF:

OCF = EBIT + Depreciation – Taxes = -1,700 + 7,000 – (-578) = \$5,878

Step 4: Calculate the project's cash flows over its life:

	0	1	2	3
OCF		\$5,878	\$5,878	\$5,878
NWC Sp.	-\$10,000			\$10,000
Cap. Sp.	<u>-\$21,000</u>			
Total	<u>-\$31,000</u>	<u>\$5,878</u>	<u>\$5,878</u>	<u>\$15,878</u>

Step 5: Calculate the project's NPV, IRR and Payback under the Worst-Case Scenario:

NPV = -\$12,831.06; IRR = -4.72%; Payback = never

Summary of the Scenario Analysis

	<u>Best-case</u>	<u>Base-case</u>	<u>Worst-Case</u>
NPV	\$16,364.77	\$655	-\$12,831.06
IRR	49.33%	21%	- 4.72%
Payback	1.57 years	2.3 years	never

Now we have a pretty good idea what to expect from the project under different economic conditions.

3). Sensitivity Analysis:

Step 1: Calculate the sensitivity analysis variable

Price = 5 (1-10%) = \$4.5/unit

Other variables remain the same as the base-case:

Quantity = 10,000 units

Variable cost per unit = \$3/unit

Fixed cost = \$5,000

Step 2: Construct the Sensitivity Analysis Pro Forma Income Statement

Pro Forma Income Statement	
(10% price drop from base-case)	
Sales	\$45,000
Var. costs	30,000
Fixed costs	5,000
Depreciation	<u>7,000</u>
EBIT	\$3,000
Taxes (34%)	<u>1,020</u>
Net income	<u>\$1,980</u>

Step 3: Calculate OCF:

OCF = EBIT + Depreciation – Taxes = 3,000 + 7,000 – 1,020 = \$8,980

Step 4: Calculate the project's cash flows over its life

	0	1	2	3
OCF		\$8,980	\$8,980	\$8,980
NWC Sp. -\$10,000				\$10,000
Cap. Sp. <u>-\$21,000</u>				
Total	<u>-\$31,000</u>	<u>\$8,980</u>	<u>\$8,980</u>	<u>\$18,980</u>

Step 5: Calculate the project's NPV if price drops 10% from the base-case, other things constant.

NPV = -\$6,297

% Δ in NPV from the base case = (-6297-655)/655 = -10.61, or -1061%.

Interpretation: If price decreases by 10%, all else equal, NPV would decrease 1061%.

4). Break-even analysis: let Q = number of units sold

(a) Accounting break-even: Q that makes NI = 0

(b) Cash flow break-even: Q that makes OCF = 0

(c) Financial break-even: Q that makes NPV = 0

(a)	Sales	5Q
	VC	3Q
	FC	5,000
	Dep.	7,000
	EBIT	(2Q-12,000)
	Interest	0
	EBT	(2Q-12,000)
	Taxes	(2Q-12,000) (0.34)
	NI	(2Q-12,000) (0.66)

(2Q-12,000) (0.66) = 0, solving for Q: Q = 6,000 units (accounting breakeven)

$$(b) \quad OCF = EBIT + Dep. - Taxes = (2Q-12,000) + 7,000 - (2Q-12,000) (0.34) \\ = 1.32Q - 920 = 0$$

Solving for Q = 697 units (cash breakeven)

(c)	0	1	2	3
	-----	-----	-----	
OCF		1.32Q-920	1.32Q-920	1.32Q-920
NWC Sp.	-\$10,000			\$10,000
CapEx	-\$21,000			
Total	-\$31,000	1.32Q-920	1.32Q-920	1.32Q+9,080

$$NPV = -31,000 + \frac{(1.32Q - 920)}{(1 + 0.20)} + \frac{(1.32Q - 920)}{(1 + 0.20)^2} + \frac{(1.32Q + 9080)}{(1 + 0.20)^3} = 0$$

$$-31,000 + 1.1Q - 767 + 0.917Q - 639 + 0.764Q + 5255 = 0$$

$$2.781Q - 27,151 = 0$$

Q = 9,763 units (financial breakeven)