FIN 301 **Homework Solution Ch9**

Chapter 9: Project Analysis

6.

	Base Case	Best Case	Worst Case
Price	¥5,000 per unit	¥5,500 per unit	¥4,500 per unit
Variable cost	¥3,000 per unit	¥2,700 per unit	¥3,300 per unit
Fixed cost	¥30 mil	¥27 mil	¥33 mil
Sales	30,000 units	33,000 units	27,000 units
Revenue (P*Q)	¥150 mil	¥181.5 mil	¥135 mil
Variable (V*Q)	¥90 mil	¥89.1 mil	¥89.1 mil

Depreciation expense = ¥180 million/10 years = ¥18 million per year

Cash flow = (Revenue –Fixed cost –Variable cost -Depreciation) (1-T)+ Depreciation

Best-case CF = (¥181.5 mil – ¥27 mil - ¥89.1 mil – ¥18 mil)(1-0.35) + ¥18 mil = ¥ 48.81 mil
Worst-case CF = (¥135 mil – ¥33 mil - ¥89.1 mil – ¥18 mil)(1-0.35) + ¥18 mil = ¥ 5.19 mil

NPV = PV of Future CFs (12% and 10 years) - NINV

$$12\%,\ 10\text{-Year Annuity factor} = \left[\frac{1}{0.12} - \frac{1}{0.12 \times (1.12)^{10}}\right] = 5.65022$$

Best-case NPV = (5.65022 × ¥ 48,810,000) – ¥180,000,000 = ¥95,787,238
Worst-case NPV = (5.65022 × ¥5,910,000) – ¥180,000,000 = –¥146,607,200

8. a. EVA = EBIT (1-T) + Depreciation – Annual cost of capital

Annual cost of capital = annuity of the (NINV = M$900) at 14% and N=infinity

Annual cost of capital = (M$900 × 0.14) = M$126

EVA = [(M$175 ─ M$40 ─ M$18) (1-0.1)] + M$18 ─ M$126= ─M$2.7

The facility has not reached break-even in terms of EVA.

b. $$\text{DOL} = 1 + \frac{\text{fixed costs (including depreciation)}}{EBIT} = 1 + \frac{\text{M\$58 million}}{\text{M\$117 million}} = 1.50$$

9.

Price = $100 per diamond

Variable cost = $40 per diamond

Fixed Cost = $200,000

Machinery Cost = $1000,000

Life of project = 10 years

Discount rate = 12%

Tax rate = 35%

a. Accounting Break-even Sales = $\frac{\text{Fixed Costs Including Depreciation}}{[1 - (\text{Var. Cost} / \text{Sales}]}$

Depreciation Expenses = $1000,000 / 10 years = $100,000

Accounting Break-even Sales = $\frac{\$200{,}000 + \$100{,}000}{[1 - (\$40 / \$100]} = \$500{,}000$

Accounting Break-even sales in terms of quantity = $500,000 / $100 = 5,000

The firm must sell 5,000 diamonds annually.

b.

$$\text{Econ Break-even Sales} = \frac{(\text{Fixed Costs Including Dep})(1\text{-T}) + \text{Annual cost of capital} - \text{Dep}}{(1\text{-T})(1 - (\text{Var. Cost} / \text{Sales}))}$$

Annual Cost of Capital = annuity of the (NINV = $1 mil) at 12% and N=10

$$\text{12\%, 10-Year Annuity factor} = \left[\frac{1}{0.12} - \frac{1}{0.12 \times (1.12)^{10}}\right] = 5.65022$$

Annual Cost of Capital = $ 1000,000 / 5.65022 = $ 176,984.26

$$\text{Econ Break-even Sales} = \frac{(\$200{,}000 + \$100{,}000)(1\text{-}0.35) + \$176{,}984.26 - \$100{,}000}{(1\text{-}0.35)\,[1 - (\$40 / \$100]}$$

$$= \$697{,}395.54$$

Economic Break-even sales in terms of quantity =$697,395.54/ $100 = 6,974

The firm must sell 6,974 diamonds annually.

10. a. The accounting break-even point would increase because the depreciation charge will be higher, thereby reducing net profit.

    b. The economic break-even point would decrease because the present value of the depreciation tax shield will be higher when all depreciation charges can be taken in the first five years.

11. The accounting break-even point would be unaffected since taxes paid are zero when pretax profit is zero, regardless of the tax rate. The economic break-even point would increase since the after-tax cash flow corresponding to any level of sales falls when the tax rate increases.

13. Cosmos India's investment (Capital) is:

R45 million + R300 million + R200 million = R545 million

Cosmos India's cost of capital = 15%

Cosmos India's Earnings = R40 million

Therefore, EVA = Earnings – Annual cost of capital

=R40 million ─ (R545 million × 0.15) = ─R41.75 million

14.

Price = $80 per keepsake

Variable cost = $60 per keepsake

Fixed Cost = $1,000

NINV = $3000

Life of project = 5 years

Discount rate = 10%

Depreciation Expenses = $3000 / 5 years = $600

Annual Cost of Capital = annuity of the (NINV = $3000) at 10% and N=5

The 10%, 5-year annuity factor is: $\left[\frac{1}{0.10} - \frac{1}{0.10 \times (1.10)^5}\right] = 3.79079$

Annual Cost of Capital = $3000 / 3.79079 = $791.39

a. If Tax Rate = 0%

$$\text{Accounting Break-even Sales} = \frac{\text{Fixed Costs Including Depreciation}}{[1 - (\text{Var. Cost} / \text{Sales}]}$$

$$\text{Accounting Break-even Sales} = \frac{\$1000 + \$600}{[1 - (\$60 / \$80]} = \$6{,}400$$

$$\text{Econ Break-even Sales} = \frac{(\text{Fixed Costs Including Dep})(1\text{-T}) + \text{Annual cost of capital} - \text{Dep}}{(1\text{-T})(1 - (\text{Var. Cost} / \text{Sales}))}$$

$$\text{Econ Break-even Sales} = \frac{(\$1000 + \$600)(1\text{-}0) + 791.39 - \$600}{(1\text{-}0)\,[1 - (\$60 / \$80]} = \$7{,}166$$

b. If Tax Rate = 35%

$$\text{Accounting Break-even Sales} = \frac{\text{Fixed Costs Including Depreciation}}{[1 - (\text{Var. Cost} / \text{Sales}]}$$

$$\text{Accounting Break-even Sales} = \frac{\$1000 + \$600}{[1 - (\$60 / \$80]} = \$6{,}400$$

Accounting break-even is unchanged since taxes are zero when profits = 0.

$$\text{Econ Break-even Sales} = \frac{(\text{Fixed Costs Including Dep})(1\text{-T}) + \text{Annual cost of capital} - \text{Dep}}{(1\text{-T})(1 - (\text{Var. Cost} / \text{Sales}))}$$

$$\text{Econ Break-even Sales} = \frac{(\$1000 + \$600)(1\text{-}0.35) + 791.39 - \$600}{(1\text{-}0.35)\,[1 - (\$60 / \$80]} = \$7{,}578$$

15. $\text{DOL} = 1 + \dfrac{\text{fixed costs (including depreciation)}}{EBIT}$

a. EBIT= Revenues – variable costs – fixed costs – depreciation

= \$7,000 – \$5,250 – \$1,000 – \$600 = \$150

$$\text{DOL} = 1 + \frac{\$1{,}600}{\$150} = 11.67$$

b. EBIT = Revenues – variable costs – fixed costs – depreciation

= \$12,000 – \$9,000 – \$1,000 – \$600 = \$1,400

$$\text{DOL} = 1 + \frac{\$1{,}600}{\$1{,}400} = 2.14$$

c. DOL is higher when profits are lower because a \$1 change in sales leads to a greater percentage change in profits.

21. a. EBIT = Revenue – variable costs – fixed costs – depreciation =

= \$6,000 – \$4,000 – \$1,000 – \$500 = \$500

If sales increase by \$600, expenses will increase by \$400, and pretax profits will increase by \$200, an increase of 40%.

b. $\text{DOL} = 1 + \dfrac{\text{fixed costs (including depreciation)}}{EBIT} = 1 + \dfrac{\$1{,}500}{\$500} = 4$

c. Percentage change in profits = DOL × percentage change in sales = 4 × 10% = 40%