

1) Noise-R-us Inc., a publicly traded Sound Systems manufacturer is planning to invest \$3 million in a project that is expected to produce revenues of \$1.3 million each year for three years. Assume that the investment can be depreciated on a straight line basis over the 3 year period, and that the tax rate is 35%. The firm's cost of borrowing is 15%, and its cost of capital if it is completely equity financed is 20%. The risk-free rate is 8%.

a) What is the NPV of the project if it is completely equity financed?

b) Now assume that a local senator decides to help authorize a government loan, at zero flotation cost, for the entire \$3 million at a rate of just 10%. What is the Adjusted Present Value of the project when the subsidized financing choice is taken into consideration?

Investment \$3,000,000, Revenue \$1,300,000 (I assume this is EBIT)

Time 3 years,  $T_c = 35\%$ ,  $R_b = 15\%$ ,  $R_0 = 20\%$ ,  $R_f = 8\%$

Annual Cash Inflow =  $\$1,300,000 * (1 - 35\%) = \$845,000.00$

PV (Cash Inflows) = PV (20%, 3, - \$845,000.00) = \$1,779,976.85

Investment can be depreciated over 3 years by SL method

Annual Investment Depreciation =  $\$3,000,000 / 3 = \$1,000,000$

Depreciation Tax Shield =  $\$1,000,000 * 35\% = \$350,000$

PV (Dep Tax Shield) = PV (8%, 3, - \$350,000) = \$901,983.95

a) NPV if the project is completely equity financed is

= PV (Cash Inflows) - PV (Cash Outflows) + PV (Depreciation Tax Shields)

= **-\$318,039.20**

b)  $R_b' = 10\%$  (Subsidized Interest rate)

Annual Interest Payments =  $\$3,000,000 * 10\% = \$300,000$

PV (Interest Payments) = PV (15%, 3, - \$300,000) = \$684,967.54

PV (Principal) = PV (15%, 3, 0, -\$3,000,000) = \$1,972,548.70

Annual Int Tax Shield =  $\$300,000 * 35\% = \$105,000$

PV (Int Tax Shield) = PV (15%, 3, - \$105,000) = \$239,738.64

NPVF = Amount received - PV (Interest Payments) - PV (Principal) + PV (Tax Shields)

= \$582,222.40

APV = NPV (with all equity financing) + NPVF = **\$264,183.20**

2) Showboat Inc., a publicly traded gaming chain, is planning to invest \$40 million towards the construction of a casino in a medium sized city that is a popular haunt for a large proportion of tourists. This investment can be depreciated on a straight line basis over a 10 year period. The investment is expected to generate \$7 million in pretax earnings each year, for the next 10 years. For Showboat, the flotation cost for raising debt capital is 5% of the issue proceeds. This flotation fee can also be amortized on a straight line basis over the next 10 years. The firm's cost of borrowing is 10%, and its cost of capital if it is completely equity financed is 15%. The relevant corporate tax rate is 35%. The risk-free rate is 5%.

- a) What is the NPV of the project if it were completely equity financed?
- b) What is the Adjusted present value (APV) of the project if Showboat uses all debt to raise the entire investment needed. (You must assume that Showboat also raises the required flotation fee in the debt issue).
- c) What is the APV of the project if Showboat is offered the opportunity to raise the debt needed for the entire investment at a rate of 8% instead of at its true cost of borrowing of 10%? (Ignore flotation costs in this calculation).

Investment - \$40,000,000 can be depreciated

Time – 10 years, Flotation Fees - 5% of Gross Proceeds,  $R_B$  - 10%,  $R_0$  - 15%,  $T_C$  - 35%,  $R_F$  - 5%

EBIT \$7,000,000

a) Depreciation of Investment =  $\$40,000,000/10 = \$4,000,000$  per year

Depreciation Tax Shield =  $\$4,000,000 * 35\% = \$1,400,000$

PV (Dep Tax Shield) =  $PV(5\%, 10, -\$1,400,000) = \$10,810,428.90$

Annual Cash Inflow =  $\$7,000,000 * (1 - 35\%) = \$4,550,000.00$

PV (Cash Inflows) =  $PV(15\%, 10, -\$4,550,000.00) = \$22,835,397.25$

NPV if the project is completely equity financed is

=  $PV(\text{Cash Inflows}) - PV(\text{Cash Outflows}) + PV(\text{Depreciation Tax Shields})$

= **-\$6,354,173.85**

b)

Gross Proceeds =  $\$40,000,000 / (1 - 5\%) = \$42,105,263.16$

Flotation Fees =  $5\% * \$42,105,263.16 = \$2,105,263.16$

Amortization for Flotation fees =  $\$2,105,263.16/10 = \$210,526.32$  per year

$$\text{Annual Tax Shield} = \$210,526.32 * 35\% = \$73,684.21$$

$$\text{PV (Tax Shield)} = \text{PV} (5\%, 10, -\$73,684.21) = \$568,969.94$$

$$\text{Net Floatation cost} = \text{Floatation Fees} - \text{PV (Tax Shield)} = \$1,536,293.22$$

$$\text{Interest Payment} = \$42,105,263.16 * 10\% = \$4,210,526.32 \text{ per year}$$

$$\text{PV (Interest Payments)} = \text{PV} (10\%, 10, -\$4,210,526.32) = \$25,871,861.50$$

$$\text{Annual Interest Tax Shield} = \$4,210,526.32 * 35\% = \$1,473,684.21$$

$$\text{PV (Int Tax Shield)} = \text{PV} (10\%, 10, - \$1,473,684.21) = \$9,055,151.52$$

$$\text{PV (Principal)} = \text{PV} (10\%, 10, 0, -\$42,105,263.16) = \$16,233,401.66$$

$$\begin{aligned} \text{NPVF} &= \text{Amount received} - \text{PV (Interest Payments)} - \text{PV (Principal)} + \text{PV (Tax Shields)} \\ &= \$9,055,151.52 \end{aligned}$$

$$\text{APV} = \text{NPV} + \text{NPVF} - \text{Net Flotation Costs} = \$1,164,684.46$$

c)  $\text{Interest Payment} = \$40,000,000 * 8\% = \$3,200,000.00$   $R_B' = 8\%$  (Subsidized interest rate)

$$\text{PV (Interest Payments)} = \text{PV} (10\%, 10, -\$3,200,000.00) = \$19,662,614.74$$

$$\text{Interest Tax Shield} = \$3,200,000.00 * 35\% = \$1,120,000.00$$

$$\text{PV (Int Tax Shield)} = \text{PV} (10\%, 10, - \$1,120,000.00) = \$6,881,915.16$$

$$\text{PV (Principal)} = \text{PV} (10\%, 10, 0, -\$40,000,000) = \$15,421,731.58$$

$$\begin{aligned} \text{NPVF} &= \text{Amount received} - \text{PV (Interest Payments)} - \text{PV (Principal)} + \text{PV (Tax Shields)} \\ &= \$11,797,568.84 \end{aligned}$$

$$\text{APV} = \text{NPV (with all equity financing)} + \text{NPVF} = \$5,443,394.99$$

3) It is the late 1990s and suppose that Digital Equipment Corporation (DEC) is planning to expand into the internet navigator & browser business by acquiring Fetch Inc. Unfortunately, the valuation of Fetch is difficult because Fetch is not publicly traded. DEC's target debt-equity ratio is 40% and its pre-tax borrowing rate is 12%. DEC has identified Yahoo Inc., a publicly traded, internet navigation software firm for its pure-play computations. Yahoo uses a debt to equity ratio of 50%, and its equity beta (from Value line) is 2. The risk free rate is 7% and the rate on the market portfolio is 15%. Both firms face a corporate tax rate of 35%.

a) What is the unlevered beta for the internet navigator & browser business?

b) What is the cost of equity capital and the WACC that DEC should use for its analysis here?