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FNCE 317

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Tutorial 9

Chapter 16

14. Elzear & Co. expects its EBIT to be \$74,000 every year forever. The firm can borrow at 7%. Elzear currently has no debt, and its cost of equity is 12%. If the tax rate is 35%, what is the value of the firm? What will the value be if the company borrows \$125,000 and uses the proceeds to repurchase shares?

$$\begin{aligned}\text{Earnings} &= \text{EBIT} - \text{Taxes} \\ &= \text{EBIT} * (1 - T_c) \\ &= \$74,000 * (1 - 0.35) = \$48,100\end{aligned}$$

$$\begin{aligned}V_u &= \frac{\text{Earnings}}{r_u} \\ &= \frac{\$74,000}{0.12} = \$400,833.33\end{aligned}$$

$$\begin{aligned}V(L) &= V(U) + T_c * D \\ V(L) &= \$400,833.33 + (0.35 * \$125,000) = \$444,583.33\end{aligned}$$

(The value of the firm increases by the amount of the interest tax shield)

15. In problem 14, what is the cost of equity after recapitalization? What is the WACC? What are the implications for the firm's capital structure decision?

$$V(L) = D + E$$

$$V(L) = \$444,583.33$$

$$D = \$125,000$$

$$E = V(L) - D = \$444,583.33 - \$125,000 = \$319,583.33$$

$$\begin{aligned} R_E &= R_u + (R_u - R_D) \left(\frac{D}{E} \right) (1 - T_c) \\ &= 0.12 + (0.12 - 0.07) \left(\frac{\$125,000}{\$319,583.33} \right) (1 - 0.35) \\ &= 0.1327 \rightarrow 13.27\% \end{aligned}$$

$$\begin{aligned} WACC &= \frac{E}{V} (R_E) + \frac{D}{V} (R_D) (1 - T_c) \\ &= \frac{\$319,583.33}{\$444,583.33} (0.1327) + \frac{\$125,000}{\$444,583.33} (0.07) (1 - 0.35) \\ &= 0.1082 \rightarrow 10.82\% \end{aligned}$$

When there are corporate taxes, the overall cost of capital of the firm declines the more leverage a company uses in its capital structure.

17. Lazare Corporation expects an EBIT of \$19,750 every year forever. Lazare currently has no debt, and its cost of equity is 15%. The firm can borrow at 10%. If the corporate tax rate is 35%, what is the value of the firm? What will be value be if the company converts to 50% debt? To 100% debt?

$$\text{Earnings} = \text{EBIT} - \text{Taxes} = \text{EBIT} \cdot (1 - T_c)$$

$$\text{Earnings} = \$19,750 \cdot (1 - 0.35) = \$12,837.50$$

$$V_u (\text{no leverage}) = \$12,837.50 / 0.15 = \$85,583.33 \leftarrow \text{this is a perpetuity}$$

$$\begin{aligned} V(L) (\text{with 50\% leverage}) &= V_u + (T_c)(D/V)(V_u) \\ &= \$85,583.33 + (0.35 \cdot 0.5 \cdot \$85,583.33) = \$100,560.41 \end{aligned}$$

$$\begin{aligned} V(L) (\text{with 100\% leverage}) &= V_u + (T_c)(D/V)(V_u) \\ &= \$85,583.33 + (0.35 \cdot 1 \cdot \$85,583.33) = \$115,537.5 \end{aligned}$$

Richmond Industries issued 1.5 million new shares of equity to raise \$50 million to finance a new investment. The equity just started trading on the stock market and investors have learned that Richmond expects to earn free cash flows of \$9 million each year in perpetuity. Richmond has 5 million shares outstanding, and it has no other assets or opportunities. Suppose the appropriate discount rate for Richmond's future free cash flows is 8% and the only capital market imperfections are corporate taxes and financial distress costs.

a. What is the NPV of Richmond's investment?

$$NPV = \frac{\$9 \text{ million}}{0.08} - \$50 \text{ million} = \$62.5 \text{ million}$$

b. What is Richmond's share price today?

Richmond is an all-equity firm right now, so the share price is going to reflect the full PV of the firm's FCF

$$V^U = \frac{\$9 \text{ million}}{0.08} = \$112.5 \text{ million}$$

$$P_0 = \frac{V^U}{S_0} = \frac{\$112.5 \text{ million}}{5 \text{ million}} = \$22.50$$

Suppose Richmond borrows the \$50 million instead and thus there are only 3.5 million shares outstanding. The firm will pay interest only on this loan each year, and it will maintain an outstanding balance of \$50 million on the loan. Suppose that Richmond's corporate tax rate is 35% and expected free cash flows are still \$9 million each year.

c. What is Richmond's share price today if the investment is financed with debt?

$$V(U) = \$112.5$$

$$V(L) = V(U) + PV(\text{interest tax shield})$$

$$V(L) = V(U) + D \cdot T_c$$

$$V(L) = 112.5 + 50 \cdot 0.35 = 130$$

$$P_0 = \frac{80}{3.5} = \$22.86$$

$$V(L) = 130$$

$$D = 50$$

$$V(L) = E + D$$

$$130 = E + 50$$

$$E = 80$$

Now suppose that with leverage, Richmond's expected free cash flows will decline to \$8 million per year due to reduced sales and other financial distress costs. Assume that the appropriate discount rate for Richmond's future free cash flows is still 8%.

d. What is Richmond's share price today given the financial distress costs of leverage?

$$V(L) = V(U) + PV(\text{Interest Tax Shield}) - PV(\text{Financial Distress Costs})$$

Method 1:

$$V(L) = 112.5 + (50)(0.35) - \frac{1}{0.08}$$
$$= \$117.5$$

$$V^L = E + D$$

$$117.5 = E + 50$$

$$E = 67.5$$

$$P_0 = \frac{67.5}{3.5} = \$19.29$$

Method 2:

$$V^U = \frac{8}{0.08}$$

$$V^L = \frac{8}{0.08} + 50(0.35)$$

$$V^L = 117.5$$

$$V^L = E + D$$

$$117.5 = E + 50$$

$$E = 67.5$$

$$P_0 = \frac{67.5}{3.5} = \$19.29$$

Hawar International is a shipping firm with a current share price of \$4.50 and 10 million shares outstanding. Suppose Hawar announces plans to lower its corporate taxes by borrowing \$20 million and repurchasing shares.

a. With perfect capital markets, what will the share price be after this announcement?

No change in share price because perfect capital markets are assumed

Suppose that Hawar pays a corporate tax rate of 35% and that shareholders expect the change in debt to be permanent.

b. If the only imperfection is corporate taxes, what will the share price be after this announcement?

$$V(L) = V(U) + PV(\text{Interest Tax Shield})$$

$$V(L) = V(U) + D \cdot T_c$$

$$V(U) = 4.5 \cdot 10 = 45$$

$$V(L) = 45 + (20 \cdot 0.35) = 52$$

$$\text{Price} = 52/10 = 5.20$$

Could also do it all on per share basis:

$$V^L = 4.50 + \frac{20(0.35)}{10} = 5.20$$

c. Suppose the only imperfections are corporate taxes and financial distress costs. If the share price rises to \$4.85 after this announcement, what is the PV of financial distress costs Hawar will incur as the result of this new debt?

$$\text{If Price is } \$4.85, \text{ then } V(L) = 4.85 \cdot 10 = 48.5$$

$$V(L) = V(U) + PV(\text{Interest Tax Shield}) - PV(\text{Financial Distress Costs})$$

$$48.5 = 45 + (20 \cdot 0.35) - PV(FDC)$$

$$PV(FDC) = 3.5$$

$$4.85 = 4.50 + \frac{20(0.35)}{10} - \frac{PV(FDC)}{10}$$

$$PV(FDC) = 3.5$$