Homework Chapter 12 and 14

12-18. Your firm is planning to invest in an automated packaging plant. Harburtin Industries is an all-equity firm that specializes in this business. Suppose Harburtin's equity beta is 0.85, the risk-free rate is 4%, and the market risk premium is 5%. If your firm's project is all equity financed, estimate its cost of capital.

Project beta = 0.85 (using all equity comp)

Thus, rp = 4% + 0.85(5%) = 8.25%

12-19. Consider the setting of Problem 18. You decided to look for other comparables to reduce estimation error in your cost of capital estimate. You find a second firm, Thurbinar Design, which is also engaged in a similar line of business. Thurbinar has a stock price of $20 per share, with 15 million shares outstanding. It also has $100 million in outstanding debt, with a yield on the debt of 4.5%. Thurbinar's equity beta is 1.00.

a. Assume Thurbinar's debt has a beta of zero. Estimate Thurbinar's unlevered beta. Use the unlevered beta and the CAPM to estimate Thurbinar's unlevered cost of capital.

b. Estimate Thurbinar's equity cost of capital using the CAPM. Then assume its debt cost of capital equals its yield, and using these results, estimate Thurbinar's unlevered cost of capital.

c. Explain the difference between your estimate in part (a) and part (b).

a. E = 20 × 15 = 300

E + D = 400

Bu = 300/400 × 1.00 + 100/400 × 0 = 0.75

Ru = 4% + 0.75(5%) = 7.75%

b. Re = 4% + 1.0 × 5% = 9%

Ru = 300/400 × 9% + 100/400 × 4.5% = 7.875%

c. In the first case, we assumed the debt had a beta of zero, so $rd = rf = 4\%$

In the second case, we assumed rd = ytm = 4.5%

14-1. Consider a project with free cash flows in one year of $130,000 or $180,000, with each outcome being equally likely. The initial investment required for the project is $100,000, and the project's cost of capital is 20%. The risk-free interest rate is 10%.

a. What is the NPV of this project?

b. Suppose that to raise the funds for the initial investment, the project is sold to investors as an all-equity firm. The equity holders will receive the cash flows of the project in one year. How much money can be raised in this way—that is, what is the initial market value of the unlevered equity?

c. Suppose the initial $100,000 is instead raised by borrowing at the risk-free interest rate. What are the cash flows of the levered equity, and what is its initial value according to MM?

a. $E\left[C(1)\right] = \frac{1}{2}(130,000 + 180,000) = 155,000,$

$$NPV = \frac{155,000}{1.20} - 100,000 = 129,167 - 100,000 = \$29,167$$

b. Equity value $= PV\left(C(1)\right) = \dfrac{155,000}{1.20} = 129,167$

c. Debt payments $= 100,000$, equity receives 20,000 or 70,000.

Initial value, by MM, is $129,167 - 100,000 = \$29,167$.

14-4. Wolfrum Technology (WT) has no debt. Its assets will be worth $450 million in one year if the economy is strong, but only $200 million in one year if the economy is weak. Both events are equally likely. The market value today of its assets is $250 million.

a. What is the expected return of WT stock without leverage?

b. Suppose the risk-free interest rate is 5%. If WT borrows $100 million today at this rate and uses the proceeds to pay an immediate cash dividend, what will be the market value of its equity just after the dividend is paid, according to MM?

c. What is the expected return of WT stock after the dividend is paid in part (b)?

a. $(0.5 \times 450 + 0.5 \times 200)/250 = 1.30 \Rightarrow 30\%$

b. $E + D = 250$, $D = 100 \Rightarrow E = 150$

c. $(0.5 \times (450 - 105) + 0.5 \times (200 - 105))/150 = 1.4667 \Rightarrow 46.67\%$

14-12. Hardmon Enterprises is currently an all-equity firm with an expected return of 12%. It is considering a leveraged recapitalization in which it would borrow and repurchase existing shares.

a. Suppose Hardmon borrows to the point that its debt-equity ratio is 0.50. With this amount of debt, the debt cost of capital is 6%. What will the expected return of equity be after this transaction?

b. Suppose instead Hardmon borrows to the point that its debt-equity ratio is 1.50. With this amount of debt, Hardmon's debt will be much riskier. As a result, the debt cost of capital will be 8%. What will the expected return of equity be in this case?

c. A senior manager argues that it is in the best interest of the shareholders to choose the capital structure that leads to the highest expected return for the stock. How would you respond to this argument?

a. $r_e = r_u + d/e(r_u - r_d) = 12\% + 0.50(12\% - 6\%) = 15\%$

b. $r_e = 12\% + 1.50(12\% - 8\%) = 18\%$

c. Returns are higher because risk is higher—the return fairly compensates for the risk. There is no free lunch.

14-16. Hartford Mining has 50 million shares that are currently trading for $4 per share and $200 million worth of debt. The debt is risk free and has an interest rate of 5%, and the expected return of Hartford stock is 11%. Suppose a mining strike causes the price of Hartford stock to fall 25% to $3 per share. The value of the risk-free debt is unchanged. Assuming there are no taxes and the risk (unlevered beta) of Hartford's assets is unchanged, what happens to Hartford's equity cost of capital?

$r_u = wacc = \dfrac{1}{2}(11) + \dfrac{1}{2}(5) = 8\%.\ r_e = 8\% + \dfrac{200}{150}(8\% - 5\%) = 12\%$

14-21. You are CEO of a high-growth technology firm. You plan to raise $180 million to fund an expansion by issuing either new shares or new debt. With the expansion, you expect earnings next year of $24 million. The firm currently has 10 million shares outstanding, with a price of $90 per share. Assume perfect capital markets.

a. If you raise the $180 million by selling new shares, what will the forecast for next year's earnings per share be?

b. If you raise the $180 million by issuing new debt with an interest rate of 5%, what will the forecast for next year's earnings per share be?

c. What is the firm's forward P/E ratio (that is, the share price divided by the expected earnings for the coming year) if it issues equity? What is the firm's forward P/E ratio if it issues debt? How can you explain the difference?

a. Issue $\frac{180}{90} = 2$ million new shares $\Rightarrow$ 12 million shares outstanding.

New EPS $= \frac{24}{12} = \$2.00$ per share.

b. Interest on new debt $= 180 \times 5\% = \$9$ million. The interest expense will reduce earnings to 24 – 9 = $15 million. With 10 million shares outstanding, $EPS = \frac{15}{10} = \$1.50$ per share.

c. By MM, share price is $90 in either case. PE ratio with equity issue is $\frac{90}{2} = 45$.

PE ratio with debt is $\frac{\$90}{1.50} = 60$.

The higher PE ratio is justified because with leverage, EPS will grow at a faster rate.