Study Problems II

Problem 4.1. Consider an outstanding bond issue having a coupon rate of 5% and a time to maturity of two years, with interest paid annually.
   a. If the face value is $20 million and the yield is 4.79%, what is the bond price?
   b. If the market value is $9.7842 million and the yield is 6.18%, what is the face value?
   c. If the face value is $100 million and the market price is $101.6 million, what is the yield?

Problem 4.2. The outstanding bonds of Colossal Corp. have a total face value of $1 billion, a coupon rate of 9.5%, and a time to maturity of six years. Interest is paid annually. The yield on similar bonds is 8.72%.
   a. Calculate the Value of Debt for Colossal.
   b. Repeat your calculation under the assumption that interest is paid semiannually, assuming that the coupon rate is 9.5% APR and the annualized yield is 8.72%.
   c. Suppose that, in addition to the bonds in part b, Colossal issues new bonds having a total face value of $500 million, a time to maturity of 10 years, a coupon rate of 9% APR and an annualized yield of 8.72%, with interest paid semiannually. Calculate Colossal’s Value of Debt in this case.

Problem 4.3. Highroller Investment Co. wishes to borrow $500 million at 2% yearly interest. Interest payments are made annually. The principal will be repaid at the end of 10 years. Investors demand an annual return of 13% on this debt. Highroller’s tax rate is 45%.
   a. Calculate the face value needed to induce investors to lend $500 million.
   b. Calculate the value of ITS received by Highroller.
   c. Suppose instead that the debt has a face value of $500 million and a yearly coupon rate of 13%. Principal will be repaid at the end of 10 years. Calculate the value of ITS received by Highroller in this case.

Problem 4.4. Emblematic Enterprises has $80 million worth of outstanding Series A bonds, yielding 7% per year, and $200 million worth of Series B bonds, yielding 6.5% per year. It also has $100 million worth of outstanding commercial paper, yielding 4% per year. All payments are made annually. The tax rate is 35%.
   a. Calculate Emblematic’s Value of Debt and Return on Debt.
   b. The Series A bonds have a coupon rate of 5.5% and mature in four years, at which point they will be retired. Calculate the face value of these securities and the value of ITS generated by them.
   c. Suppose that the coupon rates on Series B bonds and commercial paper are equal to their yields. Moreover, the face values of these securities will grow at 2% per year for
the indefinite future. Calculate the value of ITS generated by these securities. What will Emblematic’s Value of Debt and Return on Debt be at year 4?

d. Now suppose that Emblematic plans to issue $30 million worth of new Series C bonds two years from now. These bonds will have a coupon rate and yield of 6.7%, and their face value will grow at 2% per year in the following years. Calculate the current market value of ITS from these securities. How do the Value of Debt and Return on Debt change? Finally, calculate the value and OCC of Emblematic’s portfolio of ITS.

Problem 5.1.a. Share price is $150.00, expected dividend is $12.00 one year from now, expected capital gain is 9%. What is the return on equity?

b. Share price is $40.00, expected dividend is $4.50 one year from now, growing thereafter at a rate of 3% per year in perpetuity. What is the return on equity?

c. Expected dividend is $7.50 one year from now, dividend yield is 8%, return on equity is 14%. What is the share price?

Problem 5.2. Exalted Co. will pay a dividend of $2.25 per share at the end of year 1, and dividends per share are expected to grow at a rate of 10% per year in perpetuity. The return on equity is 12.8%.

a. Calculate the current share price and dividend yield for Exalted shares, and forecast the rate of capital gain on these shares for the coming year.

b. Estimate the share price, dividend yield and rate of capital gain on Exalted shares three years from now.

c. Based on new information, the growth rate on Exalted dividends is lowered to 2% per year in perpetuity. How does this change your answer for part a?

d. Suppose Exalted reduces this year’s dividend by 27%, and its stock is expected to trade at $89.00 per share one year from now. Calculate the current share price, dividend yield and rate of capital gain for this case.

Problem 5.3. Use CAPM to answer the following questions:

a. Market return is 10.4%, risk-free rate is 3.2%, beta of Asset Q is .85. What is the OCC of Asset Q?

b. Market risk premium is 6.9%, risk-free rate is 2.1%, Asset R return is 9.3%. What is the beta of Asset R?

c. Market return is 12.6%, Asset S return is 14.9%, Asset S beta is 1.30. What is the risk-free rate?

Problem 5.4. Wanda Wanderlust owns a rental property that will generate a cash inflow of $10,000 one year from now. Thereafter the cash flows from rental will grow by 2% per year in perpetuity. Wanda also owns $40,000 worth of bonds that yield 7%, and has $12,000 in a money market fund that yields 3%.

a. If the OCC of rental property is 18%, what is the value of Wanda’s real asset?

b. Calculate the value and return of Wanda’s portfolio of assets.
c. Suppose Wanda spends her entire money market fund to take a vacation. Calculate the value and return of Wanda’s portfolio in this case.

d. Suppose the risk free rate is 2% and the market return is 10%. Calculate the beta of Wanda’s portfolio before and after the vacation.

**Problem 5.5.** Remittance Inc. has 1.8 million shares of common stock outstanding, currently trading at $45 per share. In one year Remittance will pay a dividend of $6.30 per share. The return on equity has been estimated at 19%.

a. Suppose the number of shares remains constant. Calculate the net payout to shareholders at year 1. Also estimate the share price and value of equity at year 1.

b. Suppose that Remittance reduces the year 1 dividend and uses the cash to repurchase 100,000 shares at year 1. Calculate the share price and dividend per share at year 1. Also calculate the dividend yield and rate of capital gain.

**Problem 6.1.** The bonds of Breezy Brands, Inc. have a total market value of $1.29 billion and a yield of 7.26%, and the company’s common stock has a total market value of $2.42 billion and a beta of 1.229. One-year Treasury bills currently yield 4.65%, while the market index is expected to yield 10.9% over the coming year.

a. Use CAPM to forecast the rate of return on Breezy stock.

b. Calculate the expected rate of return on a portfolio consisting of $150,000 in Breezy bonds and $100,000 in Breezy stock.

c. Calculate the value of Breezy and its CCC.

**Problem 6.2.** Ideal Industries is financed by $350 million in debt, yielding 5.6%, and 160 million shares of common stock, currently trading at $4.20 per share. Ideal will pay a dividend of $0.50 per share at year 1. The dividend per share and number of shares are expected to remain constant in future years. Ideal holds no financial assets. The tax rate is 35%.

a. Estimate the return on equity and the amount of cash Ideal obtains each year from its real assets.

b. Calculate the value of Ideal and its CCC.

c. Calculate the value and OCC of Ideal’s real assets.

**Problem 6.3.** Lucre Corp. has outstanding debt valued at $300 million, yielding 6%, along with 10 million shares of common stock, trading at $65.00 per share. Lucre pays an annual dividend of $9.50 per share, which is expected to remain constant. The number of outstanding shares is also expected to remain constant. Lucre holds no financial assets and faces a tax rate of 35%.

a. Calculate the value of Lucre Corp. and its return on equity.

b. Estimate the value and OCC of Lucre’s real assets.

c. How do your answers to parts a and b change if Lucre’s dividend is expected to grow by 3% per year? Continue to assume that the current share price and this year’s dividend are $65.00 and $9.50, respectively.
**Problem 6.4.** Hoard, Inc. is financed by $1.2 billion in debt, yielding 7.2%, and 36 million shares of common stock, currently trading at $32.00 per share. The return on equity has been estimated at 11.3%. Hoard holds $1.1 billion in financial assets, yielding 3.7%. The tax rate is 35%.

   a. Calculate the value of Hoard and its CCC.
   b. Estimate the value and OCC of Hoard’s real assets.
   c. Calculate the enterprise value of Hoard, and estimate the OCC of the portfolio of Hoard’s real assets and ITS.

**Problem 6.5.** Aggressive Ventures, Inc., is considering financing a high-tech start-up company. Data on three competing companies are given in the following table.

<table>
<thead>
<tr>
<th>Value of Firm</th>
<th>D/E</th>
<th>rD</th>
<th>βE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Xicor</td>
<td>$298 m.</td>
<td>0.43</td>
<td>0.088</td>
</tr>
<tr>
<td>Yorkin</td>
<td>$160 m.</td>
<td>0.81</td>
<td>0.116</td>
</tr>
<tr>
<td>Zomax</td>
<td>$321 m.</td>
<td>0.58</td>
<td>0.100</td>
</tr>
</tbody>
</table>

Each company faces a tax rate of 35%.

   a. Assuming a risk-free rate of 3.2% and an expected market return of 11%, use CAPM to estimate the return on equity for each company.
   b. Calculate the return on assets for each company.
   c. Calculate the return on the portfolio consisting of the real assets of the three companies.

**Problem 6.6.** Tangled Technologies, Inc. has a market value of $80 billion, with $20 billion worth of debt outstanding. Based on financial data, Tangled’s debt and equity betas have been estimated at 0.19 and 1.04, respectively. Tangled consists of two divisions, biotech and computers. Each division generates cash flows of $3 billion per year. The tax rate is 35%.

   a. Use CAPM to estimate the returns on debt and equity. Assume that the risk-free rate is 2% and the market risk premium is 7%.
   b. Calculate the unlevered CCC for Tangled.
   c. Using data from biotech firms, the OCC for biotech assets has been estimated at 8.9%. Use this information to estimate the OCC for the computer assets of Tangled.

**Problem 6.7.** Surge Investment Co. has a market value of $2.7 billion, with 925 million shares of common stock outstanding. Surge maintains a debt-equity ratio of 60%. Next year Surge will pay a dividend of $0.25 per share. Surge projects that cash flows from its real assets will rise by 8% per year for the foreseeable future. Outstanding debt will also rise by 8% per year, while the number of outstanding shares will remain constant. The yield and coupon rate on Surge debt are 11% and the tax rate is 35%.

   a. Calculate the value of Surge’s debt and its current share price.
   b. Calculate the value of ITS and the value of real assets.
   c. Calculate the growth rate of the value of real assets.
d. Calculate the growth rate of dividends and the return on equity.

**Problem 7.1.** Singular Systems, Inc. has $10 billion in outstanding debt and 800 million shares of common stock trading at $50 per share. Singular can invest $5 billion in a black hole generator that will yield future cash flows having a current market value of $6.5 billion. Singular faces a tax rate of 35%.

a. Compute the market value of Singular before project adoption.

b. Compute the market value of Singular’s real assets before project adoption.

c. Suppose Singular finances the project with $4 billion in new debt and $1 billion in new equity. Calculate the APV of the project, the company’s post-adoption market value, value of equity, change in share price and number of shares sold or repurchased.

d. Suppose instead that Singular finances the project with $3 billion in new debt and $2 billion in internal cash.

e. Suppose instead that Singular finances the project using new debt and new equity in a manner that maintains its current debt ratio.

**Problem 7.2.** The Automata Medical Group has a current market value of $500 million, financed by $250 million in debt and 50 million shares of common stock. Automata is considering an investment of $100 million in a robotic clinic. The clinic is projected to generate future cash flows having a current market value of $125 million. Automata faces a tax rate of 35%.

For each of the following financing plans, calculate the APV of the project, Automata’s market value after project adoption, the value of equity after adoption, the effect of project adoption on Automata’s share price, and the number of shares that it must sell or repurchase.

a. Automata issues $40 million in new debt and finances the remainder with new equity.

b. Automata borrows $40 million and uses $60 million in internal cash.

c. Automata sells an old clinic for its current market value of $35 million and finances the remainder by issuing new debt. The old clinic has an undepreciated book value of $25 million.

d. Automata adjusts debt and equity to maintain its target debt ratio of 50%.

**Problem 7.3.** Impossible Industries, Inc., has $10 billion worth of outstanding debt and 800 million shares of common stock trading at $50 per share. Impossible can invest $5 billion in a perpetual motion machine yielding future cash flows having a current market value of $6.5 billion. Impossible faces a tax rate of 35%, and pays brokerage commissions of 5% on equity and real asset transactions, financed using internal cash. Ignore brokerage costs on debt.

For each of the following financing plans, calculate the APV of the project, Impossible’s market value after project adoption, the value of equity after adoption, the effect of project adoption on Impossible’s share price, and the number of shares that it must sell or repurchase.

a. Impossible finances the project with 80% debt and 20% equity.
b. Impossible sells existing assets for $4 billion, and finances the remainder with internal cash. The assets have a current book value of $2.5 billion.

c. Impossible structures debt and equity financing to maintain its current debt ratio.

Problem 7.4. The Fulsome Gas Co. is evaluating a new energy project. An investment of $112.4 million is required, and the project is forecasted to generate future cash flows of $19.7 million per year in perpetuity. Fulsome has a current market value of $2.65 billion. It maintains a target debt ratio of 25%, and the returns on its debt and equity are estimated to be 5.5% and 12.9%, respectively. Fulsome faces a tax rate of 35%. Ignore brokerage costs.

a. Calculate the WACC for Fulsome.

b. Calculate the APV of the project using the WACC method.

c. Calculate the APV of the project using the conventional method.

Problem 7.5. Weyland Corp. is financed by $6.8 billion worth of debt and 106 million shares of common stock, trading at $96.25 per share. Problems at Weyland’s Antarctic facility have caused its share price to fall by 12%. Weyland faces a tax rate of 35%.

a. Assume that the value of Weyland’s debt remains unchanged. How much does the market value of Weyland fall? How much does the value of its real assets fall?

b. Suppose Weyland restructures financing to maintain its target debt ratio. Calculate the amount of debt retired, the number of shares issued to finance the retirement, and Weyland’s value and share price after the restructuring. Ignore brokerage costs.

c. Suppose that following the restructuring, Weyland purchases the space shuttle program for $11.3 billion. Weyland calculates that the program will be worth $16.9 billion once it is controlled by Weyland. The purchase will be financed using new debt and internal cash. Financing is structured to maintain the target debt ratio. Calculate the APV of the asset acquisition, along with Weyland’s value and share price after the purchase and restructuring. Ignore brokerage costs.