1. The XYZ Co. is assessing its current capital structure and its implications for the welfare of its security holders. XYZ currently is financed entirely with common stock, of which 1,000 shares are outstanding. Given the risk of the underlying cash flows (EBIT) generated by XYZ, investors currently require a 20% return on the XYZ common. The company pays out all expected earnings as dividends to common stockholders, and these expected earnings are based on the expected operating earnings (EBIT) generated by the firm’s assets. XYZ estimates that operating income may be either 1,000, 2,000 or 4,200 with respective probabilities of .1, .4 and .5 depending on future economic conditions. Further, the firm expects to produce a level stream of EBIT in perpetuity. Assume that the corporate and personal tax rate is equal to zero.

(a) Given the above facts, compute

i. the value of the firm,
ii. the market value of a common share,
iii. the expected earnings per share of common,
iv. the return on the common shares under each economic scenario, and
v. the firm’s average cost of capital.

(b) The president of XYZ has come to the conclusion that shareholders would be better off if the company had equal proportions of debt and equity. He therefore proposes to issue $7,500 of debt at an interest rate of 10% and use the proceeds to repurchase 500 shares of common. Using the arguments of Modigliani and Miller (MM) analyze this proposition by computing

i. the new value of the firm,
ii. the value of debt,
iii. the value of equity,
iv. the price of one common share,
v. the required rate of return on equity ($\bar{r}_e$), and
vi. the firm’s average cost of capital.
Be sure to give (brief) supporting explanations for your answers for parts (i), (v) and (vi).

(c) Using the arguments proposed in the Traditional view, explain (without numbers) the effect of the increased debt in (b) on

i. firm value and
ii. stock price.

What effect, according to the Traditionalists, would the increased debt have on the required return on the common stock? What impact would this have on average cost of capital.

(d) Graph:

i. the relationship between market value of the firm and the firm’s debt-equity ratio, and
ii. the relationship between average cost of capital and the firm’s debt-equity ratio for both the Traditional and the MM case.

(e) What does MM’s Proposition II say about the required rate of return on equity? What does the Traditional viewpoints have to say? Graph both of these viewpoints and briefly explain why they are consistent with the graphs in Questions (d.ii).

(f) Lift the assumption of no corporate taxes and now assume that the corporate income tax rate is 40%. Using the “corrected” Modigliani-Miller framework, how does the existence of a corporate income tax affect the market value of the firm as computed in Question (b)? In particular, if we assume no risk of bankruptcy for a debt-equity ratio less than one, what would the new market value of XYZ be with the presence of $7,500 of debt in the capital structure? If bankruptcy risks were a concern with this level of debt, how would this (qualitatively) affect your answer?

(g) Now lift the assumption that personal taxes are zero. Suppose that returns to equity holders are effectively not taxed but that interest is taxed at the personal level. If the recipients of interest on the firm’s debt are in the 30% personal income tax bracket how will your answer to part (f) change qualitatively? What if the bondholders are in the 40% bracket? The 50% bracket?

2. Ignore for this problem: taxes, transaction costs, and costs of financial distress. Are the following statements true, false, or uncertain? Explain your answer:

(a) “If a firm issues equity in order to repurchase some of its debt, the price of the remaining shares will go up because they are less risky.”

(b) “Moderate borrowing doesn’t significantly affect the probability of financial distress or bankruptcy. Hence, moderate borrowing won’t increase the required return or risk of equity.”
3. The market value of a firm which has $500,000 in debt is $1,700,000. The expected value of EBIT is constant over time. The interest rate on debt (pre-tax) is 10%. The company is subject to a 40% tax rate. If the company were 100% equity financed, the equity holders would have a 20% required return. What is the net income of the firm? What would be the market value of the firm if it were 100% equity financed?

4. A non-growth firm has interest expense on debt of $200,000. The before tax cost of debt is 8%, the cost of equity is 12%. Earnings before interest and taxes are $1,200,000 and the corporate tax rate is 40 percent. What is the total value of the firm?

5. The Veblen Company and the Knight Company comprise a single risk class. These firms are identical in every respect except that the Veblen Company is not levered, while the Knight Company has $1 million in 6% bonds outstanding. (Assume that neither company pays any taxes.) The valuation of the two firms is assumed to be the following:

<table>
<thead>
<tr>
<th></th>
<th>Veblen</th>
<th>Knight</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>$300,000</td>
<td>$300,000</td>
</tr>
<tr>
<td>F</td>
<td></td>
<td>60,000</td>
</tr>
<tr>
<td>E</td>
<td>$300,000</td>
<td>$240,000</td>
</tr>
<tr>
<td>(\bar{r}_e)</td>
<td>.125</td>
<td>.140</td>
</tr>
<tr>
<td>E</td>
<td>$2,400,000</td>
<td>$1,714,000</td>
</tr>
<tr>
<td>D</td>
<td></td>
<td>1,000,000</td>
</tr>
<tr>
<td>V</td>
<td>$2,400,000</td>
<td>$2,714,000</td>
</tr>
<tr>
<td>(\bar{r}_A)</td>
<td>12.5%</td>
<td>11.0%</td>
</tr>
<tr>
<td>(D/E)</td>
<td>0</td>
<td>58.4%</td>
</tr>
</tbody>
</table>

(a) An investor owns $10,000 worth of Knight stock. Show the process and the amount by which he could increase his net return through use of arbitrage. (Assume he can borrow at 6%.)

(b) According to Modigliani and Miller, when will this arbitrage process cease?

6. Imagine it is August 1983.

Chrysler’s financial structure is as follows on August 28, 1983:
<table>
<thead>
<tr>
<th>security</th>
<th>amount outstanding</th>
<th>market price</th>
<th>market value</th>
</tr>
</thead>
<tbody>
<tr>
<td>common stock</td>
<td>115,000,000 shares</td>
<td>$ 26.00/share</td>
<td>$2,990,000,000</td>
</tr>
<tr>
<td>preferred stock</td>
<td>10,000,000 shares</td>
<td>$ 32.50/share</td>
<td>$ 325,000,000</td>
</tr>
<tr>
<td>warrants</td>
<td>14,400,000 warrants</td>
<td>$ 13.50/warrant</td>
<td>$194,000,000</td>
</tr>
<tr>
<td>bonds</td>
<td>2,000,000 bonds</td>
<td>$650.00/bond</td>
<td>$1,300,000,000</td>
</tr>
<tr>
<td><strong>total market value</strong></td>
<td></td>
<td></td>
<td><strong>$4,800,000,000</strong></td>
</tr>
</tbody>
</table>

Because of the large losses incurred in 1978–81, Chrysler has $2,000,000,000 in tax-loss carry-forwards: the next $2,000,000,000 of income is free from corporate income taxes. The consensus among security analysts is that Chrysler’s cumulative profits over the next 5 years are likely to be less than $2,000,000,000.

Most of the preferred stock is held by banks, and Chrysler has agreed to retire the preferred within the next few years. Chrysler must decide to issue either debt or common equity to retire the preferred stock. If you were Lee Iacocca, what would you do? Why?

7. “A firm’s stockholders will never want the firm to invest in negative NPV projects.” Do you agree or disagree? Explain.

8. Acetate, Inc., has common stock with a market value of $20 million and a debt of $10 million. The current Treasury bill rate is 10 percent and the expected market risk premium is also 10 percent. A plot of the returns on the stock against the market returns shows a scatter of points through which a line can be fitted with a slope of 45 degrees.

   (a) What is Acetate’s debt/value ratio?
   (b) What is its expected return under the CAPM?
   (c) What would be the required expected return on a project with a similar risk as the firm’s current assets?

9. An all equity firm is subject to a 30% tax rate and its equity holders require a 20% return. Its total market value is initially $3,500,000. There are 175,000 shares outstanding. It then issues $1 million worth of bonds at 10% interest and uses the proceeds to buy back common stock. (Assume no change in costs of financial distress.)

According to MM what is the new market value of the equity of the firm on a per share basis? What is the change?
10. You are given the following information about the XYZ corporation:

Stock price: $100
# shares outstanding: 1 million
Market value debt: $25 million

The corporation is about to make all of the following pre-announced changes:

i) A two for one stock split.
ii) A $1 dividend payment (per new share).
iii) Issuing $5 m of new debt.
iv) Repurchase $3 m worth of stock (ex-dividend).

Ignoring taxes, transaction costs, and costs of financial distress, how do the values of the following change (just before to just after the combined changes i)—iv))?

(a) Market value of debt.
(b) Number of common stock shares outstanding.
(c) Price per share.
(d) Market value of equity.
(e) Market value of firm.

How would the original equity holders feel about these changes?

11. The equity of company ABC has a current market value of $1500 million. It has no debt outstanding and 15 million shares of stock outstanding. The company currently has a surplus of cash of $15 million, and is considering ways to distribute it. One possibility is to increase its dividend by $1 per share for one time only. The other possibility is to repurchase shares at the current market price.

(a) Assume that there are no personal taxes. For each possibility calculate:
   i. The per share stock price after the policy is enacted.
   ii. The market value of equity after the policy is enacted.
   iii. The total wealth of the old shareholders after the policy.

(b) You work for an institutional investor that owns 1 million shares of company ABC. You were counting on receiving the $1 dividend. If ABC instead repurchases the shares (and pays no dividend), what additional steps could you undertake that would leave you in exactly the same position as you would have been in had the company paid the dividend?

(c) Which policy would the shareholders prefer? Why?
(d) How would your answer to (c) change if instead of distributing funds the company needed to raise $15 m in new funds, and was considering doing so with either a one time $1 cut in dividends or a new issue of stock?

(e) Now assume that dividends are taxed at 50%, and that capital gains are only taxed at 20%. How do your answers to (a) and (c) change? (Assume that the stock was purchased for $90 per share.)

(f) Under the new tax law, dividends and realized capital gains will be taxed at the same rate. The capital gains tax is not collected, however, until the stock is sold (i.e. until the gains are realized.) How will this affect your answers to (a) and (c) above?