Financial Distress, Managerial Incentives, and Information

1. (Example 1 in the Note)
   Consider the following outcomes for the following scenarios both with and without leverage for Moon Industries' new venture:

   Value of Debt and Equity with and without Leverage ($ million)

	Without Leverage		With Leverage	
	Success	Failure	Success	Failure
Debt Value			$150	$90
Equity Value	$250	$90	$100	$0
Total to All Investors	$250	$90	$250	$90

   Assume Moon's new venture is equally likely to succeed or to fail. The risk-free rate is 4%. The venture has a beta of 0, and the cost of capital is equal to the risk-free rate. Compute the value of Moon's securities at the beginning of the year with and without leverage.

   Solution)

$$Equity\ (Unlevered) = V^U = \frac{0.5(\$250) + 0.5(\$90)}{1.04} = \$163.46\ million$$

$$Equity\ (Levered) = V^L = \frac{0.5(\$100) + 0.5(\$0)}{1.04} = \$48.08\ million$$

$$Debt = \frac{0.5(\$150) + 0.5(\$90)}{1.04} = \$115.38\ million$$

$$V^L = \$48.08 + \$115.38 = \$163.46$$

   As stated by MM Proposition I, the total value of the firm is unaffected by leverage.

2. (Example 2 in the Note)
Extending the previous question, assume now that the costs of financial distress are $15 million:

Value of Debt and Equity with and without Leverage ($ million)

	Without Leverage		With Leverage	
	Success	Failure	Success	Failure
Debt Value			$150	$75
Equity Value	$250	$90	$100	$0
Total to All Investors	$250	$90	$250	$75

Compute the value of Moon's securities at the beginning of the year with and without leverage given that financial distress is costly.

Solution)

$$Equity\ (Unlevered) = V^U = \frac{0.5(\$250) + 0.5(\$90)}{1.04} = \$163.46\ million$$

$$Equity\ (Levered) = V^L = \frac{0.5(\$100) + 0.5(\$0)}{1.04} = \$48.08\ million$$

$$Debt = \frac{0.5(\$150) + 0.5(\$75)}{1.04} = \$108.17\ million$$

$$V^L = \$48.08 + \$108.17 = \$156.25$$

$V^L \neq V^U$ in the presence of financial distress costs.

The difference, $\$163.46 - \$156.25 = \$7.21$, is the present value of the $\$15\ million$ in financial distress costs:

$$PV(Financial\ Distress\ Costs) = \frac{0.5(\$0) + 0.5(\$15)}{1.04} = \$7.21\ million$$

3. (Example 4 in the Note)
   Holland, Inc. is considering adding leverage to its capital structure. Holland's managers believe they can add as much as $50 million in debt and exploit the benefits of the tax shield. They estimate $\tau_c = 39\%$. However, they also recognize that higher debt increases the risk of financial distress. Based on simulations of the firm's future cash flows, the CFO has made the estimates on the next slide (in millions of dollars):

Debt	0	10	20	30	40	50
PV(Interest Tax Shield)	0	3.9	7.8	11.7	15.6	19.5
PV(Financial Distress Costs)	0	0	0	3.38	19.23	23.47

   What is the optimal debt choice for Holland?

   Solution)

Debt	0	10	20	30	40	50
Net Benefit	0	3.9	7.8	8.32	-3.63	-3.97

   The level of debt that leads to the highest net benefit is $30 million. Holland will gain $11.7 million due to tax shields and lose $3.38 million due to the present value of financial distress costs, for a net gain of $8.32 million.

4. (Example 5 in the Note)
   Assume we have estimated that Walmart has an equity beta of 0.20, while Johnson & Johnson has an equity beta of 0.54. In addition, it is estimated that Walmart has a debt-equity ratio of 0.22 and a debt beta of 0.05. Johnson & Johnson has a debt-equity ratio of 0.07 and a debt beta of 0.05. For both firms, estimate the minimum NPV such that a new $100,000 investment (which does not change the volatility of the firm) will benefit shareholders. Which firm has the more severe debt overhang?

   Solution)
   We can use Eq. (2) to estimate the cutoff level of the profitability index for Walmart as $\frac{0.05}{0.20} \times 0.22 = 0.055$. Thus, the NPV would need to equal at least $5,500 for the investment to benefit shareholders. For Johnson & Johnson, the cutoff is $\frac{0.05}{0.54} \times 0.07 = 0.00648$. Thus, the minimum NPV for Johnson & Johnson is $648.

   Walmart has the more severe debt overhang because its shareholders will reject projects with positive NPV s up to this higher cutoff. Similarly, Walmart's shareholders would benefit if the firm "cashed out" by liquidating up to $105,500 worth of assets to pay out an additional $100,000 in dividends.

5. (Example 9 in the Note)
   You are an analyst who follows Great Windows' stock. Although the current stock price is $37.50, you believe the stock is worth either $25 or $50, depending on the success of a new product launch. If Great Windows' CEO announces that she plans to buy 10,000 additional shares in the company, how will the share price change?

   Solution)
   If the CEO knows the new product launch is a failure, she would sell the stock at $37.50 given that the she knows true value is $25. If the CEO announces that she is buying 10,000 additional shares, she must know that the new product launch is a success and the true value is $50 per share. Thus, the stock price should rise to $50.