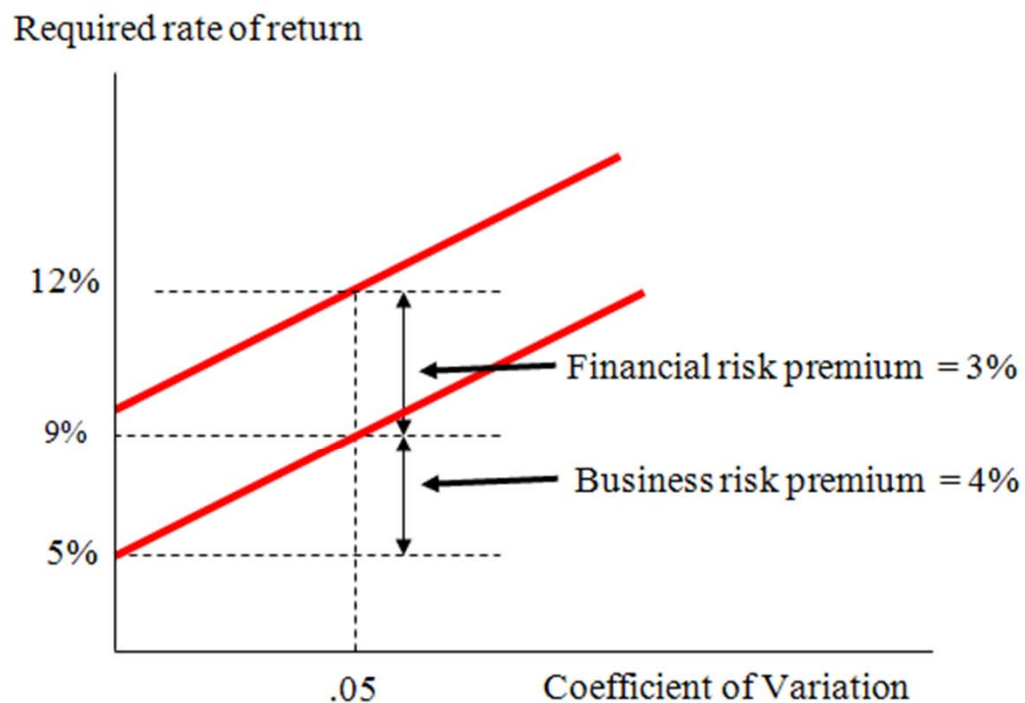


1. Assume the yield on a risk-free government bond is 5 percent and that the coefficient of variation is 0.05. Also assume the investor currently has a leverage ratio near the maximum permitted by lenders and requires a 3 percent financial risk premium. Finally assume the investor desires a total required rate of return of 12 percent. Make sure you carefully label all aspects of this graph. (15 points)
- a. Please graphically illustrate the risk-return preference curve for a highly risk averse investor.



- b. What is the slope of the risk return function in your graph?

$$b = (.09 - .05) / .05 = .04 / .05 = .80$$

2. Please fully *define* each term of the following terms we have referred to over the first half of the semester. (3 points each; 15 total points)

a. Required rate of return

*The discount rate used to discount future cash flows back to the present. The RRR is equal to:*

$$RRR_i = RF_i + b_i(CV_j) + c_i(L_j)$$

*where the first term is the risk free rate of return, the second term is the business risk premium and the third term is the financial risk premium*

b. Financial risk premium

*The additional rate of return required for a new project based upon the firm's leverage ratio. The higher the leverage ratio, the greater the premium assessed by a risk inverse firm.*

c. Long term planning curve

*The LTP curve is an envelope of a series of short run total cost curves. It demonstrates sizes of firms associated with economies of size or diseconomies of size and the risk associated with overexpansion if market prices in the industry fall.*

d. Coefficient of variation

*Standard deviation of net cash flows divided by the mean or expected value of net cash flows. Measures the business risk per dollar of expected net cash flows.*

e. Portfolio effect

*The potential reduction in required rate of return as a result of investing in a new project with negatively correlated ROA to the firm's existing operations.*

3. Assume the following characteristics of a potential investment with an economic life of three years. Please answer the two part question below the data table. (20 points)

	<u>Year 1</u>	<u>Year 2</u>	<u>Year 3</u>
Expected net cash flow	15,000	20,000	25,000
Coefficient of variation	0.10	0.12	0.14
Risk free rate of return	0.05	0.07	0.06
Slope of risk/return curve	0.25	0.25	0.25
Shift coefficient for leverage	0.05	0.05	0.05
Total assets	300,000	310,000	320,000
Total debt	200,000	180,000	160,000

- a. Please calculate the *annual required rates of return* for each of the three years. (10 points)

<i>Equity</i>	<i>100,000</i>	<i>130,000</i>	<i>160,000</i>
<i>Leverage ratio</i>	<i>2.000</i>	<i>1.385</i>	<i>1.000</i>

<u><i>Business risk premium:</i></u>	<u><i>Financial risk premium:</i></u>
<i>Year 1 = .25(.10) = .025</i>	<i>Year 1 = .05(2.0) = .10</i>
<i>Year 2 = .25(.12) = .03</i>	<i>Year 2 = .05(1.38) = .069</i>
<i>Year 3 = .25(.14) = .035</i>	<i>Year 3 = .05(1.0) = .05</i>

<u><i>Required rate of return:</i></u>	<u><i>Discount factors:</i></u>
<i>Year 1 = .05 + .025 + .10 = .175</i>	<i>(1/.175) = 0.8511</i>
<i>Year 2 = .07 + .03 + .069 = .169</i>	<i>(1/(.175)(1.169))) = 0.7280</i>
<i>Year 3 = .06 + .035 + .05 = .145</i>	<i>(1/(.175)(1.169)(1.145))) = 0.6358</i>

- b. If the cost of the project is \$25,000 and has no terminal value, is the project economically feasible? (10 points)

$$\begin{aligned}
 NPV &= 15,000(0.8511) + 20,000(0.7280) + 25,000(0.6358) - 25,000 \\
 &= 12,767 + 14,560 + 15,895 - 25,000 \\
 &= 18,222
 \end{aligned}$$

*Since the NPV > 0, the investment is economically feasible*

4. Assume the owner of a firm wants to know the maximum rate at which it can withdraw funds from the firm in order to achieve a desired rate of return on equity. The firm owns \$100,000 in assets and has debt outstanding of \$50,000. It is in the 25 percent income tax bracket and pays a cost on debt capital of 10 percent. (15 points)

(SHOW ALL WORK FOR FULL CREDIT)

- a. If the firm wants to achieve a rate of return on equity capital of 15 percent and earned an after tax profit of \$20,000 this year, what is the maximum withdrawal rate? (10 points)

$$ROA = 20,000/100,000 = .20 \text{ or } 20\%$$

$$\text{Leverage ratio} = 50,000/50,000 = 1.0$$

$$.15 = [.20 - .08]1.0 + .20(1 - .25)(1 - w)$$

$$.15 = [.12 + .20](1 - .25)(1 - w)$$

$$.15 = .32(.75)(1 - w)$$

$$.15 = .24 - .24w$$

$$.24w = .24 - .15$$

$$w = .09/.24 = .375 \text{ or } 37.5\%$$

- b. If the owner of the firm instead withdrew 50 percent of its after tax profit, what would its rate of return on equity be? (5 points)

$$ROE = [(.32(.75)(1 - .50)]$$

$$= .24(.50) = .12 \text{ or } 12\%$$

5. Suppose you are considering investing in a \$30,000 capital improvement to your business, which has an economic life of 20 years. Assume further that you plan to sell this improvement 10 years from now. Assume there is no capital gain involved. If the expected net cash revenue generated by this investment is \$4,000 annually and you choose a discount rate of 10%, what would this market value have to be 10 years from now before you would be indifferent between making and not making this investment? (10 points)

$$\begin{aligned}T &= [C - NCF_E(EPIF_{.10,10})] / (PIF_{.10,10}) \\ &= [30,000 - 4,000(6.145)] / .386 \\ &= [30,000 - 24,580] / .386 \\ &= 5,420 / .386 \\ &= \$14,041\end{aligned}$$

6. Suppose a firm is considering of two projects. Project A generates an annual net cash flow of \$2,600 over a 3-year life of the project and costs \$5,000. Project B generates an annual net cash flow of \$3,300 over a 4-year life of that project and costs \$6,000. Assuming no increase in the cost of assets acquired by two projects over time, which would you rank highest? Assume a required rate of return of 6%. (15 points)

$$\begin{aligned} NPV_A &= -5,000 + 2,600(EPIF_{.06,12}) - 5,000(PIF_{.06,3}) - 5,000(PIF_{.06,6}) \\ &\quad - 5,000(PIF_{.06,9}) \\ &= -5,000 + 2,600(8.384) - 5,000(0.840) - 5,000(0.705) - 5,000(0.592) \\ &= -5,000 + 21,798 - 4,200 - 3,525 - 2,960 \\ &= 6,113 \end{aligned}$$

$$\begin{aligned} NPV_B &= -6,000 + 3,300(EPIF_{.06,12}) - 6,000(PIF_{.06,4}) - 6,000(PIF_{.06,8}) \\ &= -6,000 + 3,300(8.384) - 6,000(0.792) - 6,000(0.627) \\ &= -6,000 + 27,667 - 4,752 - 3,762 \\ &= 13,153 \end{aligned}$$

Prefer project B over project A due to its higher NPV.

7. Please assume a firm had the following financial performance during the current year: **(10 points)**

Current assets = 43,000  
Current liabilities = 15,913  
Total assets = 233,000  
Total liabilities = 46,613  
Equity = 186,387  
Cash receipts from product sales = 73,000  
Total operating expenses = 53,700  
Net cash income from operations = 19,300  
Net income before taxes = 11,900  
Net income = 4,687

Please assess this firm's liquidity and solvency position at the end of the year using the financial indicators discussed in class.

**Liquidity:**

**Current ratio = current assets / current liabilities = 43,000 / 15,913 = 2.70**

**Working capital = current assets – current liabilities**

**= 43,000 – 15,913 = 15,913**

**The firm is technically liquid since the current ratio is greater than 1.0 and the net working capital is positive.**

**Solvency:**

**Debt ratio = total debt / total assets = 46,613 / 233,000 = 0.20**

**Leverage ratio = total debt / equity = 46,613 / 186,387 = 0.25**

**The firm's solvency position is good since the debt ratio is less than 0.50 and the leverage ratio is less than 1.0.**