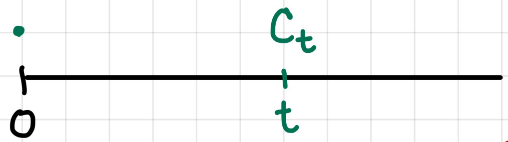
M339W: April 21st, 2021.

"Corporate Finance (4th Ed)" by Berk/DeMarzo

Analyzing a Project

Our criterion (w/out considering risk for now!)

Recall: Interest Theory — Maximizing the Net Present Value



Now: Estimates of Incremental Cashflows.

e.g., expectation under a probability measure

$$NPV = \sum_t PV_{0,t}(C_t)$$

Depends on the cost of capital

Notation: r ... effective annual

Break-even analysis: keep all but one of the inputs fixed and then figure out the value of the remaining input for which the NPV is zero.

e.g., break-even points of options in M339D;

e.g., with all the cashflows fixed, we can look for the interest rate @ which the NPV is zero; this interest rate is called the internal rate of return (or the yield rate)

27) Consider a two-year project, where the cost of capital is 10%. $r = 0.10$ (EFFECTIVE?)

There are only three cash flows for this project.

- The first occurs at $t = 0$, and is -100.
- The second occurs at $t = 1$, and is 66.
- The third occurs at $t = 2$, and is X.

$\Rightarrow$ NPV = 0

Determine X, the level of the cash flow at $t = 2$, that leads to the project breaking even.

(A) 34.0

(B) 38.4

(C) 44.0

(D) 48.4

(E) 54.0

-100	66	X
0	1	2

$$-100 + 66(1.1)^{-1} + X(1.1)^{-2} = 0$$

$$\Rightarrow \quad X = 100(1.1)^2 - 66(1.1) =$$

$$= 121 - 72.6 = 48.4 \Rightarrow (D)$$

The expected return of a portfolio

Say that your portfolio has n different securities in it,

$i = 1..n$ the indices of the investment components in your portfolio

For every i : R_i .. the realized (simple) return of the ith component over a particular time period (say, a year)

R_P... the realized return of the entire portfolio

beg end

$$R_P := \frac{P_P^{end} - P_P^{beg}}{P_P^{beg}}$$

Compare to the notion of the effective interest rate in interest theory.

w/ P_P... the price of the total portfolio,

i.e.,

$$P_P = \sum_{i=1}^{n} \underbrace{P_i}_{\text{value of the component } i}$$

$$R_P = \frac{\sum_{i=1}^{n} P_i^{end} - \sum_{i=1}^{n} P_i^{beg}}{P_P^{beg}} = \sum_{i=1}^{n} \frac{P_i^{end} - P_i^{beg}}{P_P^{beg}} \cdot \frac{P_i^{beg}}{P_i^{beg}}$$

$$= \sum_{i=1}^{n} \underbrace{\frac{P_i^{beg}}{P_P^{beg}}}_{= w_i} \cdot \underbrace{\frac{P_i^{end} - P_i^{beg}}{P_i^{beg}}}_{= R_i}$$

w_i... portfolio weight of investment i (deterministic)

$$R_P = \sum_{i=1}^{n} w_i \cdot R_i$$

$\Rightarrow$ the expected return: $\boxed{\mathbb{E}[R_P] = \sum_{i=1}^{n} w_i \mathbb{E}[R_i]}$ ✓

4) You are given the following information about a portfolio consisting of stocks X, Y, and Z:

Stock	Investment	Expected Return
X	10,000	8%
Y	15,000	12%
Z	25,000	16%

$\Sigma : 50{,}000$

Calculate the expected return of the portfolio.

$$w_X = \frac{10{,}000}{50{,}000} = 0.2$$

$$w_Y = \frac{15000}{50{,}000} = 0.3$$

$$w_Z = \frac{25{,}000}{50{,}000} = 0.5$$

$$E[R_P] = 0.2 \cdot 0.08 + 0.3 \cdot 0.12 + 0.5 \cdot 0.16 = 13.2\%$$

(A) 10.8%

(B) 11.4%

(C) 12.0%

(D) 12.6%

(E) 13.2%

Review the covariance formula.