Capital Asset Pricing Model

I. CAPM: Assumptions and Prediction

- 1. Perfect markets
 - Perfect competition: Each investor has no effect on prices or returns
 - No taxes
 - No transaction costs
 - All assets are traded and perfectly divisible
 - No short sale constraints
 - Borrow and lend at the same risk-free rate, total borrowing = total lending
- 2. Investors only worry about mean and variance of end-of-period wealth
- 3. Homogeneous expectations

Under these assumptions, CAPM says that the return of any Stock i, r_i , should satisfy

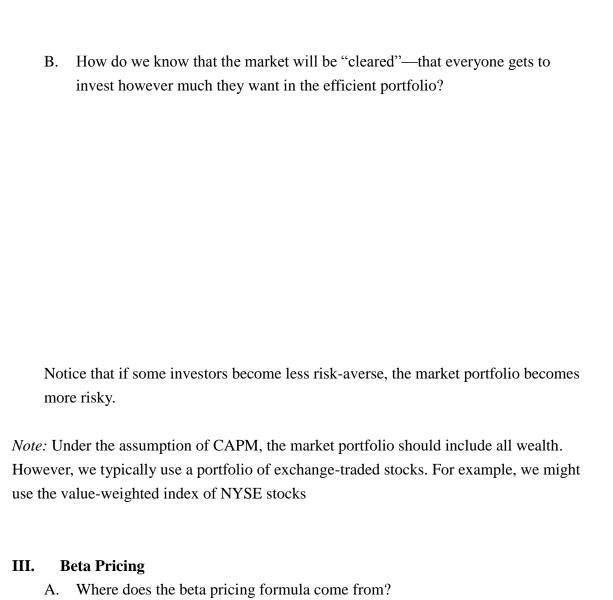
$$E[r_i] = r_f + \beta_i \left[E(r_M) - r_f \right]$$

Where r_f is the risk free rate, r_M is the market portfolio return, and

$$\beta_i = \frac{Cov(r_i, r_M)}{Var(r_M)}$$

II. CAPM Market Portfolio and Risk-Free Rate

A. How do we know that everyone would invest only in same portfolio?



- B. What does the CAPM Beta formula says?
 - 1. β measures each asset's contribution to the variance of the market portfolio, which we know is the optimal portfolio. (You will be asked to derive this property of β in Assignment 1.)
 - 2. Investors only care about the risk and expected return of their *optimal portfolios*. Therefore, they are only concerned with the impact of an additional asset on the risk and return of their portfolio.
 - 3. Since the only relevant risk of an asset is its *marginal contribution to the risk of the market portfolio*, this is the only risk that gets compensated.

For an asset that goes against the market, its return should be negative! Why?