BEM 103: Introduction to Finance.
Homework 6:

Solutions

November 4, 2013

1. **Financial Literacy**

   Answer these questions in 3 steps. (1) give an answer to the question, (2) look over the material assigned for class and find a definition (3) modify if need be your first answer. The goal is not for you to memorize a given answer but to be sure you can explain the concept to someone. If you can't, then you do not control that concept.

   (a) *Market portfolio*: a portfolio consisting of a weighted sum of every asset in the market, with weights in the proportions that they exist in the market.

   (b) *Systematic risk*: part of the variance of an asset that is perfectly correlated with aggregate variation (so you can't offset it); in other words, the risk common to all securities which cannot be diversified away; measured by β.

   (c) *Relative return ratio*:

   (d) *Tangent portfolio*: portfolio that combines the optimal combination of risky assets with a risk-free asset; in other words, it is the tangent line to the efficient frontier (upper part of the hyperbolic curve) through the point that represents a risk-free asset.

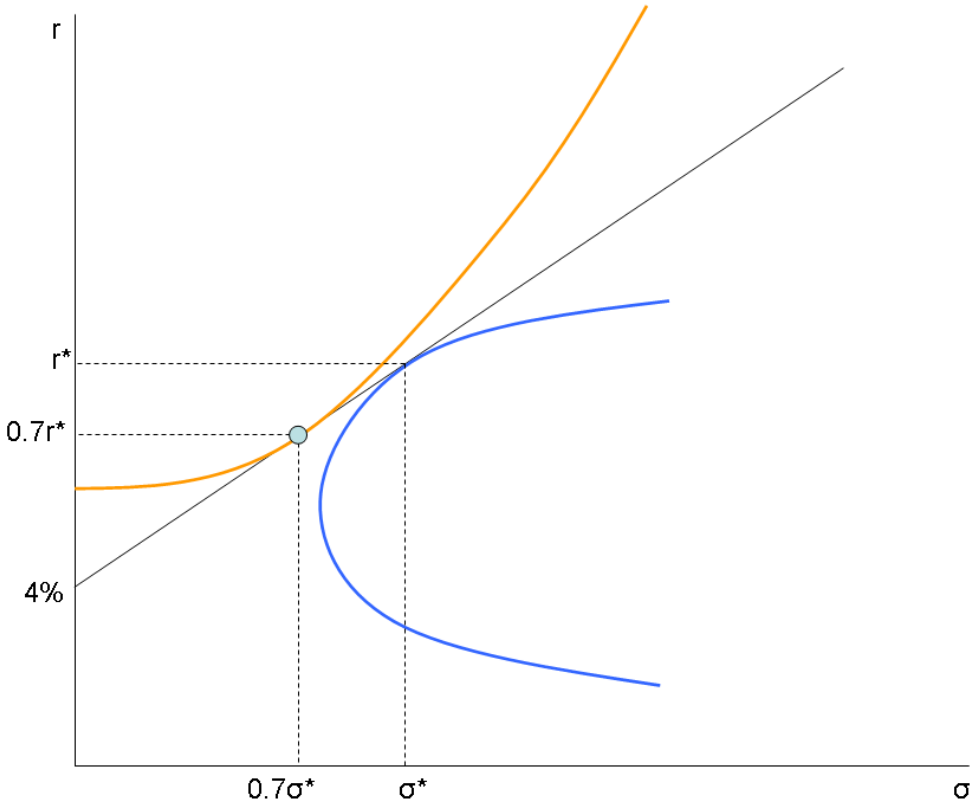
   (e) *Leverage*: the amount of debt used to finance a firm's assets; a firm with significantly more debt than equity is considered to be highly leveraged.

   (f) *Loan to value ratio*: the ratio of a loan to the value of an asset purchased:

$$\alpha = \frac{Debt}{Debt + Equity}.$$

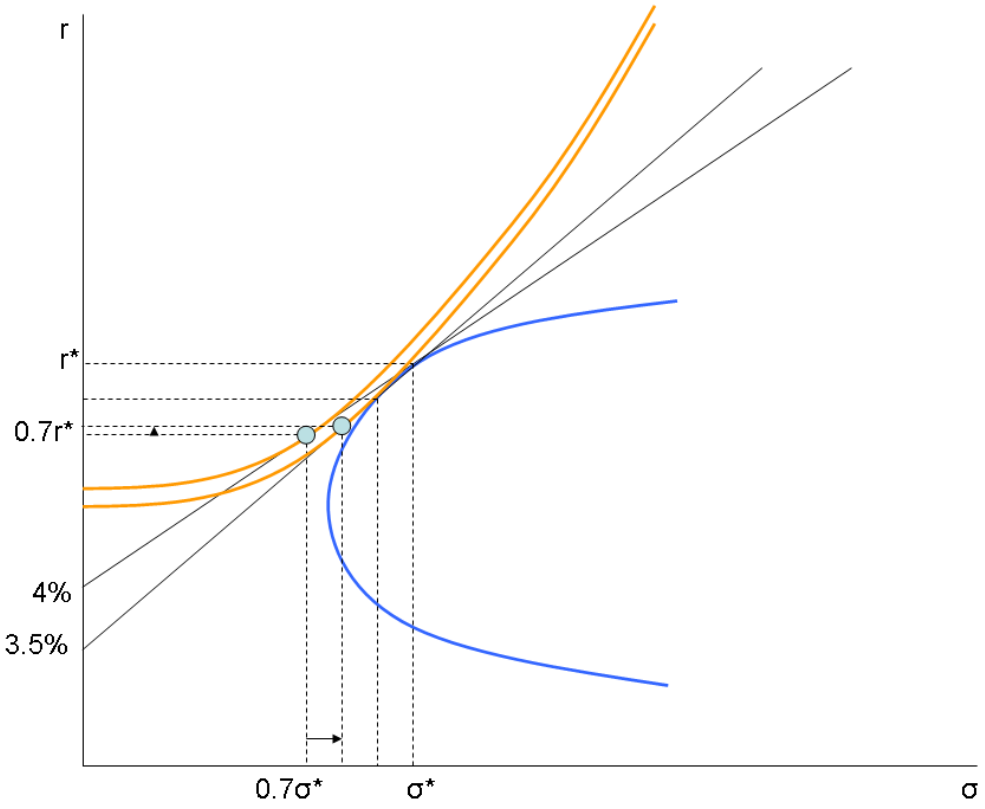
2. *An investor who has been using CAPM principles for choosing her portfolio (she has a mean-variance utility function) faces a number of different situations. Note you are trying to trace out partial equilibrium effects (if everyone's demand changes in the same way there would be other effects as well).*

   (a) *Given a risk free return 4% and her portfolio is balanced 30% risk free asset and 70%, graph the efficient frontier, the market portfolio, the set of tangent portfolios and her choice in a risk-return diagram. What condition is required of her utility function at her choice?*



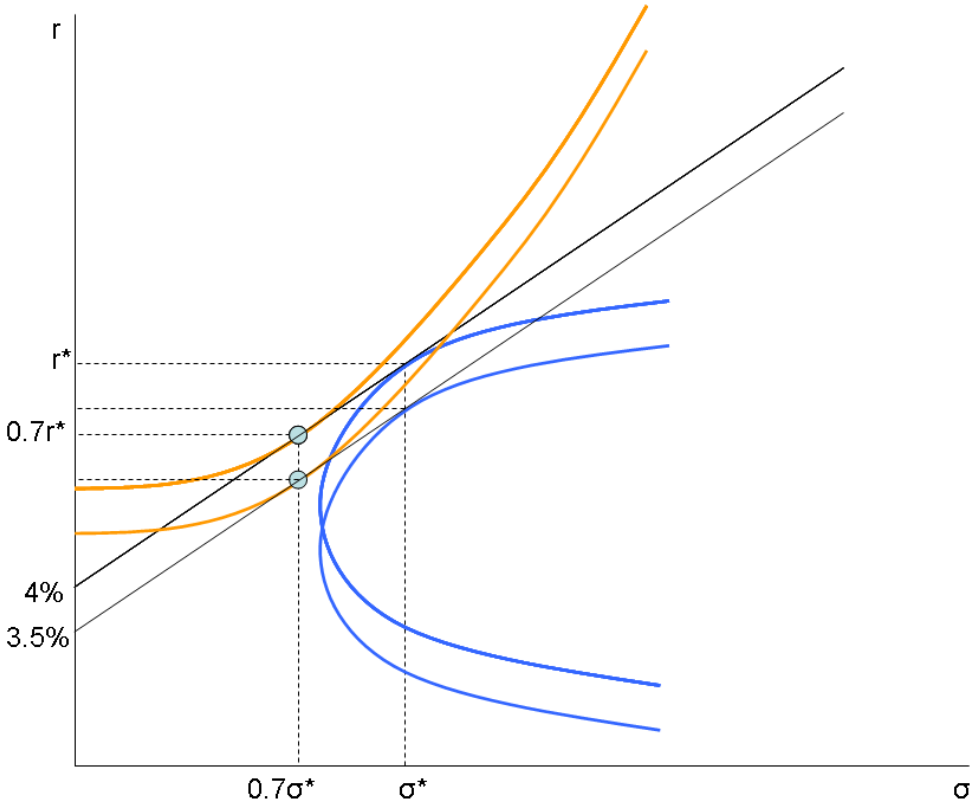
The line of tangent portfolios should be tangent to the indifference curve of the utility function at the choice point.

(b) *Suddenly there is a sharp inflow of capital from abroad and the price of the riskless asset rises so that its return drops to 3.5%. If there was no change in the price of risk securities, how would the investor's optimal portfolio change?*



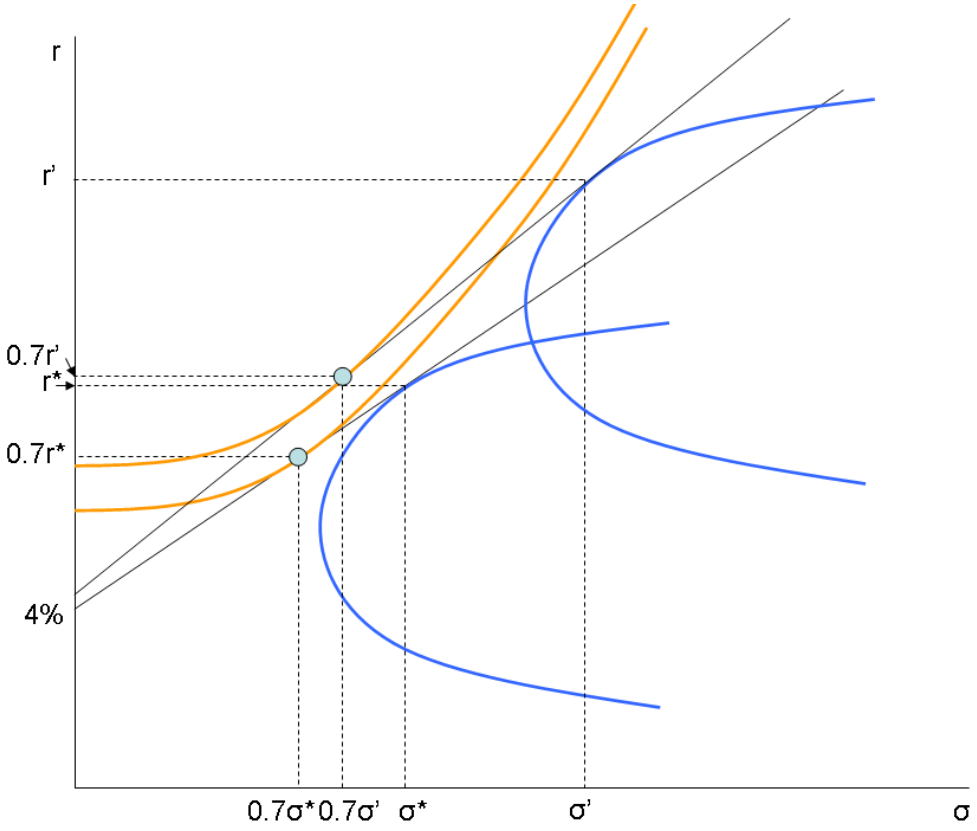
As you can see, the share of the risky portfolio increases. Moreover, the return and the risk of the optimal portfolio both will increase.

(c) *Suppose as in (b) that the price of the riskless asset falls to 3.5% but there is no change in the variance-covariance matrix of risk assets happens to the price of risky securities? In a new diagram plot the change to the efficient frontier, the market portfolio, the set of tangent portfolios. What can you say about the investor's change in portfolio?*



The price of the risky securities will go up, which moves the efficient frontier downwards. In equilibrium, the prices should adjust in such way that everybody will keep their initial portfolios. So, our investor should not change her portfolio.

(d) *Suppose conversely that the riskless return remains the same but that due to budgetary uncertainty in Washington the amount of systematic risk has increased. What do you think happens to the return to the risky portfolio (hint consider an investor who was wholly invested in the market portfolio)? What would be the response of investor?*



As the market risk increases, the efficient frontier shifts to the right. This movement makes the risk free asset more attractive to investors. Therefore, the prices of the risky securities will go down which moves the efficient frontier upward (returns go up). As in (c), in equilibrium, everybody should keep their initial portfolios, and therefore, the portfolio of our investor will not change.