EE431/438 Economics of Financial Markets and Institutions

Exercise 4: Capital Asset Pricing Model (CAPM) and Abitrage Pricing Theory (APT)

1. Suppose stock XYZ has an expected return of 12% and risk of β =1. Stock ABC has expected return of 14% and β =2. The market expected return is 11% and $r_f = 5\%$.

   (a) What is the risk premium on the market portfolio?

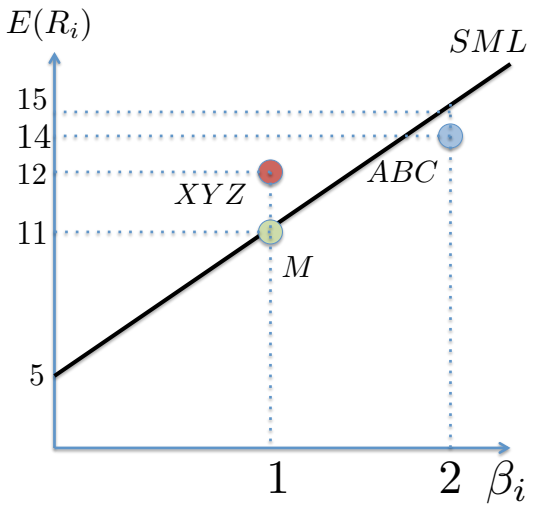
   The risk premium of the market portfolio is equal to $r_m - r_f = 11 - 5 = 6\%$

   (b) What is the risk premium of stock XYZ and stock ABC?

   The risk premium of stock XYZ is equal to $r_{XYZ} - r_f = 12 - 5 = 7\%$.

   The risk premium of stock ABC is equal to $r_{ABC} - r_f = 14 - 5 = 9\%$..

   (c) Plot the SML and each stock's risk-return point on one graph.



   Equation for SML is $E(R_i) = R_f + \beta_i(R_m - R_f) = 5 + 6\beta_i$.

   (d) According to CAPM, which stock is overvalued and which stock is undervalued?

   According to CAPM, the risk premium of stock XYZ is $(r_m - r_f)\beta_{XYZ} = 5\%(1) = 5\%$. The expected rate of returns on stock XYZ (12%) is more than what is required by CAPM (r_f + risk premium=5+5=10%).. Therefore, stock XYZ is underpriced.

   According to CAPM, the risk premium of stock ABC is $(r_m - r_f)\beta_{XYZ} = 5\%(2) = 10\%$. The rate of returns on stock ABC (14%) is less than what is required by CAPM (r_f + risk premium=5+10=15%). Therefore, stock ABC is overpriced.

2. What is the difference between capital market line and security market line ?

   The CAPM is an equilibrium model that encompasses two important relationship: the capital market line (CML) and the security market line (SML). The CML specifires the equilibrium relationship between expected return and total risk for efficiently diversified portfolios. The security market line (SML) specifies the the equilibrium relationshionship between expected return and systematic risk. The risk of each security can be divided into two parts: systematic risk and unsystematic risk. Systematic risk (or market risk) is the risk associated with the correlation between the return on the security and the return on the market portfolio. Unsystematic risk is the risk which is associated with the variability of returns of that security alone. These two components of risk behave differently. The unsystematic risk can be diversified away because it gets averaged out as the number of securities get larger, so it can be ignored in a well-diversified portfolio. Systematic risk, on the other hand, cannot be diversified away. Investors expect to be compensated for bearing it.