

Capital Asset Pricing Model (CAPM)

A security risk consists of two components-diversifiable risk and non-diversifiable risk. Diversifiable risk, sometimes called controllable risk or unsystematic risk, represents the portion of a security's risk that can be controlled through diversification. This type of risk is unique to a given security. Business, liquidity, and default risks fall into this category. Non-diversifiable risk, sometimes referred to as non-controllable risk or systematic risk, results from forces outside of the firm's control and is therefore not unique to the given security. Purchasing power, interest rate, and market risks fall into this category. Non-diversifiable risk is assessed relative to the risk of a diversified portfolio of securities, or the market portfolio. This type of risk is measured by the beta coefficient.

The capital asset pricing model (CAPM) relates the risk measured by beta to the level of expected or required rate of return on a security. The model, also called the security market line (SML), is given as follows:

$$r_j = r_f + b(r_m - r_f)$$

where r_j	=	the expected (or required) return on security j
r_f	=	the risk-free security)
r_m	=	the expected return on the market portfolio
b	=	beta, an index of non-diversifiable (non-controllable, systematic) risk

The key component in the CAPM, beta (b), is a measure of the security's volatility relative to that of an average security. For example: $b = 0.5$ means the security is only half as volatile, or risky, as the average security; $b = 1.0$ means the security is of average risk; and $b = 2.0$ means the security is twice as risky as the average risk.

The whole term $b(r_m - r_f)$ represents the risk premium, the additional return required to compensate investors for assuming a given level of risk.

Thus, in words, the CAPM (or SML) equation shows that the required (expected) rate of return on a given security (r_j) is equal to the return required for securities that have no risk (r_f) plus a risk premium required by investors for assuming a given level of risk. The higher the degree of systematic risk (b), the higher the return on a given security demanded by investors. Graphically illustrates the CAPM as the security market line.

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