

# The Capital Asset Pricing Model

Subjects: [Others](#)

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The capital asset pricing model (CAPM) is an influential paradigm in financial risk management. It formalizes mean-variance optimization of a risky portfolio given the presence of a risk-free investment such as short-term government bonds. The CAPM defines the price of financial assets according to the premium demanded by investors for bearing excess risk.

beta

Sharpe ratio

three-factor model

momentum

intertemporal CAPM

Roll's critique

investor heterogeneity

multifractality

efficient market hypothesis

fractal market hypothesis

The capital asset pricing model (CAPM) is an influential and popular model for describing the price of financial assets such as publicly traded stock. The CAPM traces its origins to “general models” seeking to solve “the problem of capital asset pricing under uncertainty” <sup>[1]</sup> (p. 40). The CAPM assumes that investors are risk-averse and demand additional return as compensation for bearing risk. Like most other aspects of mathematical finance, the CAPM implicitly endorses the rational expectations hypothesis <sup>[2]</sup>. The CAPM presumes that rational, welfare-maximizing agents will understand and act upon an “objective probability law” that quantifies the relationship between risk and return <sup>[3]</sup> (p. 283).

An efficient market rewards the assumption of risk by investors with higher returns <sup>[4]</sup>. The fundamental expectation that returns in excess of a risk-free baseline “should vary positively and proportionately to market volatility” is properly regarded as the “first law of finance” <sup>[5]</sup> (p. 233). The Supreme Court of the United States has offered a simpler formulation: “The less risk, the less right to any unusual returns upon ... investments” <sup>[6]</sup> (p. 49).

[Section 2](#) of this entry derives the CAPM from its origins in mean-variance optimization, the basis of modern portfolio theory. It describes the Treynor and Sharpe ratios. [Section 3](#) focuses on beta, the mathematical building block for many variants of the CAPM. [Section 4](#) harmonizes the CAPM with asset-pricing theories distinguishing quantifiable risk from complete uncertainty. [Section 5](#) identifies and discusses practical applications of the CAPM. [Section 6](#) recounts criticisms of the CAPM. [Section 7](#) elaborates the extension of the CAPM to account for multifractality in volatility. [Section 8](#) explains why the CAPM persists despite blows to its empirical underpinnings.

## References

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