

Introduction to Financial Theory

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Key concepts, foundational models, and the logical framework that underpins modern finance.

1. What Is Financial Theory?

Aspect	Description
Definition	A systematic body of ideas that explains how financial markets work, how assets are priced, and how individuals and firms make optimal financial decisions.
Goal	Explain observed market behavior, predict future outcomes, and provide a basis for sound financial decision-making.
Scope	• Asset pricing (stocks, bonds, derivatives) • Portfolio selection • Capital structure • Market efficiency • Risk management • Behavioral anomalies

2. Core Assumptions

Assumption	Typical Formulation	Implication
Rational agents	Investors maximize expected utility.	Choices are consistent with risk-return trade-off.
Efficient markets	Prices fully reflect all available information.	No systematic arbitrage opportunities.
Homogeneous expectations	All investors share the same probability beliefs about future cash flows.	Leads to a unique equilibrium price.
Frictionless trading	No taxes, transaction costs, or short-sale restrictions.	Allows continuous rebalancing of portfolios.
Divisible assets	Securities can be bought in any quantity.	Enables precise portfolio construction.

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Assumption	Typical Formulation	Implication
Risk-free borrowing/lending	Exists a security with a certain return (r_f) .	Provides a baseline for measuring risk premiums.

Real-world finance relaxes many of these assumptions; extensions (e.g., behavioral finance, market microstructure) address the gaps.

3. Fundamental Models

3.1 Time Value of Money (TVM)

- **Present Value (PV):** $(PV = \frac{CF}{(1+r)^t})$
- **Future Value (FV):** $(FV = PV \times (1+r)^t)$
- **Annuities & Perpetuities:** Standard formulas for streams of equal cash flows.

3.2 Portfolio Theory (Markowitz, 1952)

- **Objective:** Minimize portfolio variance for a given expected return (or maximize return for a given variance).
- **Key Equations**
 - Expected portfolio return: $(\mathbb{E}[R_p] = \sum_i w_i \mathbb{E}[R_i])$
 - Portfolio variance: $(\sigma_p^2 = \sum_i \sum_j w_i w_j \sigma_{ij})$
- **Efficient Frontier:** Set of optimal portfolios; the **tangent portfolio** (market portfolio) is the point where the Capital Market Line (CML) touches the frontier.

3.3 Capital Asset Pricing Model (CAPM)

- **Equation:** $[\mathbb{E}[R_i] = r_f + \beta_i (\mathbb{E}[R_M] - r_f)]$
 - $(\beta_i = \frac{\text{Cov}(R_i, R_M)}{\text{Var}(R_M)})$
- **Interpretation:** Expected return = risk-free rate + systematic risk premium.
- **Implications**
 - Only systematic (market) risk is priced.
 - All assets lie on the Security Market Line (SML).

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3.4 Arbitrage Pricing Theory (APT)

- **Form:** $\mathbb{E}[R_i] = r_f + \sum$