Financial Mathematics

MATH 5870/6870¹ Fall 2021

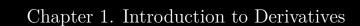
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¹Based on Robert L. McDonald's *Derivatives Markets*. 3rd Ed. Pearson. 2013.



Chapter 1. Introduction to Derivatives

- § 1.1 What is a derivative?
- § 1.2 An overview of financial markets
- § 1.3 The use of derivatives
- § 1.4 Buying and short-selling financial assets
- § 1.5 Problems

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Common reasons to use derivatives

- 1. Risk management. Derivatives are a tool for companies and other users to reduce risks (\sim hedging). Every form of insurance is a derivative.
- 2. Speculation. Derivatives can serve as investment vehicles (\sim betting).
- 3. Reduce transaction costs. Sometimes derivatives provide a lower cost way to undertake a particular financial transaction.
- 4. Regulatory arbitrage. It is sometimes possible to circumvent regulatory restrictions, taxes, and accounting rules by trading derivatives.

Three perspectives on derivatives

End users	Intermediaries	Economic Observers
Corporations	Market-makers	Regulators
Investment managers	Traders	Researchers
investors		
How to use a derivative	Mathematical details of	Make sense of the market
to meet the goal	pricing and hedging	

New securities can be designed by using existing securities

Financial engineering is the construction of a financial product from other products.

Principles for financial engineering (or security design):

- 1. Facilitate hedging of existing positions
- 2. Allow for creation of customized products
- 3. Enable understanding of complex positions
- 4. Render regulation less effective