

# TERM STRUCTURES: COMMODITIES, INTEREST RATES, AND OTHER ASSETS

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The program for the master 104 finance, this year, will be the following:

Chapter 1. The development of derivative markets

Chapter 2. Price relationships between spot and futures markets

Chapter 3. Term structures: dynamic behaviour, theories and models

Chapter 4. Applications of term structure models

Chapter 5. General equilibrium models

## MAIN REFERENCES<sup>1</sup>

- Danthine J.P., Donaldson J.B., *Intermediate Financial Theory*, 2d Ed., Elsevier, 2005.
- Hull J., *Options, futures and other derivatives*, 7<sup>th</sup> Ed., 2008
- Kolb R.W. , Overdahl J.A. , *Futures, options, and swaps*, 5th Ed., Blackwell, 2007.
- Y. Simon et D. Lautier, *Marchés dérivés de matières premières*, 3<sup>ème</sup> Ed., Economica, 2006.
- Stulz R.M., *Risk Management and derivatives*, Thomson South Western, 2003.
- Williams J., *The economic function of futures markets*, Cambridge University Press, 1986
- Wilmott P., *Paul Wilmott on Quantitative Finance*, 3-volume set, 2<sup>nd</sup> Ed., Wiley, 2006.

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<sup>1</sup> For each chapter, a more precise bibliography will be provided.

CHAPTER 1. THE DEVELOPMENT OF DERIVATIVE MARKETS

Section 1. A short introduction

Section 2. The economic function of derivative markets

Section 3. Key dates on the development of derivative markets

Section 4. The frontier between OTC and organized markets

CHAPTER 2. PRICE RELATIONSHIPS BETWEEN SPOT AND FUTURES MARKETS

Section 1. The theory of normal backwardation

1.1. Presentation The relationship between the spot and futures prices

1.2. The analysis of the risk premium towards the theory of financial markets

1.3. Empirical tests

1.4. Comparison with other financial assets

Section 2. The storage theory

2.1. The role of inventory in commodity markets

2.2. The analysis of contango and backwardation

2.3. The convenience yield

2.4. Empirical tests of the storage theory

2.5. Critiques of the theory

2.6. Comparison with other financial assets

CHAPTER 3. TERM STRUCTURES: DYNAMIC BEHAVIOUR, THEORIES AND MODELS
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Section 1. Dynamic behaviour of the term structures

- 1.1. The Samuelson effect
- 1.2. Principal component analysis of prices curves
- 1.3 Dynamic behaviour of the prices curves: illustrations
- 1.4. Three dimensions' term structures: surfaces of volatilities and credit spreads

Section 2. Theories of the term structures

- 2.1. Term structures and institutional factors
- 2.2. Term structures and expectations
- 2.3. Risk and liquidity premiums
- 2.4. Preferred habitat theory
- 2.5. From interest rates to other assets

Section 3. Term structure models

- 3.1. Contingent claim analysis: a brief reminder
- 3.2. One-factor models
- 3.3. Two-factor models
- 3.4. Three-factor models
- 3.5. The HJM framework

CHAPTER 4. APPLICATIONS OF TERM STRUCTURE MODELS
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Section 1. Empirical validation of term structure models

- 1.1. Simulations
- 1.2. Parameters estimations
- 1.3. Performances of the models

Section 2. Dynamic hedging

- 2.1. Liquidity on derivative markets
- 2.2. An example of dynamic hedging: Metallgesellschaft
- 2.3. Dynamic hedging in commodity markets
  - 2.3.1. General features
  - 2.3.2. Hedge portfolios
  - 2.3.3. Hedge ratios
  - 2.3.4. Empirical results

Section 3. Investment

- 3.1. The real options theory
- 3.2. The pioneer article
- 3.3. Other models

CHAPTER 5. GENERAL EQUILIBRIUM MODELS
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Section 1. The structure of the models

- 1.1 Fundamental economic structures
- 1.2 The speculator
- 1.3 The short hedger
- 1.4 The long hedger
- 1.5 The trader

Section 2. Maximization of the expected utility functions

- 2.1. The speculator
- 2.2. The short hedger
- 2.3. The long hedger
- 2.4. The trader

Section 3. Market equilibriums

- 3.1. Rational expectations equilibriums
- 3.2. Equilibrium on the spot market
- 3.3. Equilibrium on the futures market

Section 4. Multi-period setting

- 4.1. Analysis of an individual hedger
- 4.2. Hedging price and quantity risk
- 4.3. Futures market equilibrium