

FINM2002 Derivatives

FINM6041 Applied Derivatives

Lecture 1 - Course Overview

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Hull *et al.*: Chapters 1 & 2



Australian
National
University

1. Course overview

- Wattle: FINM2002 Derivatives / FINM6041 Applied Derivatives
- Lecture and Workshop
 - Three-hour on-campus Lecture + Workshop every Tue 10AM–1PM at Copland Lecture Theatre
 - Lectures / Workshops are recorded and posted on Wattle/Echo360
- Tutorial
 - On-campus only
 - Week 2 to 12
- Consultation
 - Tuesdays 1–4PM (in-person)
 - Tutor consultations (in-person and online)
 - See information posted on Wattle

1. Course overview

- Three Assessments
- Progress test
 - Open-book Wattle online test
 - In week 7, details to be announced
 - 90-minute long and cover Week 1 to 6 inclusive
 - 15% and redeemable towards the final exam
- Group Assignment
 - Due date: Friday 9 May 2025, by 5pm (Week 10)
 - 20% and is NOT redeemable
 - Details will be discussed in Workshop in Week 4
 - Team formation: 3 – 4 students
 - Please form groups ASAP before Week 5
 - Form groups on Wattle
 - You can use the forum to search for group members



1. Course overview

- Final Exam
 - Closed-book in-person exam
 - Two-hour long
 - 65% of the overall course grade (or 80% if mid-term is redeemed)
 - Comprehensive question format
 - Questions written around recent real-life events
 - Emphasis on applications to real-life events
 - See “Comprehensive question examples”
 - Significant fraction of conceptual questions
 - More important to understand the fundamental intuitions
 - Develop a professional “common sense” in finance after this course
 - Powerful programs to do calculations in industry
 - More sophisticated asset pricing models in industry



1. Course overview

- Your final grade before any scaling (if applicable) is

$$\max\left(\frac{\text{Progress test}}{15}, \frac{\text{Final}}{65}\right) \times 15 + \text{Assignment} + \text{Final}$$

1. Course Overview

- Recommended textbook:

- Hull, J., Treepongkaruna, S., Heaney, R., Pitt, D., and D. Colwell, **Fundamentals of futures and options markets**
- The textbook readings are optional
- Textbook can be borrowed from ANU library
- e-copy available from ANU library
<https://library.anu.edu.au/record=b6460173>

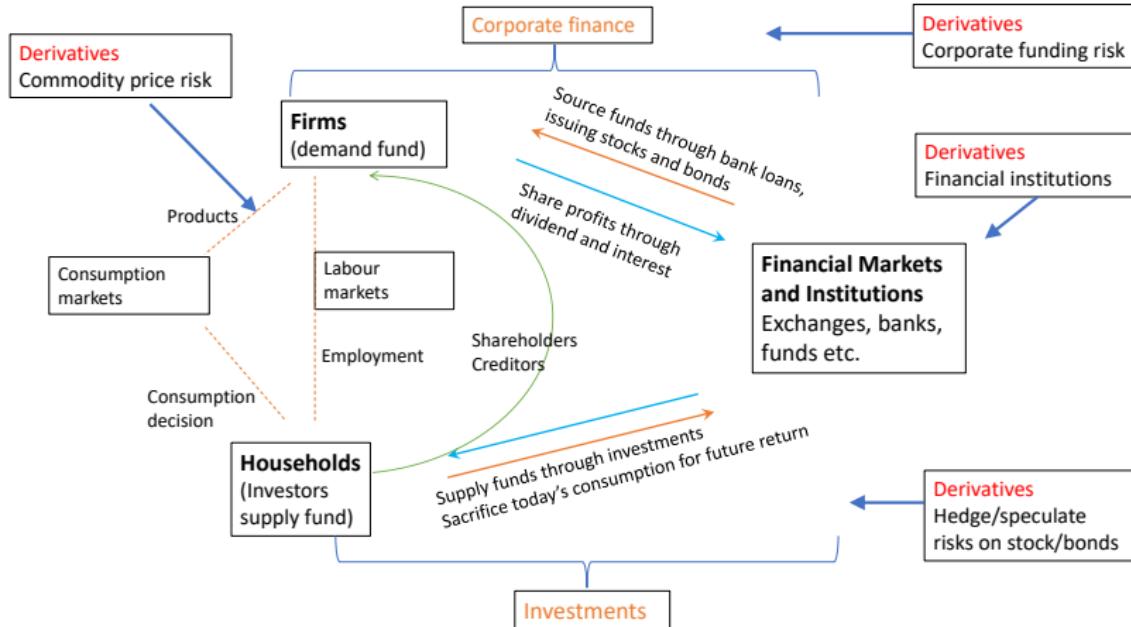


1. Course overview

- What are derivatives?
 - A financial instrument whose value depends on the values of other more basic underlying assets
 - Trade specific risks without trading in the underlying assets
 - Price risk, interest rate risk, credit risk and etc.
 - With someone who are more willing / suited to take these risks
- Examples of derivatives
 - Forward, Futures, Swaps and Options
- Main use of derivatives
 - Hedge
 - Speculate
 - Arbitrage



1. Course overview - the role of Derivatives in Finance



1. Course overview

- Course outline
 - Week 1: Course Overview
 - Week 2: Hedging Strategies Using Futures
 - Week 3: Interest Rate Contracts and Swaps
 - Week 4: Options and Options Trading Strategies
 - Week 5: Binomial Model for Pricing Options
 - Week 6: Black-Scholes Model for Pricing Options
 - Week 7: Index and Foreign Exchange Options
 - Week 8: Options on Futures Contracts
 - Week 9: The Greek Letters
 - Week 10: Exotic Options and other Non-standard Products
 - Week 11: Credit, Weather, Energy and Insurance Derivatives and Derivatives Mishaps and Ethics in Risk Management
 - Week 12: Review



1. Course overview

- If you are interested in the following events
 - Negative oil future price in Apr 2020
How can the future price fall below zero?
 - Russian nickel (a type of metal) under sanction
What happens if the underlying asset is sanctioned suddenly?
 - The fall of Silicon Valley Bank
What could be done to hedge interest rate risk?
 - The GameStop short squeeze
How to squeeze short sellers using options?
 - Elon Musk's big bet on Trump in 2024 US presidential election
How to join the bet as an investor?
 - The Structured Deposit
A very popular new investment product, but what is it?
 - The debt crisis of Evergrande, a Chinese real estate giant
How can debt holders protect themselves through derivatives?
 - The Great Financial Crisis in 2008
A comprehensive analysis of the role of derivatives



2. Lecture Overview

- In today's class
 - Forwards and futures contracts recap
 - Convergence of futures to spot
 - Settlement procedures for futures
 - Closing-out before expiry
 - Settlement at expiry (physical and cash)
 - Options
 - Types of Market Traders



3. Forwards and Futures Contracts

- **Spot contract**

- An agreement to buy or sell the asset immediately (or within a very short period of time)
- Spot price S

- **Forward/Futures contract**

- An agreement to buy or sell an asset at a certain time in the future for a certain price
- Forward/Futures prices F is the price at which you agree to buy or sell the underlying asset



3. Forwards and Futures Contracts

Key Features of Forward/Futures Contracts:

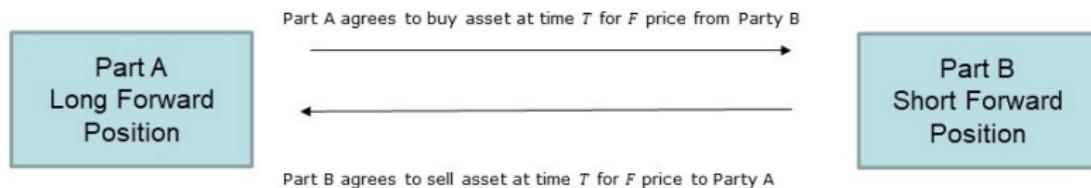
FORWARDS	FUTURES
Private contract between 2 parties	Exchange traded
Non-standard contract	Standard contract
Usually 1 specified delivery date	Range of delivery dates
Settled at maturity	Settled daily
Delivery or final cash settlement usually occurs	Contract usually closed out prior to maturity



3. Forwards and Futures Contracts

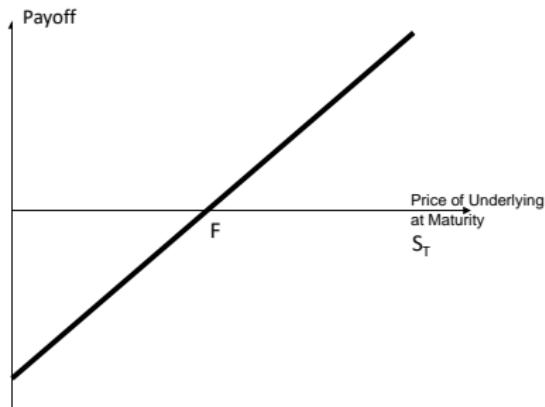
- In a forward or futures contract

- The party that has agreed to buy has a **long** position. They have a final payoff of $S_T - F$
- The party that has agreed to sell has a **short** position. They have a final payoff of $F - S_T$

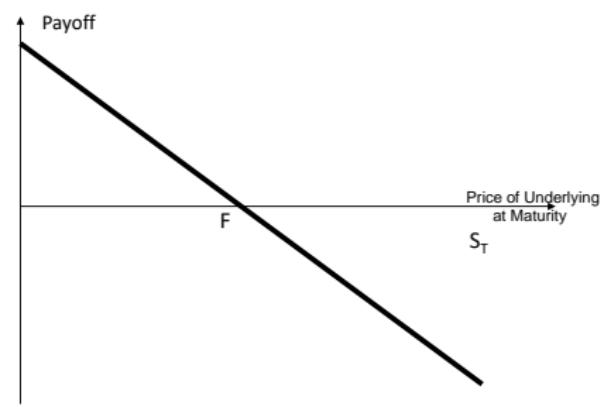


3. Forwards and Futures Contracts

Payoff from a long futures position



Payoff from a short futures position



3. Forwards and Futures Contracts

- Example

- In July an investor enters into a long futures contract
- to buy 100 oz of gold at $F = \$1,200$ per oz in October
- In October the spot price of gold is $S_T = \$1,215$ per oz
- What is the investor's payoff?
- The investor is in the long position, so the payoff from the futures is
- $S_T - F = (\$1,215 - \$1,200) \times 100 = \$1,500$



3. Forwards and Futures Contracts

- Additional features

- The price of Forward/Futures F may change over time, depending on the supply/demand
- The initial value of the contract is zero
- No money changes hands when forward/futures are first negotiated
- For Futures, intermediate gains or losses are posted each day
 - Mark to market
 - Determined by the changes in futures price from day to day
 - Money transferred between the margin accounts



3. Forwards and Futures Contracts

- Margin Accounts

- A margin is cash or marketable securities deposited by an investor with the broker
- The balance in the margin account is adjusted to reflect daily settlement of gains / losses
- Margins minimize the possibility of a loss through a default on a contract

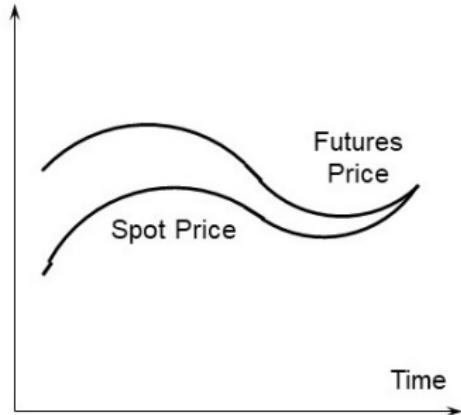


3. Forwards and Futures Contracts

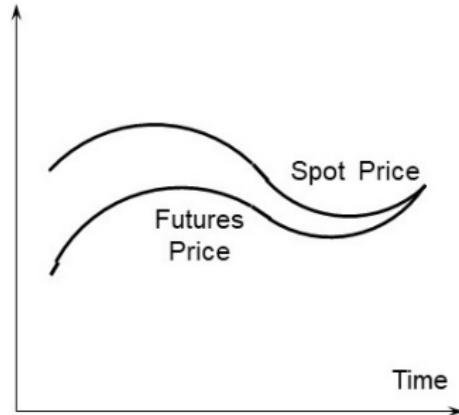
- Examples of futures markets:
 - ASX (<http://www.asx.com.au>)
 - Chicago Board of Trade
 - Chicago Mercantile Exchange
 - LIFFE (London)
 - Eurex (Europe)
 - BM&F (Sao Paulo, Brazil)
 - TIFFE (Tokyo)



4. Convergence of Futures to Spot



(a)



(b)

- As the delivery period of a futures contract is approached, the futures price **converges** to the spot price of the underlying asset
- When the delivery period is reached, the futures price equals, or is very close to the spot price

4. Convergence of Futures to Spot

- During the delivery period
 - If the futures price is **above** the spot price
 - Arbitrage opportunity
 - **short** the futures contract, buy the asset and make delivery
 - force the futures price to fall and converge to the spot price
 - If the futures price is **below** the spot price
 - Companies wanting to acquire the asset would enter into a **long** position in the futures contract
 - Wait for delivery to be made
 - Difficult to arbitrage, cannot force immediate delivery of the asset
 - Futures price will tend to rise, until converge with spot price



5. Settlement Procedures for Futures

- Once entered a futures position (either long or short), you may
 - Hold that position until the expiry/delivery date, or
 - “Close-out” before expiry



5.1. Closing-out Before Expiry

- All futures contracts can be “closed-out” prior to expiry
- **Closing out** a futures position simply means entering a new futures position **equal in magnitude but opposite in direction** to your original futures position
- i.e. entering into an “offsetting trade”
- Most futures contracts are closed out before maturity



5.1. Closing-out Before Expiry

- Example
- Enter one long contract in Sep-2023 Eastern Australian Wheat Futures at \$274 per tonne
- The underlying asset of each futures contract is 20 tons
 - If futures price is \$300 when we close
 - Enter one short Sep-2023 wheat contract at \$300
 - Profit of $\$520 = (300-274) \times 20$ tonnes
 - If futures price is \$260 when we close
 - Enter one short Sep-2023 wheat contract at \$260
 - Loss of $\$280 = (260-274) \times 20$ tonnes



5.2. Settlement at Expiry

- If a futures contract is not closed out before maturity
- To be settled by delivering the assets underlying the contract
 - Physical delivery
 - Cash delivery

5.2. Settlement at Expiry - Physical Delivery

- Some futures contracts allow physical delivery of the underlying asset on the expiry date
 - The contract specifies where, when and how delivery must be made
 - If there are alternatives about the above terms, the party on the **short position** chooses
- In practice, it is rare that Futures result in physical delivery
 - The vast majority of futures are closed out prior to expiry
 - They have served their purpose (hedging or speculation)
 - Physical delivery is more troublesome than it is worth



5.2. Settlement at Expiry - Physical Delivery

Bitumen Contract Specifications

Product	Bitumen	Updated on: Sep 25, 2013
Contract Size	10 tons/lot	
Price Quotation	(RMB) Yuan/ton	
Minimum Price Fluctuation	2 Yuan/ton	
Daily Price Limit	Within 3% up or down of the settlement price of the previous trading day	
Contract Series	Monthly contract of the recent 6 consecutive months and consecutive quarterly contracts within the recent 24 months	
Trading Hours	9:00am to 11:30am, 1:30pm to 3:00pm (the Beijing Time) and other trading hours as prescribed by the SHFE	
Last Trading Day	The 15th day of the spot month (If it is a public holiday, the Last Trading Day shall be the 1st business day after the holiday)	
Delivery Period	The 5 consecutive business days after the last trading day	
Grade and Quality Specifications	70# Class-A road bitumen, more details on quality specifications to be found in the Bitumen Futures Delivery Rules of the Shanghai Futures Exchange (Trial)	
Delivery Venue	Certified Delivery Warehouse of the SHFE	
Minimum Trade Margin	4% of contract value	
Settlement Type	Physical Delivery	
Contract Symbol	BU	
Exchange	SHFE	



5.2. Settlement at Expiry - Cash Delivery

- Some futures contracts cannot be physically delivered
 - E.g. SPI200 index Futures, infeasible to deliver
- These Futures are cash settled if not closed out before expiry
 - On expiry, the exchange enters an offsetting trade on client's behalf
 - Calculate the net profit or loss, and transfer to/from client's account



6. Options

- A **call** option is an option to **buy** a certain asset by a certain date for a certain price (strike price)
- A **put** option is an option to **sell** a certain asset by a certain date for a certain price (strike price)
- **American option** can be exercised at any time during its life, up to and including the expiry date
- **European option** can be exercised only at the expiry date

6. Options

- **Long** position of a call/put option
 - Holder/buyer of the option
 - Make the choice whether or not to exercise the option
 - Must pay an option premium to the writer
- **Short** position of a call/put option
 - Writer/seller of the option
 - Obliged to fulfill the terms of option contract if holder exercises it
 - Receive an option premium from the holder



6. Options

- Options v.s. Forward and Futures
 - Futures/forward contract gives the holder the **obligation** to buy or sell at a certain price
 - Option gives the holder the **right but not the obligation** to buy or sell at a certain price
 - Option is not free and holder must pay option premium, whereas there is no money transfer when a forward/futures contract is initially negotiated
 - Options can be both OTC and exchange-traded, whereas Forward are OTC and Futures are exchange-traded



7. Types of Market Traders

- Three main types of market participants
 - Hedgers
 - Want to avoid exposure to adverse movements in the asset price
 - Will have a position in both the derivative and underlying asset
 - Speculators
 - Take a position betting on the asset price movement
 - Make gains if correct, and suffer losses if wrong
 - Arbitrageurs
 - Attempt to lock in a riskless profit
 - By simultaneously entering into transactions in two or more markets



8. Conclusion

- In today's class
 - Forwards / Futures and options recap
 - Convergence of futures to spot
 - Settlement procedures for futures
- Next week
 - Interest rate compounding
 - Price and value of forward and future contract
 - Hedging strategies

