FINM2002 Derivatives
FINM6041 Applied Derivatives

Workshop 1

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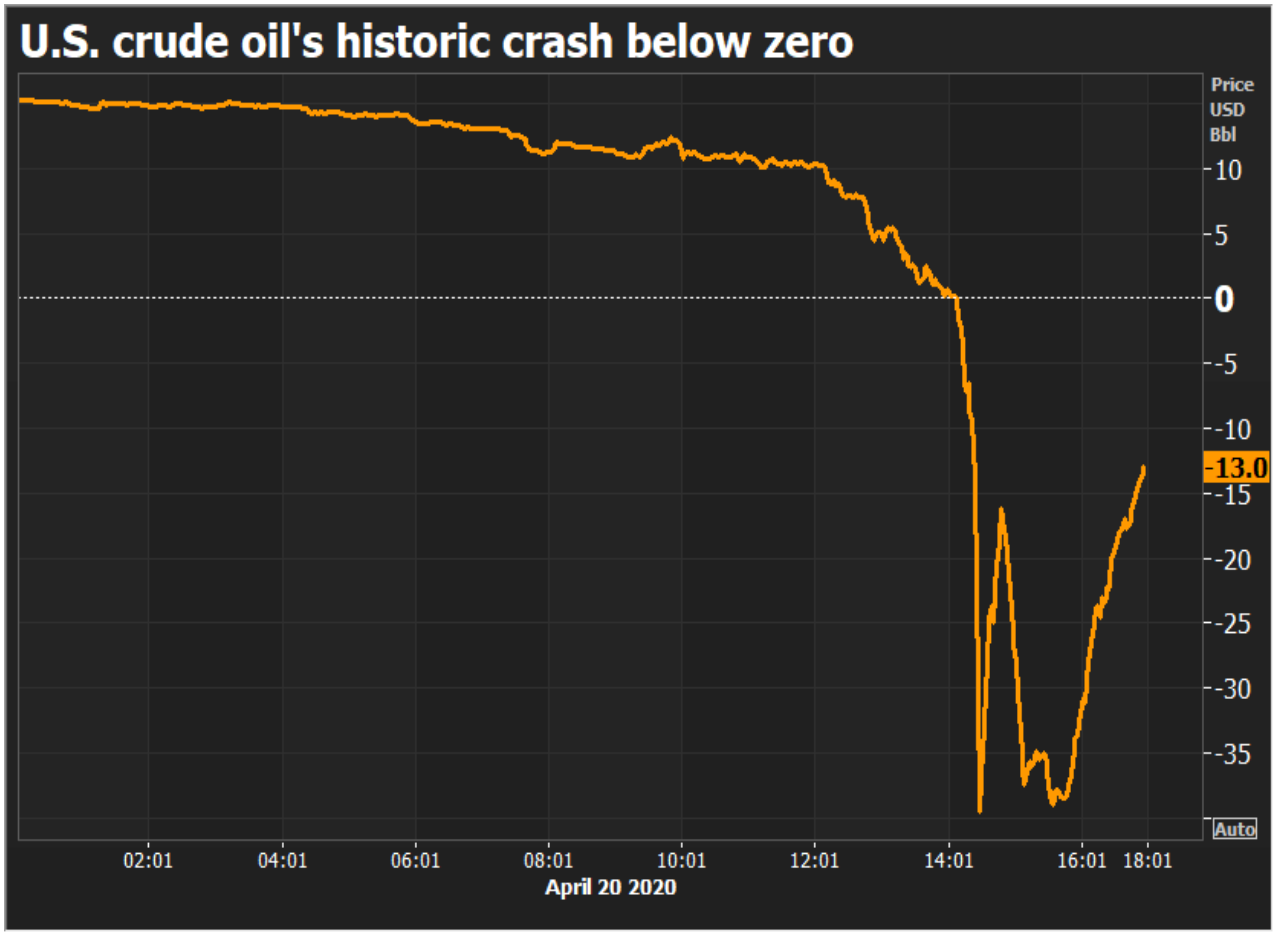
1. Overview

- Negative oil future price in Apr 2020
- Russian nickel (a type of metal) under sanction
- Example of hedging

1. Negative oil future price



Source: Reuters

1. Negative oil future price

- The price of a barrel of benchmark U.S. oil (WTI) plunged below \$0 ($-\$35$) on April 20, 2020 for the first time in history
  - COVID and oil price war, historical low oil price and oversupply
  - Whole industry running out of storage space to store their oil
  - "No available storage anymore"
  - As the delivery date for WTI grew near, investors long in future began a massive sell-off to close out position
  - Unprecedented crash to a negative price below $-\$35$

2. Russian nickel

- On 28 February 2023, London Metal Exchange (LME) suspended Russian-branded metal, including nickel, as deliverable underlying asset in the exchange

2. Russian nickel

- LME's biggest crisis in decades
  - Russian nickel as one of major suppliers
  - After suspension, short position cannot make delivery in short-term
  - Speculators push up the future prices from around $25,000 to above $100,000 in a week
  - Short position cannot afford margin to maintain position, even they may source nickel to make delivery until maturity
  - China's Tsingshan Holding Group suffered as an innocent hedger
  - LME paused/canceled trading and then put a daily price limit
  - Aftermath still unclear for each participants
  - Distort the market

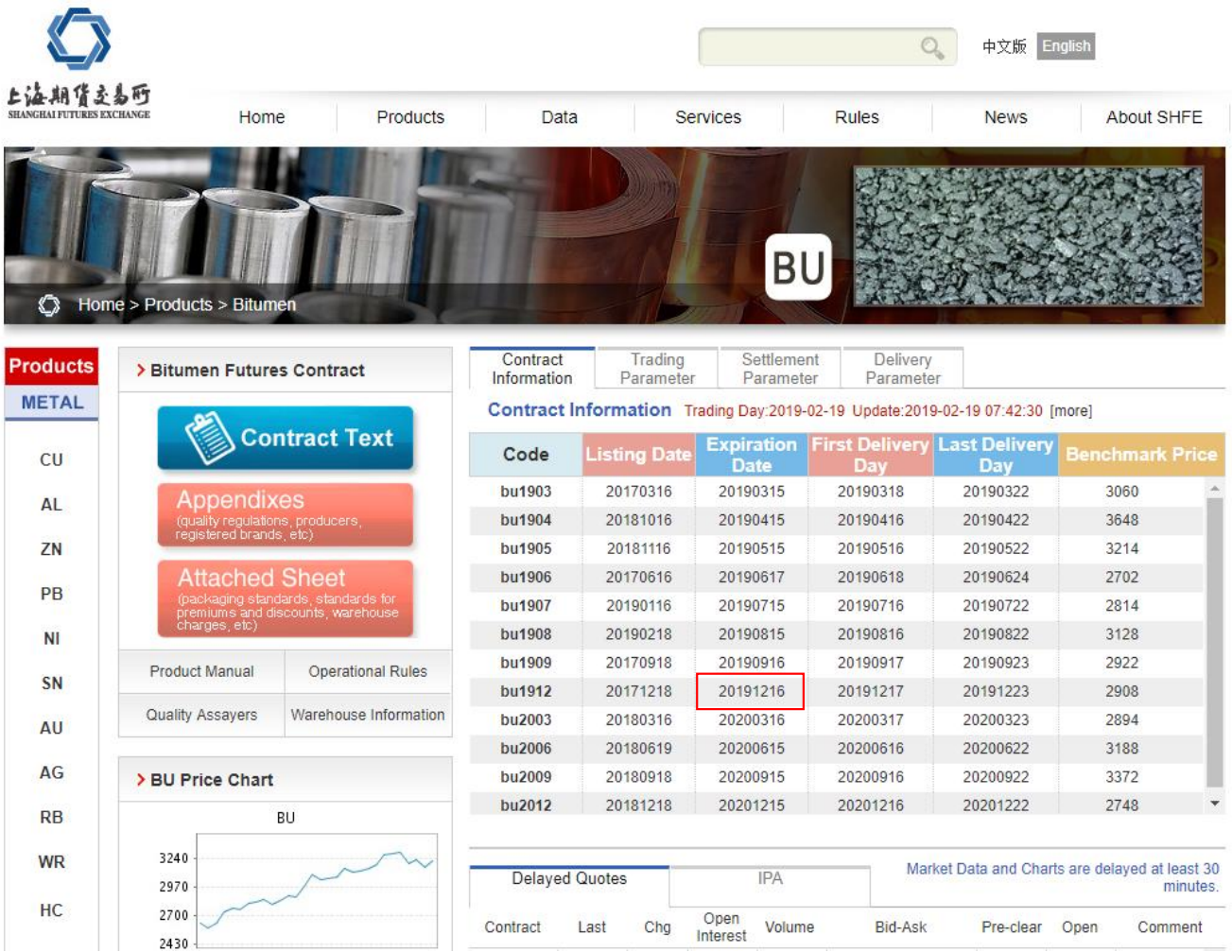
Example of hedging

- Basic principles of hedging
  - Hold (or expected to hold) a position in an asset
  - But don't want to be exposed to movements in asset price
  - Hedge to eliminate (or reduce) the exposure to price movements
  - Enter a derivatives position that provides a payoff which offsets the price movements in the exposed underlying asset
- Strategy
  - Identify the risk/exposure in the asset
  - Enter a derivatives position that makes money when this unfavourable scenario occurs

Example of hedging

- Your company's business is in building roads and highways
- Just signed a contract to construct a road in China
  - Assume we are at the beginning of 2019 now
  - The road due to be completed in December 2019.
  - Towards the end of the construction process, you need to purchase about 500 tons of bitumen to complete the road construction.
  - The current (spot) price of bitumen is RMB 3000 per ton, but you have no idea what the price will be in late 2019
  - You learned that the Shanghai Futures Exchange offers futures contract on bitumen

Example of hedging



Example of hedging

Delayed Quotes | IPA

Market Data and Charts are delayed at least 30 minutes.

Contract	Last	Chg	Open Interest	Volume	Bid-Ask	Pre-clear	Open	Comment
bu1903	3100	-22	114	0	3142/3222	3122	--	
bu1904	3218	0	6	0	2962/3472	3218	--	
bu1905	3214	22	2204	1560	3208/3214	3192	3212	
bu1906	3224	22	647650	342700	3224/3226	3202	3216	
bu1907	3254	64	6	0	2936/3442	3190	--	
bu1908	3128	0	0	0	2628/3626	3128	--	
bu1909	3216	30	3014	164	3202/3218	3186	3200	
bu1912	3208	34	60950	8048	3208/3212	3174	3188	

- Open interest: the total number of contracts outstanding
- Volume (of trading): the number of trades in 1 day

Example of hedging

Bitumen Contract Specifications

Updated on:Sep 25,2013

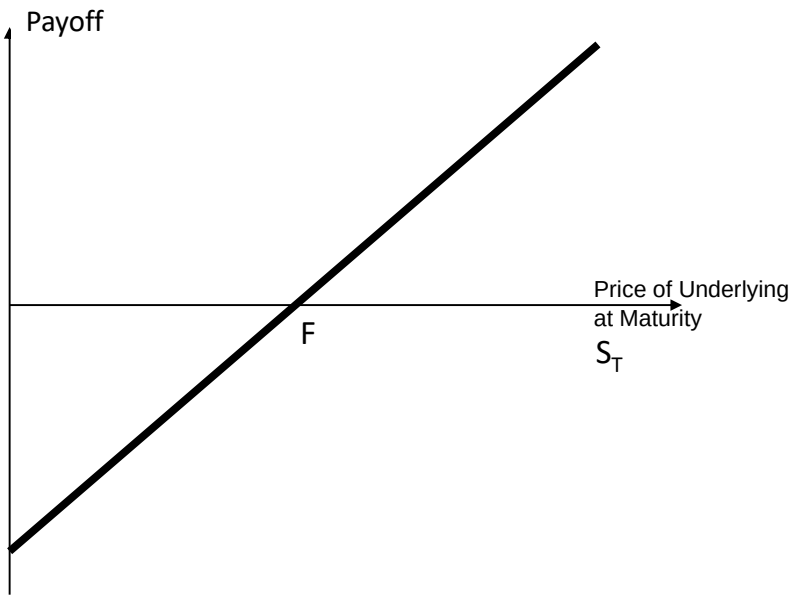
Product	Bitumen
Contract Size	10 tons/lot
Price Quotation	(RMB) Yuan/ton
Minimum Price Fluctuation	2 Yuan/ton
Daily Price Limit	Within 3% up or down of the settlement price of the previous trading day
Contract Series	Monthly contract of the recent 6 consecutive months and consecutive quarterly contracts 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

Example of hedging

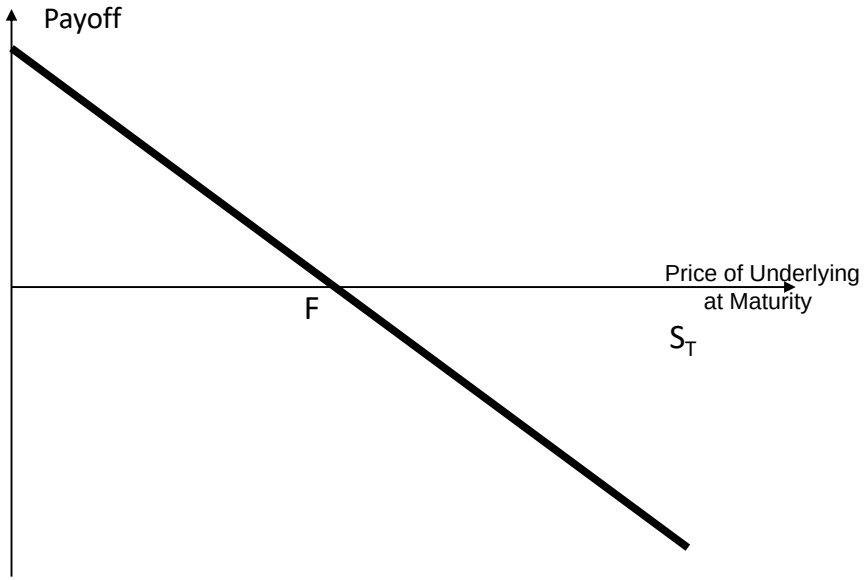
- Use the SHFE bitumen futures contract to hedge risk
- Decide which position to enter
- Identify the risk/exposure in the asset
  - Need to purchase bitumen in December 2019
  - Exposed to the price of bitumen rising between now and then
  - i.e. suffer loss if price of bitumen increases
- Enter a derivatives position that makes money when this unfavourable scenario occurs
  - Long futures position
  - Makes money when the price of bitumen increases
  - Offset the loss in the spot market in December 2019

Example of hedging

Payoff from a long futures position



Payoff from a short futures position



Example of hedging

- A long position in SHFE bitumen futures contract to hedge
- The contract specifies each contract covers 10 tons of bitumen
  - Construction project requires 500 tons
  - Need $N = 500/10 = 50$ futures contracts
- SHFE offers a range of expiry dates
  - Need the bitumen in December 2019
  - Choose the contract expiring in December 2019 (bu1912)
- bu1912 has a delivery price (F) of 3208, meaning you can lock in a purchase price of RMB 3208 per ton of bitumen
- Hedge strategy
  - Enter 50 long futures contracts of bu1912
  - Know exactly how much the bitumen will cost

    $50 \times 10 \times 3208 = \text{RMB } 1,604,000$

Example of hedging

- If bitumen price rises to RMB 4000 per ton
- Assume close out just prior to expiry
- When the expiry date arrives, the quoted futures price on bu1912 contracts will equal the spot price for bitumen
- Profit calculation
  - Original position was 50 long bu1912 contracts
  - Close out by entering 50 short bu1912 contracts
  - Profit from futures contract

    $50 \times 10 \times (4000 - 3208) = \text{RMB } 396,000$
  - Still need 500 tons of bitumen, purchase from spot market at a cost

    $500 \times 4000 = \text{RMB } 2,000,000$
- Net result, i.e. the total cost to purchase 500 tons of bitumen

  $2,000,000 - 396,000 = \text{RMB } 1,604,000$

  or say $1,604,000/500 = \text{RMB } 3208$ per ton, as locked in by futures

Example of hedging

- If bitumen price falls to RMB 2000 per ton
- Assume close out just prior to expiry
  - Close out by entering 50 short bu1912 contracts
  - Loss from futures contract

    $50 \times 10 \times (2000 - 3208) = \text{RMB } 604,000$
  - Still need 500 tons of bitumen, purchase from spot market at a cost

    $500 \times 2000 = \text{RMB } 1,000,000$
- Net result, i.e. the total cost to purchase 500 tons of bitumen

  $1,000,000 + 604,000 = \text{RMB } 1,604,000$

  or say $1,604,000/500 = \text{RMB } 3208$ per ton, as locked in by futures

Example of hedging

- Hedging means locking in a price
  - Great if underlying asset price moves unfavourably
  - But also gives potential benefit if price moves favourably
  - When (fully) hedged
    - Completely immunized from price movements in underlying asset
    - Final outcome is insensitive to what happens with underlying asset