Financial Derivatives: Speculation and Arbitrage
Speculators vs. Hedgers

- Hedgers want to avoid exposure to adverse movements in the price of an asset.
- Speculators wish to take a position in the market. Either they are betting that the price of the asset will go up or they are betting that it will go down.
Speculation with Futures: Example

• A US speculator on February 15, 2013 believes that GBP will strengthen relative to the US$ over the next 2 months and is prepared to buy £250,000.

• He can either purchase £250,000 in the spot market for 1.4470. Or, he can take a long position in four April futures contracts on GBP of £62,500 each (the futures price equals to 1.4410).

• Suppose that the initial margin requirement is $5,000 per futures contract.

• Two scenarios for futures price on April 15, 2013:
  a) 1.5000
  b) 1.4000
The broker will require the investor to deposit funds in a margin account.

The amount that must be deposited at the time the contract is entered into is known as the initial margin.

The initial margin requirement is $5,000 per futures contract.
Speculation with Futures: Payoffs

<table>
<thead>
<tr>
<th>Possible trades</th>
<th>Buy £250,000</th>
<th>Buy 4 futures contracts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Spot price = 1.4470</td>
<td>Futures price = 1.4410</td>
</tr>
<tr>
<td>Investment</td>
<td>$361,750</td>
<td>$20,000</td>
</tr>
<tr>
<td>Profit if April spot = 1.5000</td>
<td>$13,250</td>
<td>$14,750</td>
</tr>
<tr>
<td>Profit if April spot = 1.4000</td>
<td>−$11,750</td>
<td>−$10,250</td>
</tr>
</tbody>
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Speculation with Futures: Outcome

- The spot market alternative appears to give rise to slightly worse outcomes for both scenarios.
- Importantly, the first alternative of buying GBP requires an up-front investment of $361,750. In contrast, the second alternative requires only a small amount of cash (i.e., $20,000) to be deposited by the speculator in a margin account.
- The futures market allows the speculator to obtain leverage. With a relatively small initial outlay, the investor is able to take a large speculative position.
Why a futures contract can be used for either speculation or hedging?

- If an investor has an exposure to the price of an asset, he can hedge with futures contracts.
- If the investor will gain when the price decreases and lose when the price increases, a long futures position will hedge the risk.
- If the investor will lose when the price decreases and gain when the price increases, a short futures position will hedge the risk.
- Thus either a long or a short futures position can be entered into for hedging purposes.
Why a futures contract can be used for either speculation or hedging?

- If the investor has no exposure to the price of the underlying asset, entering into a futures contract is speculation.
- If the investor takes a long position, he gains when the asset’s price increases and loses when it decreases.
- If the investor takes a short position, he or she loses when the asset’s price increases and gains when it decreases.
Speculation with Options: Example

- In October 2013 a speculator considers that a stock is likely to increase in value after 2 months.
- The stock price is currently $20, and a 2-month call option with a $22.50 strike price is currently selling for $1.
- The speculator is willing to invest $2,000.
Speculation with Options: Example

- One alternative is to purchase 100 shares
- The other involves the purchase of 2,000 call options (i.e., 20 call option contracts).
- Two different scenarios for the stock price:
  a) $27 in December 2013
  b) $15 in December 2013
The options strategy is, therefore, 10 times more profitable than directly buying the stock.

Options give rise to a greater potential loss.
Figure 1.5 Profit or loss from two alternative strategies for speculating on a stock currently worth $20.
Speculation with Options: Outcome

- Options like futures provide a form of leverage.
- For a given investment, the use of options magnifies the financial consequences. Good outcomes become very good, while bad outcomes result in the whole initial investment being lost.
Futures and options are similar instruments for speculators in that they both provide a way in which a type of leverage can be obtained.

However, there is an important difference between the two: When a speculator uses futures, the potential loss as well as the potential gain is very large. When options are used, no matter how bad things get, the speculator’s loss is limited to the amount paid for the options.
Arbitrage: Example

- Arbitrage involves locking in a riskless profit by simultaneously entering into transactions in two or more markets.
- Let us consider a stock that is traded on both the NYSE and the LSE.
- Suppose that the stock price is $140 in NYSE and £100 in LSE when the exchange rate is $1.4300 per £.
Transactions costs would probably eliminate the profit for a small investor.

A large investment bank faces very low transactions costs in both the stock market and the foreign exchange market.

It would find the arbitrage opportunity very attractive and would try to take as much advantage of it as possible.
Arbitrage opportunities such as the one just described cannot last for long.

As arbitrageurs buy the stock in NYSE, the forces of supply and demand will cause the dollar price to rise. Similarly, as they sell the stock in London, the sterling price will be driven down. Very quickly the two prices will become equivalent at the current exchange rate.

In fact, the existence of profit-hungry arbitrageurs makes it unlikely that a major disparity between the sterling price and the dollar price could ever exist in the first place.
Dangers

- Traders can switch from being hedgers to speculators or from being arbitrageurs to speculators.
- It is important to set up controls to ensure that trades are using derivatives in for their intended purpose.
- Risk limits should be set and the activities of traders should be monitored daily to ensure that these risk limits are adhered to.
Jerome Kerviel joined SocGen in 2000 to work in the compliance area. In 2005, he was promoted and became a junior trader in the bank’s Delta One products team. He traded equity indices such as the German DAX index, the French CAC 40, and the Euro Stoxx 50. His job was to look for arbitrage opportunities. These might arise if a futures contract on an equity index was trading for a different price on two different exchanges. They might also arise if equity index futures prices were not consistent with the prices of the shares constituting the index.
Kerviel used his knowledge of the bank’s procedures to speculate while giving the appearance of arbitraging. He took big positions in equity indices and created fictitious trades to make it appear that he was hedged. In reality, he had large bets on the direction in which the indices would move. The size of his unhedged position grew over time to tens of billions of euros. In January 2008, his unauthorized trading was uncovered by SocGen. Over a three-day period, the bank unwound his position for a loss of 4.9 billion euros. This was at the time the biggest loss created by fraudulent activity in the history of finance.
Dangers: Other examples

- Bernard Madoff’s Ponzi scheme in late 2000s.
- In the 90s, Nick Leeson who worked at Barings Bank, had a mandate similar to that of Kerviel. His job was to arbitrage between Nikkei 225 futures quotes in Singapore and Osaka. Instead he found a way to make big bets on the direction of the Nikkei 225 using futures and options, losing $1b and destroying the 200-year old bank in the process.
- In 2002, it was found that John Rusnak at Allied Irish Bank had lost $700m from unauthorized foreign exchange trading.
1. You would like to speculate on a rise in the price of a certain stock. The current stock price is $29, and a three-month call with a strike of $30 costs $2.90. You have $5,800 to invest.
   
a) Identify two alternative strategies, one involving an investment in the stock and the other involving investment in the option.
   
b) What are the potential gains and losses from each? Assume that the share price i) goes up to $40, and ii) decreases to $25.
2. A trader enters into a short forward contract on 100m yen. The forward exchange rate is $0.0080 per yen. How much does the trader gain or lose if the exchange rate at the end of the contract is:

a) $0.0074 per yen, and
b) $0.0091 per yen?
3. Suppose that you write a put contract with a strike price of $40 and an expiration date in three months. The current stock price is $41 and the contract is on 100 shares.

a) What have you committed yourself to?
b) How much could you gain or lose?
3. Answer

a) You have sold a put option: You have agreed to buy 100 shares for $40 per share if the party on the other side of the contract chooses to exercise the right to sell for this price. The option will be exercised only when the price of stock is below $40.

b) Suppose that the option is exercised when the price is $30. You have to buy at $40 shares that are worth $30; you lose $10 per share, or $1,000 in total. If the option is exercised when the price is $20, you lose $20 per share, or $2,000 in total.
3. Answer

The worst that can happen is that the price of the stock declines to almost zero during the three-month period. This highly unlikely event would cost you $4,000.

In return for the possible future losses, you receive the price of the option from the purchaser.