Overview and Learning Objectives

Overview

This chapter provides a brief introduction to two important areas in today's finance arena – risk management and international finance. These two areas are fully developed in their respective courses – FIN 652 (Derivative Markets) and FIN 655 (International Financial Management).

Although commodity derivatives have long been used for managing price risk, financial futures contracts for currencies and interest rates have become a dominant force in risk management in recent years. We introduce the basics of derivatives and their marketplace in this chapter.

International finance is an important topic even for domestic firms because the world economy, especially global financial markets, is becoming more integrated. Firms can easily search the globe to locate the best financing alternatives. At the same time, even if a firm only sells its goods or services domestically, its suppliers and competitors are likely to include foreign firms. As such, the understanding and management of currency (foreign exchange) risk is an integral part of business today.

Learning Objectives

After reading course materials on this chapter, students should be able to:

- Explain the basic concepts and functions of derivatives.
- Compare and contrast the forward and futures contracts.
- Explain the daily settlement (marking-to-market) process in the futures market.
- Interpret the information on futures quotes presented in financial press.
- Explain the spot and forward exchange rates.
- Explain the difference between direct and indirect quotes.
- Contrast the differences among arbitrage, hedging and speculative activities.
- Explain the different types of hedges.
- Explain a currency swap and the risks involved.
- Explain and execute a triangular artbitrage in the foreign exchange market.

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Derivatives: Their Basics and Functions (Ref: Section 25.1)

- Derivatives are financial instruments that are derived from their underlying assets. Hence, their values (payoffs) depend on, or are contingent on, the values of the underlying assets. Their values are determined according to the Law of One Price, which states that "Equivalent assets sell for the same price."
- The pricing relationship between derivatives and their underlying assets is such that no arbitrage opportunity will be available in the related markets.
    - Arbitrage opportunity is the opportunity to make a riskless profit with no investment. It exists when two 'equivalent' assets being sold at different prices.
- One can take advantage of an arbitrage opportunity by buying the lower price asset with the proceeds that you receive from short selling the higher price asset. The riskless arbitrage profit is the difference in prices of the equivalent assets, with a zero net investment.

Basic derivatives include forwards, futures, options and swaps. For example, the S&P 500 futures contract is an equity derivative whose value is contingent on the level of the S&P 500 Index.

Participants in Derivative Markets include:

- **Hedgers**, who use derivatives to reduce or eliminate their risk exposures in the cash/spot market by taking the opposite position in the derivatives.
- **Speculators**, who trade derivatives to increase risk exposure in pursuit of profits based on their speculations on the direction of the price movement.
- **Arbitragers**, who trade derivatives and the underlying assets for taking advantage of arbitrage opportunities.

Note that derivative trading is a ZERO-SUM game, i.e., one party's gain is the counterparty's loss.

Functions of Derivatives:

- Enable companies and individuals to manage their risk exposures by hedging.
- Enable arbitrage activities that realign prices in related markets.
- Increase trading efficiency by lowering trading costs and increasing liquidity.
- Facilitate creation of structured assets and liabilities with any risk-return characteristics to meet specific needs in the marketplace.
- Enable speculation, though it is not the recommended use of derivatives.

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Forward and Futures Contracts (Ref: Sections 25.2 & 25.3)

A forward (or futures) contract specifies that an underlying asset will be exchanged between the parties at a specified time in the future (i.e., the maturity/expiration/delivery date), at a price specified today (i.e., the forward (or futures) price).

- If you have agreed to SELL anything (forward/futures or spot), you are "SHORT", i.e., a short position.
- If you have agreed to BUY anything (forward/futures or spot), you are "LONG", i.e., a long position.

Elements of a forward contract include price, quantity, and the deliverable instrument. These elements, which are tailored to the needs of the participants, are jointly determined by the parties involved in the agreement. The buyer of a forward contract takes delivery on the maturity date and the seller receives the agreed payment.

Since a position in a forward/futures contract represents obligations to both parties, the market value of the contract is ZERO at the moment it is initiated!

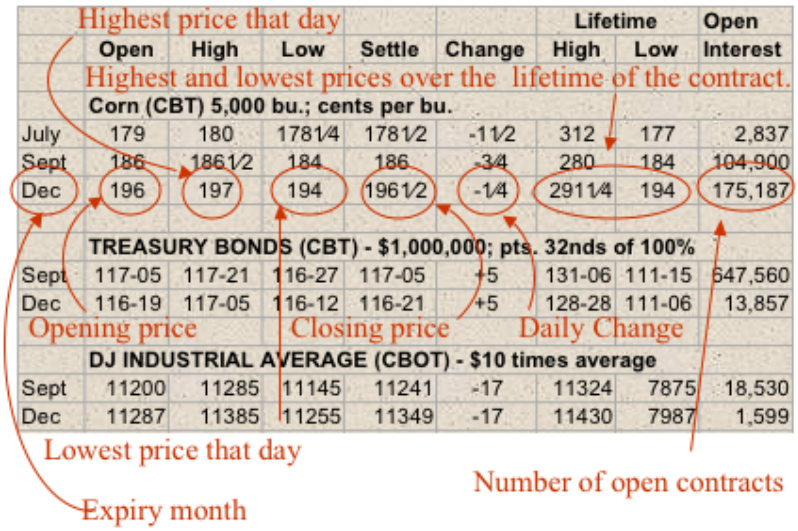
While a futures contract is very similar to a forward contract, there are differences between a futures contract and a forward contract, as highlighted below.

- Futures are standardized contracts trading on organized exchanges with a daily settlement ("marking-to-market") process through a clearinghouse. For instance, some standard features of futures contracts are contract size and delivery month. In addition, there are initial margin and maintenance margin requirements for a futures account. For instance, the initial margin requirement is typically cash or marketable securities amounted to 3~4 percent of the contract value held in a street name at your brokerage. These features greatly reduce default risk, and provide liquidity, in futures trading. In addition, futures contracts allow the sellers, i.e., those who hold a short position, to choose when to make delivery of the underlying asset during the delivery month.

Forwards	Futures
Are private contracts contracts	Are exchange traded
Have default risk exchange	Are guaranteed by the clearinghouse
Require no up front cash	Require margin account deposits
Have low or no regulation	Are regulated
Cash payments only at maturity	Are marked-to market (daily cash settlements)

The presentation of market trading data of futures in financial press.

Wall Street Journal Futures Price Quotes



	Open	High	Low	Settle	Change	Lifetime High	Lifetime Low	Open Interest
	Corn (CBT) 5,000 bu.; cents per bu.							
July	179	180	178¼	178½	-1½	312	177	2,837
Sept	186	186½	184	186	-¾	280	184	104,900
Dec	196	197	194	196½	-¼	291¼	194	175,187
	TREASURY BONDS (CBT) - $1,000,000; pts. 32nds of 100%							
Sept	117-05	117-21	116-27	117-05	+5	131-06	111-15	647,560
Dec	116-19	117-05	116-12	116-21	+5	128-28	111-06	13,857
	DJ INDUSTRIAL AVERAGE (CBOT) - $10 times average							
Sept	11200	11285	11145	11241	-17	11324	7875	18,530
Dec	11287	11385	11255	11349	-17	11430	7987	1,599

Open Interest

While most of the information on futures trading data presented in the financial press is self explanatory, the item "Open Interest" may need some explanation. Open Interest refers to the number of contracts outstanding for a particular delivery month. As such, open interest is a good proxy for demand for a contract. Some people refer to open interest as the depth of the market. The breadth of the market would be how many different contracts (expiry month, currency) are outstanding. Another observation is that the contract size and the price unit of the contract are presented next to the type of the underlying asset of the futures contract.

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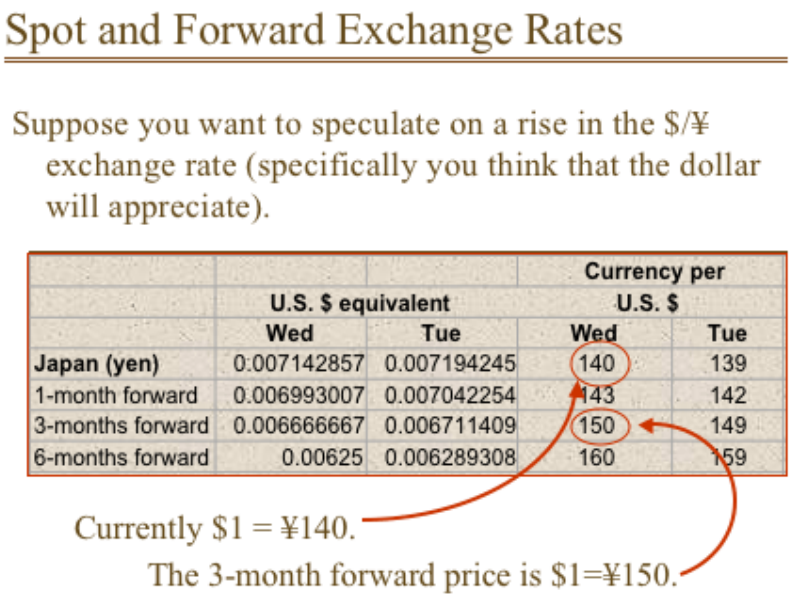
Exchange Rates & Daily Settlement of Currency Futures (Ref: Sections 31.1 & 31.2)

Before we look at an illustration of the marking-to-market (daily settlement) process in the currency futures market, let us learn about the basics of spot and forward exchange rates.



Exchange rate quotations

Direct quote – It is the U.S. dollar equivalent.

- It can be interpreted as the price of the foreign currency in U.S. dollar. For example, a Japanese Yen is worth about U.S. 0.71 cents.

Indirect quote – It is the quantity of the foreign currency per U.S. dollar.

- It can be interpreted as the price of a U.S. dollar in the foreign currency. For example, it costs 140 Japanese yens to buy one U.S. dollar.

Spot (or Cash) versus Forward Markets

- The spot or cash market is the market for immediate delivery, i.e., the settlement is due within two business days.
- The forward market for FOREX involves agreements to buy and sell foreign currencies in the future at prices agreed upon today.
    - Bank quotes for 1, 3, 6, 9, and 12-month maturities are readily available for forward contracts. Longer-term swaps are available.

In the chart above- Given that the spot rate for Japanese yen is ¥140 = $1.00, and the three-month forward rate is ¥ 150 = $1.00. The forex market clearly thinks that the yen is going to be worth less in three months (the yen is expected to depreciate) because one dollar will buy more yen.

Daily Settlement in the Currency Futures Market

- Assume that the three-month futures rate is the same as the three-month forward rate for Japanese yen.
- If you enter into a three-month futures contract to sell ¥ (a short position); at the rate of $1 = ¥150, you will make money if the yen depreciates. The contract size is ¥12,500,000, and your initial margin is 4% of the contract value:

  $3,333.33 = .04 × ¥12,500,00 × $1 ÷ ¥150

If tomorrow, the futures exchange rate closes at $1 = ¥149, then your position's value drops.
Your original agreement was to sell ¥12,500,000 and receive $83,333.33:

$83,333.33 = ¥12,500,00 × $1 ÷ ¥150

But ¥12,500,000 is now worth $83,892.62:

$83,892.62 = ¥12,500,00 × $1 ÷ ¥149

You have lost $559.29 overnight. This comes out of your $3,333.33 margin account, leaving a balance of $2,774.04.

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Hedging and Speculating (Ref: Section 25.4)

Two counterparties with offsetting risks can eliminate risk with derivatives. For example, if a wheat farmer and a flour mill owner enter into a forward/futures contract, they can eliminate the risk each other faces regarding the future spot price of wheat.

Hedgers, who have a position in the spot market, can also transfer price risk to speculators, who have NO position in the spot market, and speculators absorb price risk from hedgers. Speculators' positions in the derivatives are opposite to those of the hedgers.

Types of Hedge

Inventory Hedge

- One takes a long position in the underlying asset and takes a short position in, i.e., sell, the futures contract to hedge against the price risk – falling price.

Anticipatory Hedge

- Anticipating a position in the underlying asset in the future, one takes an opposite position in the futures contract now to hedge against the unfavorable price movement.

Short Hedge

- One takes a short position in the futures to lock in the price.
- Short hedges are used when you will be making delivery of an asset at a future date (e.g. a farmer anticipating a harvest of wheat) and wish to minimize the risk of a drop in price.

Long Hedge

- One takes a long position in the futures to lock in the price.
- Long hedges are used when you must purchase an asset at a future date (e.g. a bakery with a demand for wheat) and wish to minimize the risk of a rise in price.

Hedging Example

You are a farmer and you will harvest 50,000 bushels of corn in three months. You want to hedge against a price decrease. Corn is quoted in cents per bushel at 5,000 bushels per contract. The futures price is $2.30 cents per bushel for a three-month contract and the spot price is $2.05 per bushel.

To hedge you will sell 10 corn futures contracts:

50,000 bushels ÷ 5,000 bushels per contract = 10 contracts

By taking a short position in 10 corn futures contracts, you are locked in the price of selling your 50,000 bushels of corn at $2.30 each in three month, regardless of the prevailing corn price at that time. Now, you can quit worrying about the price of the corn and get back to worrying about the weather that might adversely affect your harvest, i.e., quantity risk.

Speculating Example

You speculate that copper will go up in price, so you go long 10 copper contracts for delivery in three months. A contract is 25,000 pounds in cents per pound and is at $0.70 per pound or $17,500 per contract.

- If futures prices rise by 5 cents, you will gain 25,000 × .05 × 10 = $12,500.
- If prices decrease by 5 cents, your loss is 25,000 × -.05 × 10 = -$12,500.

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Swaps (Ref: Section 25.7)

In a swap, two counterparties agree to a contractual arrangement wherein they agree to exchange cash flows at periodic intervals.

There are two types of interest rate swaps:

- Single currency interest rate swap
  - "Plain vanilla" fixed-for-floating swaps are often just called interest rate swaps.
- Cross-Currency interest rate swap
  - This is often called a currency swap; fixed for fixed rate debt service in two (or more) currencies.

A swap bank is a generic term to describe a financial institution that facilitates swaps between counterparties. The swap bank can serve as either a broker or a dealer.

- As a broker, the swap bank matches counterparties but does not assume any of the risks of the swap.
- As a dealer, the swap bank stands ready to accept either side of a currency swap, and then later lay off their risk, or match it with a counterparty.

Currency Swap Example

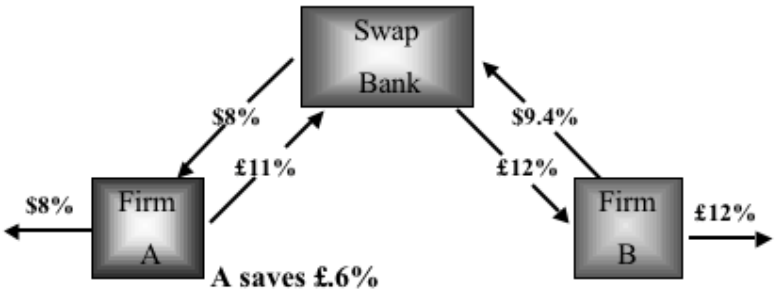
Suppose a U.S. MNC wants to finance a £10,000,000 expansion of a British plant.

- They could borrow dollars in the U.S. where they are well known and exchange the dollars for pounds.
  - This will expose them to exchange rate risk: financing a sterling project with dollars.
- They could borrow pounds in the international bond market, but pay a premium since they are not as well known abroad.
- If they can find a British MNC with a mirror-image financing need they may both benefit from a swap.
  - If the spot exchange rate is $S_0(\$/£) = \$1.60/£$, the U.S. firm needs to find a British firm wanting to finance dollar borrowing in the amount of $16,000,000.

Now, consider two firms A and B: firm A is a U.S.–based multinational and firm B is a U.K.–based multinational. Both firms wish to finance a project in each other's country of the same size. Their borrowing opportunities are given in the table below:

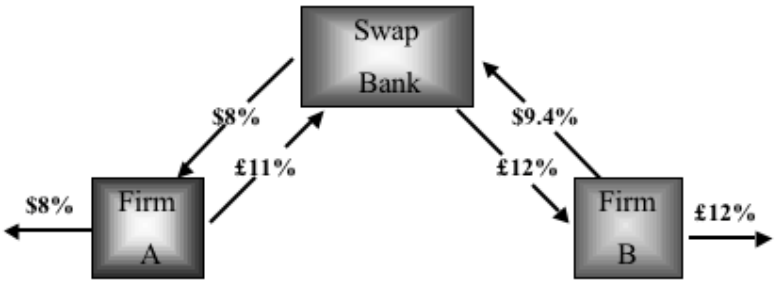
	U.S. Dollar Loan	British Pound Loan
Company A	8.0%	11.6%
Company B	10.0%	12.0%

A's net position is to borrow at £11%



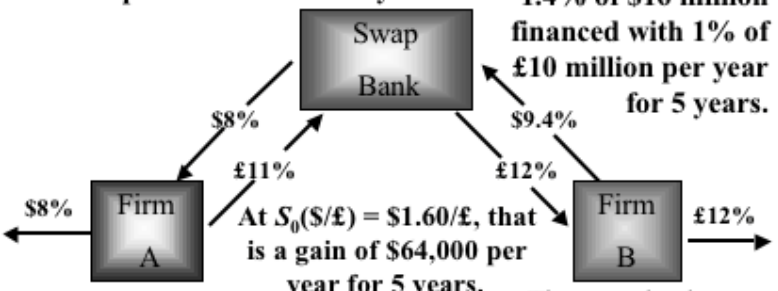
	$	£
Company A	8.0%	11.6%
Company B	10.0%	12.0%

B's net position is to borrow at $9.4%



	$	£
Company A	8.0%	11.6%
Company B	10.0%	12.0%

The swap bank makes money too:



	$	£
Company A	8.0%	11.6%
Company B	10.0%	12.0%

The swap bank faces exchange rate risk, but maybe they can lay it off (in another swap).

Note that the two multinational companies transfer their currency risks to the swap bank because each of them is borrowing in the loan denominated in the local currency where their project is operated. The swap bank has a constant annual net interest income of U.S. $224,000 (1.4% of U.S. $16M) and annual net interest payment of 100,000 Pounds (1% of 10M Pounds) during the life of the swap contract.

Risks of Currency Swaps

Exchange Rate Risk

- In the example of a currency swap given earlier, the swap bank would be worse off if the pound appreciated.

Credit Risk

- This is the major risk faced by a swap dealer–the risk that a counter party will default on its end of the swap.

Mismatch Risk

- It is hard to find a counterparty that wants to borrow the right amount of money for the right amount of time.

Sovereign Risk

- The risk that a country will impose exchange rate restrictions that will interfere with performance on the swap.

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Cross Exchange Rate & Triangle Arbitrage (Ref: Sections 31.1 & 31.2)

The cross exchange rate is the exchange rate between two countries' currencies that is determined in the foreign exchange market of a third country with the involvement of the third country's currency.

Suppose:

- $S_{\$/DM}(0) = .50$ (direct quote), that is, \$1 = 2 DM in the spot market
- $S_{¥/\$}(0) = 100$ (indirect quote), i.e. \$1 = ¥100

What must the DM/¥ cross rate be?

$$\text{since } \frac{DM}{¥} = \frac{\$}{¥} \times \frac{DM}{\$},$$

$$\frac{DM}{¥} = \frac{\$1}{¥100} \times \frac{DM2}{\$1} = \frac{DM1}{¥50}$$

$$\Rightarrow S_{DM/¥}(0) = .02 \text{ or } DM1 = ¥50$$

Suppose we observe these banks posting these exchange rates.

First calculate the implied cross rates to see if an arbitrage exists.

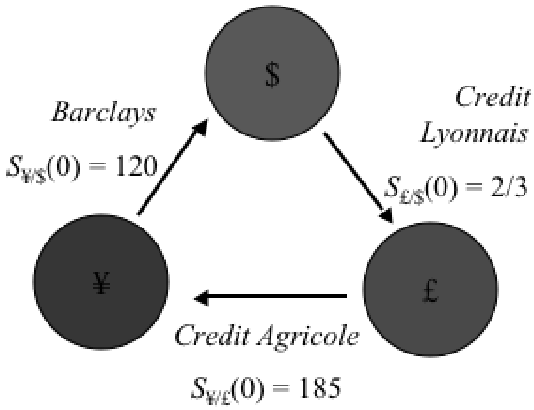
The implied S(¥/£) cross rate is S(¥/£) = $120*(2/3)^{-1} = 180$

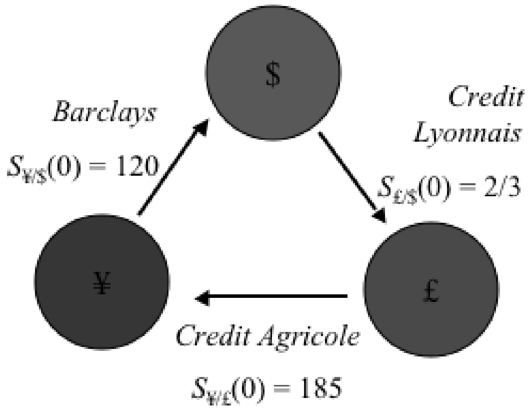
Credit Agricole has posted a quote of S (¥/£)=185 so there is an arbitrage opportunity.

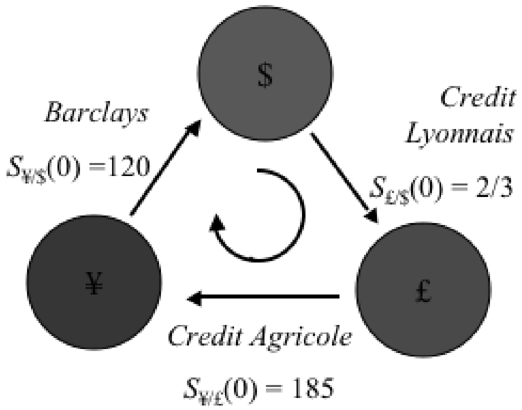
So, how can we make money?

As easy as 1 – 2 – 3:

1. Sell our $ for £.
2. Sell our £ for ¥.
3. Sell those ¥ for $.







Sell \$100,000 for £ at $S_{£/\$}(0) = 2/3$

- receive £66,667

Sell our £ 66,667 for ¥ at $S_{¥/£}(0) = 185$

- receive ¥12,333,395

Sell ¥ 12,333,395 for \$ at $S_{¥/\$}(0) = 120$

- receive \$102,778

Profit per round trip = \$ 102,778 − \$100,000 = \$2,778

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