

# AcF 304 Financial Markets



## Financial Derivatives

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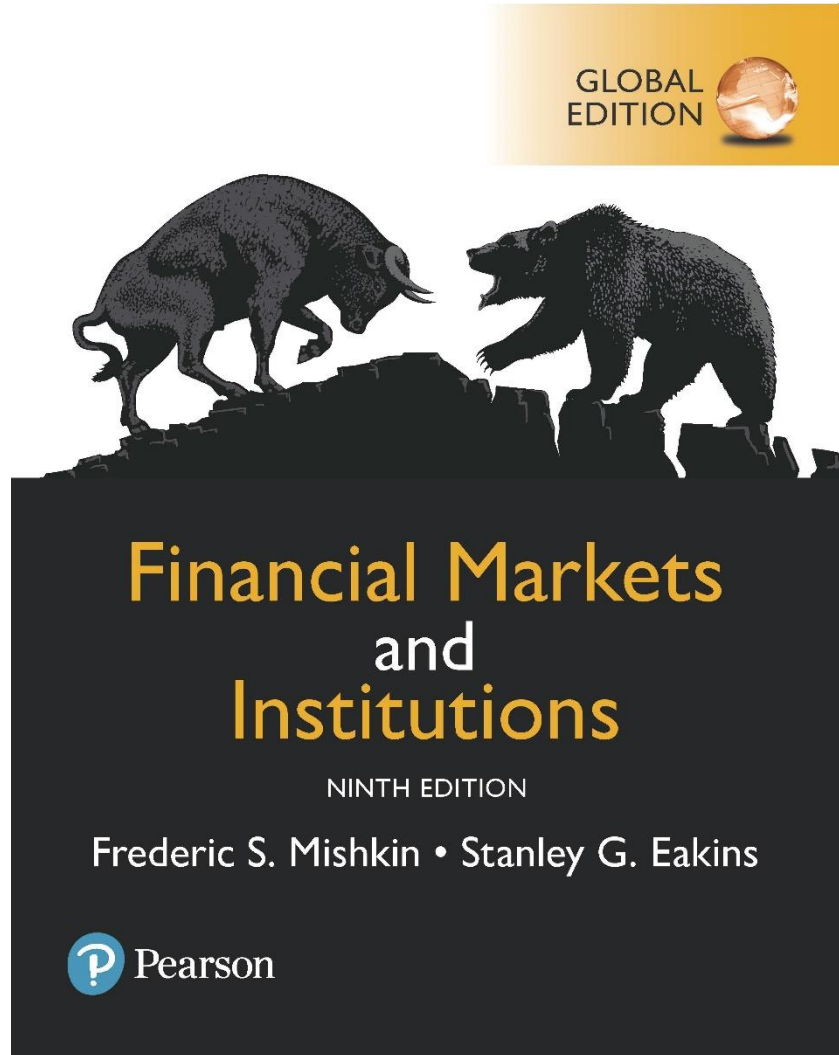
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# Financial Markets and Institutions

Ninth Edition, Global Edition



## Reading – Chapter 24 Hedging with Financial Derivatives

*We follow the chapter quite  
closely but do NOT include  
coverage of Options*

# Topic Preview (1 of 3)

- Starting in the 1970s, the world became a riskier place for financial institutions.
- Interest rate volatility increased, as did the stock and bond markets.
- Financial innovation helped with the development of derivatives.
- But if improperly used, derivatives can dramatically increase the risk institutions face.

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# Topic Preview (2 of 3)

- In this topic, we look at the most important derivatives that managers of financial institution use to manage risk. We examine how the markets for these derivatives work and how the products are used by financial managers to reduce risk. Topics include:
  - Hedging
  - Forward Markets
  - Financial Futures Markets

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# Topic Preview (3 of 3)

- Stock Index Futures
- Interest-Rate Swaps
- Credit Derivatives/Credit Default Swaps

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# Hedging (1 of 2)

- Hedging involves engaging in a financial transaction that reduces or eliminates risk.
- Definitions
  - **long position:** when a financial institution has bought an asset, it is said to have taken a long position
  - **short position:** if it has sold an asset that it has agreed to deliver to another party at a future date, it is said to have taken a short position i.e. it sold the asset to a counterparty that it does not at present own
  - **no position** – a trader says he is ‘flat’

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# Hedging (2 of 2)

- **Basic Principle of Hedging:** Hedging risk involves engaging in a financial transaction that offsets a long position by taking an additional short position, or offsets a short position by taking an additional long position.
  - i.e. if a financial institution has bought a security and has therefore taken a long position, it conducts a hedge by contracting to sell that security (take a short position) at some future date.
  - Alternatively, if it has taken a short position by selling a security that it needs to deliver at a future date, then it conducts a hedge by contracting to buy that security (take a long position) at some future date.
- We will examine how this is specifically accomplished in different financial markets.

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# Forward Markets

- **Forward contracts** are agreements by two parties to engage in a financial transaction at a future (forward) point in time. Although the contract can be written however the parties want, the contract usually includes:
  - The exact assets to be delivered by one party, including the location of delivery
  - The price paid for the assets by the other party
  - The date when the assets and cash will be exchanged

*e.g. FX*

*I sell you 10 MM USD v JPY @ USD/JPY 120.40 for delivery in 3 months time*

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# The Practicing Manager: Hedging Interest Rate Risk with Forwards

- First National Bank owns \$5 million of T-bonds that mature in 2037. Because these are long-term bonds, you are exposed to interest-rate risk. How do you hedge this risk?
- Enter into a forward contract with Rock Solid Insurance company, where Rock Solid agrees to buy the bonds for \$5m.

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# Forward Markets

- An Example of an Interest-Rate Forward Contract
  - First National Bank agrees to deliver **\$5 million in face value of 6% Treasury bonds maturing in 2037\*** at a price that yields the same interest rate as today's price
  - Rock Solid Insurance Company agrees to pay \$5 million for the bonds
  - FNB and Rock Solid agree to complete the transaction one year from today at the FNB headquarters in town\*\*

*Note:*

*\*Treasury 6% 2037 or 6s of '37*

- *Long position: Rock Solid      Short position: First National Bank*

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# The Practicing Manager: Hedging Interest Rate Risk with Forwards

- First National Bank is hedged against interest-rate increases
- Rock Solid, on the other hand, has protected itself against rate declines.
- Both parties can gain or lose, since we don't know which way rates will actually go in one year. But both are better off (removing uncertainty). Good example in theory!

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# Forward Markets

- **Long Position**

- Agree to buy securities at future date
- Hedges by locking in future interest rates /yields.
- Eliminates/Reduces risk of yields coming down/prices going up in the future.

- **Short Position**

- Agree to sell securities at future date
- Hedges by locking in future interest rates /yields.
- Eliminates/Reduces risk of yields going up/prices going down in the future

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# Forward Markets

- **Pros**

1. Flexible: they can be as flexible as the parties involved want them to be

- **Cons**

1. Lack of liquidity: hard to find a counterparty and thin or non-existent secondary market
2. Subject to default risk—requires information to screen good from bad risk i.e. adverse selection

*Conclusion: Forwards of limited use in debt markets: Much more common in FX!*

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# Financial Futures Markets

- **Financial futures contracts** are similar to forward contracts in that they are an agreement by two parties to engage in a financial transaction at a future point in time. However, they differ from forward contracts in several significant ways.

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# Financial Futures Markets

- Financial Futures Contract
  - Specifies delivery of type of security at future date
  - If rates/yields increase, long contract has loss, short contract has profit
  - Arbitrage elimination: at expiration date, price of contract = price of the underlying asset delivered (Page 619 FM&I)
  - Hedging similar to forwards: *micro* versus *macro* hedge
- Traded on Exchanges
  - Global competition regulated by CFTC

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# Example: Hedging Interest Rate Risk Revisited

- A manager has a long position in Treasury bonds. She wishes to hedge against interest rate increases, and uses T-bond futures to do this:
  - Her portfolio is worth \$5,000,000
  - Futures contracts have an underlying value of \$100,000, so she must **short** 50 contracts.

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# Example: Hedging Interest Rate Risk

- As interest rates increase over the next 12 months, the value of the bond portfolio drops by almost \$1,000,000.
- Losses in the spot T-bond market are offset by gains in the T-bond futures market.
- You can see all of the details of this example in the book, on Page 621.

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# Financial Futures Markets

- The previous example is a **micro** hedge—hedging the value of a specific asset. **Macro** hedges involve hedging, for example, the entire value of a portfolio.

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# Financial Futures Markets

- In the U.S., futures are traded on the Chicago Board of Trade and the Chicago Mercantile Exchange in Chicago, the NY Futures Exchange, and others.
- They are regulated by the Commodity Futures Trading Commission.

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# Financial Futures

The prices for financial futures contracts for debt instruments are published daily in newspapers and on Internet sites. A typical entry, like the following one for the Chicago Board of Trade's \$100,000 Treasury Bonds contract on June 23, 2019, would have the following information:

	Open	High	Low	Settle	Change	Open Interest
Sept.	131.09	131.09	130.24	130.26	-0.17	2,771,629
Dec.	130.235	130.235	130.01	130.02	-0.19	3,554,632

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# Financial Futures Markets

- The U.S. exchanges dominated the market for years. However, this isn't true anymore.
- The London Int'l Financial Futures Exchange trades Eurodollar futures (*LIFFE now known as EURONEXT*)
- The Tokyo Stock Exchange trades Euroyen and gov't bond futures
- Several others as well, as seen next.

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**Table 24.1** Widely Traded Financial Futures Contracts  
(1 of 2)

Type of Contract	Contract Size	Exchange	Open Interest (May 2019)
<b>Interest-Rate Contracts</b>			
Treasury bonds (30 yr.)	\$100,000	CBOT	564,537
Treasury notes (10 yr.)	\$100,000	CBOT	2,629,971
Five-year Treasury notes	\$100,000	CBOT	2,556,335
Two-year Treasury notes	\$200,000	CBOT	1,007,329
Fed funds	\$5 million	CBOT	1,008,414
Eurodollar	\$1 million	CME	10,816,515

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**Table 24.1** Widely Traded Financial Futures Contracts  
(2 of 2)

Type of Contract	Contract Size	Exchange	Open Interest (May 2016)
<b>Stock Index Contracts</b>			
Standard & Poor's 500 Index	\$250 x index	CME	83,115
<b>Currency Contracts</b>			
Yen	¥12,500,000	CME	156,605
Euro	€ 125,000	CME	356,777
Canadian dollar	C\$100,000	CME	126,537
British pound	£62,500	CME	243,778
Swiss franc	SF 125,000	CME	57,178
Mexican peso	MXN 500,000	CME	143,577

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# Trading on a Futures Exchange... 'open out-cry'



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# Trading on a Futures Exchange



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# Financial Futures Markets

- Success of Futures Over Forwards
  1. Standardized contract → futures are more liquid: the quantities delivered and the delivery dates of futures contracts are standardized, making it more likely that different parties can be matched in the futures market, thereby increasing the liquidity of the market.
  2. Delivery of range of securities reduces the chance that a trader can corner the market
  3. Mark to market daily, margin requirement: avoids default risk
  4. Don't have to deliver: cash netting of positions
  5. Default risk is with Clearing House not counterparty

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# Hedging FX Risk

- Example: A manufacturer expects to be paid 10 million euros in two months for the sale of equipment in Europe. Currently, 1 euro = \$1, and the manufacturer would like to lock-in that exchange rate.

One option is to doing a FX forward trade.

- Trade date today
- Value date two months
- Sell EUR *BUY* USD

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# Hedging FX Risk

- Another option = the manufacturer can use the FX futures market to accomplish this:
  1. The manufacturer sells 10 million euros of futures contracts. Assuming a contract is 125,000 euros and a price of \$1 per Euro, the manufacturer takes as **short** position in 80 contracts.
  2. The exchange will require the manufacturer to deposit cash into a margin account. For example, the exchange may require \$2,000 per contract, or \$160,000.

*Note: Currently, 1 Euro = \$1*

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# Hedging FX Risk

3. As the exchange rate fluctuates during the two months, the value of the margin account will fluctuate. If the value in the margin account falls too low, additional funds may be required. This is how the market is **marked to market**. If additional funds are not deposited when required, the position will be closed by the exchange.

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# Hedging FX Risk

4. Assume that actual exchange rate is 1 euro = \$0.96 at the end of the two months. The manufacturer receives the 10 million euros and exchanges them in the **spot market** for \$9,600,000.
5. The manufacturer also closes the margin account, which has \$400,000 for profit in it plus any margin requirement.
6. In the end, the manufacturer has the \$10,000,000 desired from the sale.

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# Hedging FX Risk

Of course, the exchange rate could have gone the other way. For example, if the actual exchange rate is 1 euro = \$1.04 at the end of the two months, the manufacturer will exchange the 10 million euros for \$10,400,000. At the same time, losses in futures market amount to \$400,000, netting the same \$10,000,000. Just as happy? Probably not. Even though the hedge worked exactly as needed.

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# Stock Index Futures

- Financial institution managers, particularly those that manage mutual funds, pension funds, and insurance companies, also need to assess their **stock market risk**, the risk that occurs due to fluctuations in equity market prices.
- One instrument to hedge this risk is **stock index futures**.

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# Stock Index Future

- **Stock index futures** are a contract to buy or sell a particular stock index, starting at a given level. Contracts exist for most major indexes, including the S&P 500, Dow Jones Industrials, Russell 2000, etc.
- The “best” stock futures contract to use is generally determined by the highest correlation between returns to a portfolio and returns to a particular index.

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# Stock Index Futures

- The prices for stock index futures contracts are published daily in newspapers and on Internet sites such as [finance.yahoo.com](http://finance.yahoo.com). A typical entry, like the following one for the Chicago Mercantile Exchange's S&P 500 Index contract on June 23, 2019, would have the following information:

	<b>Open</b>	<b>High</b>	<b>Low</b>	<b>Settle</b>	<b>Change</b>	<b>Open Interest</b>
Sept.	2083	2112.508	2083	2105.8	+29.1	64,616

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# Hedging with Stock Index Futures (1 of 4)

- Example: Rock Solid has a stock portfolio worth \$100 million, which tracks closely with the S&P 500. The portfolio manager fears that a decline is coming and wants to completely hedge the value of the portfolio over the next year. If the S&P is currently at 1,000, how is this accomplished?

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# Hedging with Stock Index Futures (2 of 4)

- Value of the S&P 500 Futures Contract =  $250 \times \text{index}$   
= currently  $250 \times 1,000 = \$250,000$
- To hedge \$100 million of stocks that moves 1 for 1 (perfect correlation) with S&P currently selling at 1000, you would:
  - sell \$100 million of index futures = 400 contracts

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# Hedging with Stock Index Futures (3 of 4)

- Suppose after the year, the S&P 500 is at 900 and the portfolio is worth \$90 million.
  - futures position is up \$10 million (*sold 400 contracts*)
- If instead, the S&P 500 is at 1100 and the portfolio is worth \$110 million.
  - futures position is down \$10 million
- Either way, net position is \$100 million

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# Hedging with Stock Index Futures (4 of 4)

- Note that the portfolio is protected from **downside** risk, the risk that the value in the portfolio will fall. However, to accomplish this, the manager has also eliminated any **upside** potential.
- If we wanted a hedging strategy that protects against downside risk, but does not sacrifice the upside we would use Options (*outside module scope*).

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