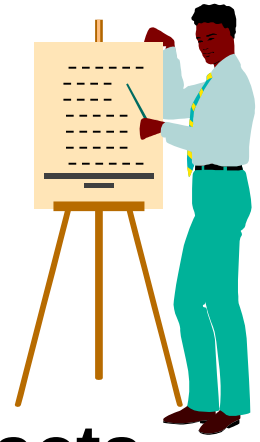
Topic 5

Currency Derivatives

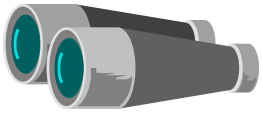
Dr. Jamsher Radjabov. TSUE-2018

Chapter Objectives



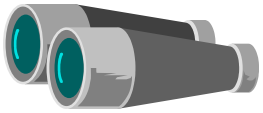
- To explain how forward contracts are used for hedging based on anticipated exchange rate movements; and
- To explain how currency futures contracts and currency options contracts are used for hedging or speculation based on anticipated exchange rate movements.

Forward Market



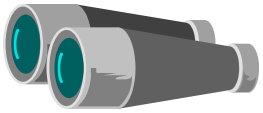
- **The forward market facilitates the trading of forward contracts on currencies.**
- **A *forward contract* is an agreement between a corporation and a commercial bank to exchange a specified amount of a currency at a specified exchange rate (called the *forward rate*) on a specified date in the future.**

Forward Market



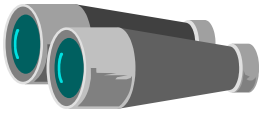
- When MNCs anticipate future need or future receipt of a foreign currency, they can set up forward contracts to lock in the exchange rate.
- Forward contracts are often valued at $1 million or more, and are not normally used by consumers or small firms.

Forward Market



- **As with the case of spot rates, there is a bid/ask spread on forward rates.**
- **Forward rates may also contain a premium or discount.**
  - If the forward rate exceeds the existing spot rate, it contains a *premium*.
  - If the forward rate is less than the existing spot rate, it contains a *discount*.

Forward Market



- **annualized forward premium/discount**

$$= \frac{\text{forward rate} - \text{spot rate}}{\text{spot rate}} \times \frac{360}{n}$$

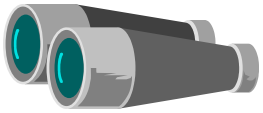
where *n* is the number of days to maturity

- **Example: Suppose £ spot rate = $1.681,**
  90-day £ forward rate = $1.677.

$$\frac{\$1.677 - \$1.681}{\$1.681} \times \frac{360}{90} = -0.95\%$$

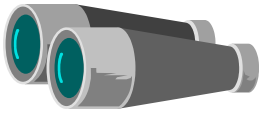
So, forward discount = 0.95%

Forward Market



- **The forward premium/discount reflects the difference between the home interest rate and the foreign interest rate, so as to prevent arbitrage.**

Forward Market



- **A *non-deliverable forward contract (NDF)* is a forward contract whereby there is no actual exchange of currencies. Instead, a net payment is made by one party to the other based on the contracted rate and the market rate on the day of settlement.**
- **Although NDFs do not involve actual delivery, they can effectively hedge expected foreign currency cash flows.**

Online Application

- **Forward rates can be found online at** http://www.bmo.com/economic/regular/fxrates.html**.**

Currency Futures Market

- ***Currency futures contracts*** **specify a standard volume of a particular currency to be exchanged on a specific settlement date, typically the third Wednesdays in March, June, September, and December.**
- **They are used by MNCs to hedge their currency positions, and by speculators who hope to capitalize on their expectations of exchange rate movements.**

Currency Futures Market

- **The contracts can be traded by firms or individuals through brokers on the trading floor of an exchange (e.g. Chicago Mercantile Exchange), on automated trading systems (e.g. GLOBEX), or over-the-counter.**
- **Participants in the currency futures market need to establish and maintain a margin when they take a position.**

Currency Futures Market

	Forward Markets	*Futures Markets*
Contract size	Customized.	Standardized.
Delivery date	Customized.	Standardized.
Participants	Banks, brokers, MNCs. Public speculation not encouraged.	Banks, brokers, MNCs. Qualified public speculation encouraged.
Security deposit	Compensating bank balances or credit lines needed.	Small security deposit required.

Currency Futures Market

	Forward Markets	*Futures Markets*
Clearing operation	Handled by individual banks & brokers.	Handled by exchange clearinghouse. Daily settlements to market prices.
Marketplace	Worldwide telephone network.	Central exchange floor with global communications.

Currency Futures Market

	Forward Markets	*Futures Markets*
Regulation	Self-regulating.	Commodity Futures Trading Commission, National Futures Association.
Liquidation	Mostly settled by actual delivery.	Mostly settled by offset.
Transaction Costs	Bank's bid/ask spread.	Negotiated brokerage fees.

Currency Futures Market

- **Normally, the price of a currency futures contract is similar to the forward rate for a given currency and settlement date, but differs from the spot rate when the interest rates on the two currencies differ.**
- **These relationships are enforced by the potential arbitrage activities that would occur otherwise.**

Currency Futures Market

- **Currency futures contracts have no credit risk since they are guaranteed by the exchange clearinghouse.**
- **To minimize its risk in such a guarantee, the exchange imposes margin requirements to cover fluctuations in the value of the contracts.**

Currency Futures Market

- **Speculators often sell currency futures when they expect the underlying currency to depreciate, and vice versa.**

April 4 → **June 17**

1. **Contract to sell 500,000 pesos @ $.09/peso ($45,000) on June 17.**

2. **Buy 500,000 pesos @ $.08/peso ($40,000) from the spot market.**
3. **Sell the pesos to fulfill contract. Gain $5,000.**

Currency Futures Market

- **Currency futures may be purchased by MNCs to hedge foreign currency payables, or sold to hedge receivables.**

April 4 → **June 17**

1. **Expect to receive 500,000 pesos. Contract to sell 500,000 pesos @ $.09/peso on June 17.**

2. **Receive 500,000 pesos as expected.**

3. **Sell the pesos at the locked-in rate.**

Currency Futures Market

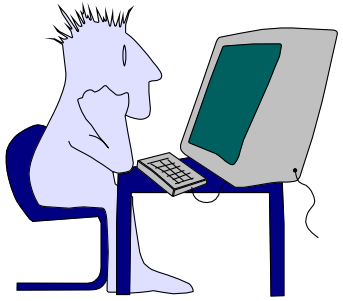
- **Holders of futures contracts can close out their positions by selling similar futures contracts. Sellers may also close out their positions by purchasing similar contracts.**

January 10	February 15	March 19
1. Contract to buy A$100,000 @ $.53/A$ ($53,000) on March 19.	2. Contract to sell A$100,000 @ $.50/A$ ($50,000) on March 19.	3. Incurs $3000 loss from offsetting positions in futures contracts.

Currency Futures Market

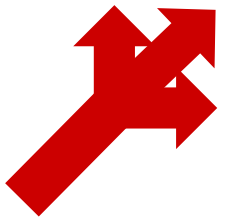
- **Most currency futures contracts are closed out before their settlement dates.**
- **Brokers who fulfill orders to buy or sell futures contracts earn a transaction or brokerage fee in the form of the bid/ask spread.**

Online Application



- **Visit the Commodity Futures Trading Commission at** http://www.cftc.gov/**.**
- **Also check out**
  - the National Futures Association at http://www.nfa.futures.org, and
  - the Futures Industry Association at http://futuresindustry.org/.

Currency Options Market



- A currency option is another type of contract that can be purchased or sold by speculators and firms.
- The standard options that are traded on an exchange through brokers are guaranteed, but require margin maintenance.
- U.S. option exchanges (e.g. Chicago Board Options Exchange) are regulated by the Securities and Exchange Commission.

Currency Options Market

- In addition to the exchanges, there is an over-the-counter market where commercial banks and brokerage firms offer customized currency options.
- There are no credit guarantees for these OTC options, so some form of collateral may be required.
- Currency options are classified as either calls or puts.

Currency Call Options

- A ***currency call option*** grants the holder the right to buy a specific currency at a specific price (called the ***exercise*** or ***strike*** price) within a specific period of time.
- A call option is
  - ***in the money*** if spot rate > strike price,
  - ***at the money*** if spot rate = strike price,
  - ***out of the money*** if spot rate < strike price.

Currency Call Options

- **Option owners can sell or exercise their options. They can also choose to let their options expire. At most, they will lose the premiums they paid for their options.**
- **Call option premiums will be higher when:**
  - (spot price – strike price) is larger;
  - the time to expiration date is longer; and
  - the variability of the currency is greater.

Currency Call Options

- **Firms with open positions in foreign currencies may use currency call options to cover those positions.**
- **They may purchase currency call options**
  - to hedge future payables;
  - to hedge potential expenses when bidding on projects; and
  - to hedge potential costs when attempting to acquire other firms.

Currency Call Options

- **Speculators who expect a foreign currency to appreciate can purchase call options on that currency.**
  - Profit = selling price – buying (strike) price – option premium
- **They may also sell (write) call options on a currency that they expect to depreciate.**
  - Profit = option premium – buying price + selling (strike) price

Currency Call Options

- **The purchaser of a call option will break even when**

  selling price = buying (strike) price
  + option premium

- **The seller (writer) of a call option will break even when**

  buying price = selling (strike) price
  + option premium

Currency Put Options

- A ***currency put option*** grants the holder the right to sell a specific currency at a specific price (the ***strike*** price) within a specific period of time.
- A put option is
  - ***in the money*** if spot rate < strike price,
  - ***at the money*** if spot rate = strike price,
  - ***out of the money*** if spot rate > strike price.

Currency Put Options

- **Put option premiums will be higher when:**
  - (strike price – spot rate) is larger;
  - the time to expiration date is longer; and
  - the variability of the currency is greater.
- **Corporations with open foreign currency positions may use currency put options to cover their positions.**
  - For example, firms may purchase put options to hedge future receivables.

Currency Put Options

- **Speculators who expect a foreign currency to depreciate can purchase put options on that currency.**
  - Profit = selling (strike) price – buying price – option premium
- **They may also sell (write) put options on a currency that they expect to appreciate.**
  - Profit = option premium + selling price – buying (strike) price

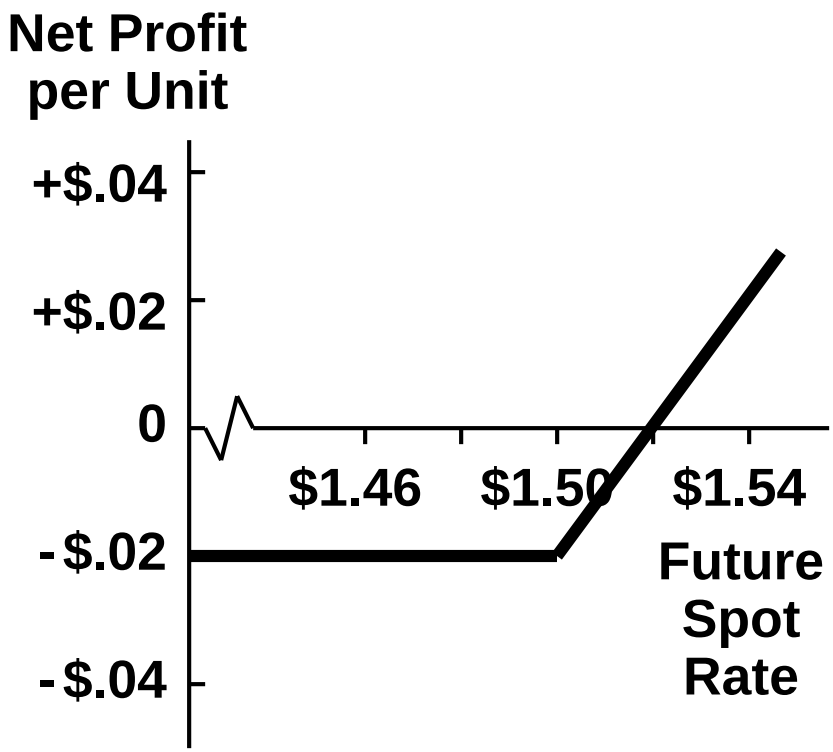
Currency Put Options

- **One possible speculative strategy for volatile currencies is to purchase both a put option and a call option at the same exercise price. This is called a *straddle*.**
- **By purchasing both options, the speculator may gain if the currency moves substantially in either direction, or if it moves in one direction followed by the other.**

Contingency Graphs for Currency Options

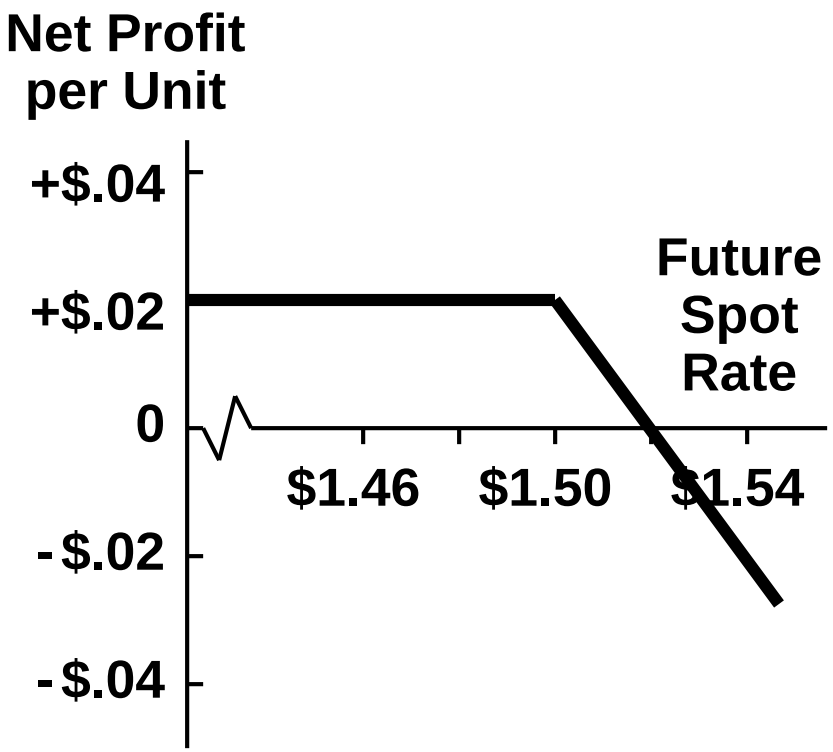
For Buyer of £ Call Option

Strike price = $1.50
Premium = $ .02



For Seller of £ Call Option

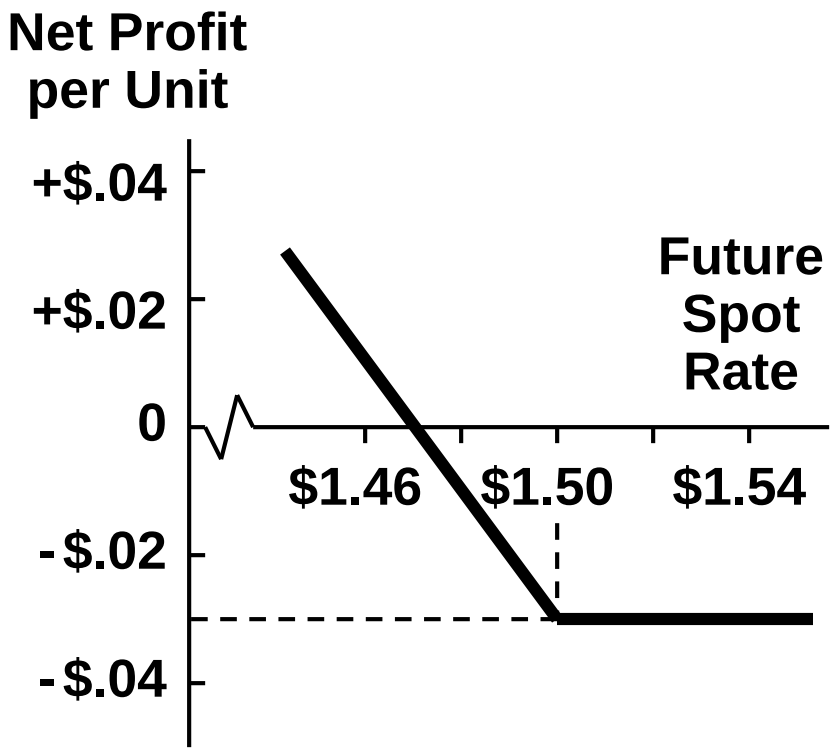
Strike price = $1.50
Premium = $ .02



Contingency Graphs for Currency Options

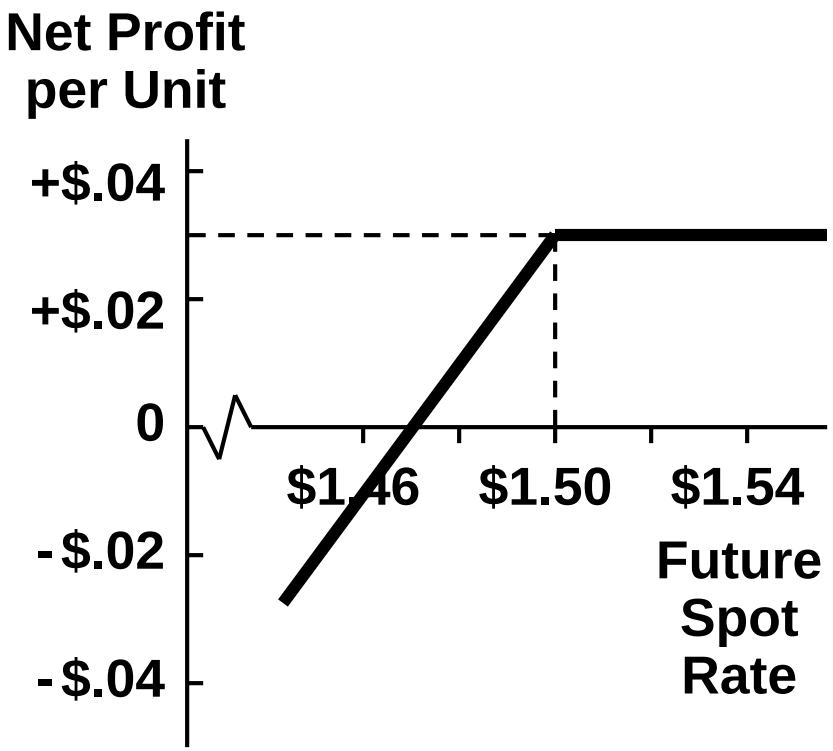
For Buyer of £ Put Option

Strike price = $1.50
Premium = $ .03

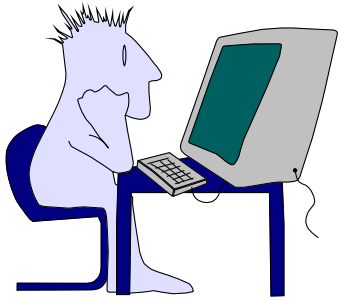


For Seller of £ Put Option

Strike price = $1.50
Premium = $ .03

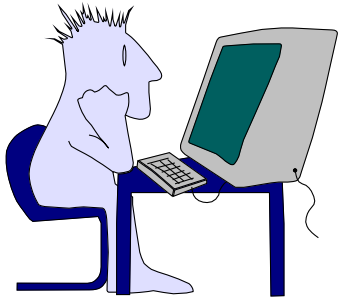


Online Application



- **The Chicago Mercantile Exchange provides current and historical futures and option prices at** http://www.cme.com/prices/index.cfm**.**
- **Also visit**
  - the Chicago Board Options Exchange at http://www.cboe.com, and
  - the London International Financial Futures and Options Exchange at www.liffe.com.

Online Application



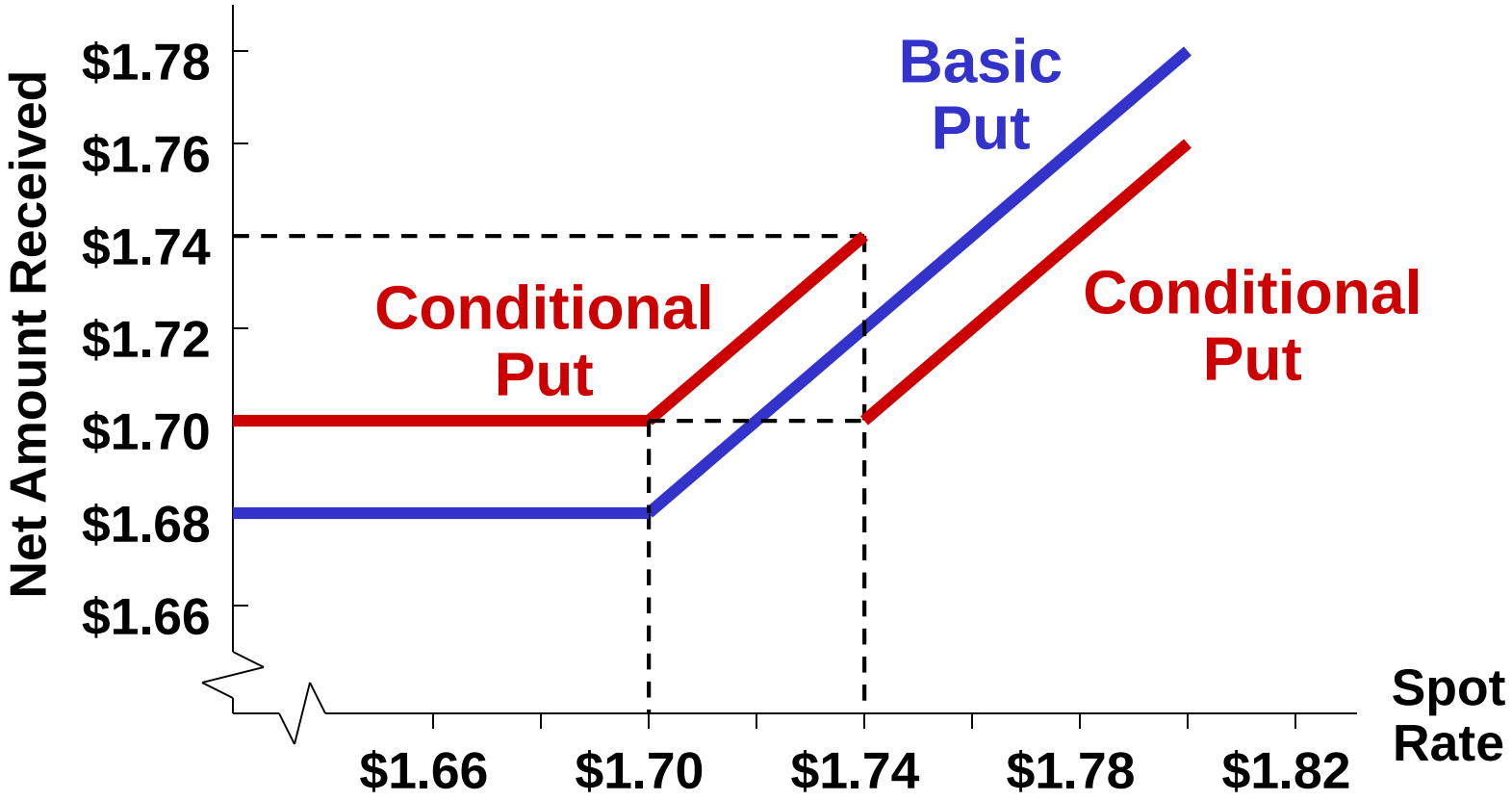
- **You may also want to check out**
  - the Options Industry Council at http://www.optionscentral.com/,
  - the Options Clearing Corporation at http://www.optionsclearing.com/, and
  - the Futures and Options Association at http://www.foa.co.uk/.

Conditional Currency Options

- **A currency option may be structured such that the premium is conditioned on the actual currency movement over the period of concern.**
- **Suppose a conditional put option on £ has an exercise price of $1.70, and a *trigger* of $1.74. The premium will have to be paid only if the £'s value exceeds the trigger value.**

Conditional Currency Options

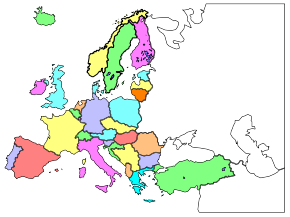
Option Type	Exercise Price	Trigger	Premium
basic put	$1.70	-	$0.02
conditional put	$1.70	$1.74	$0.04



Conditional Currency Options

- **Similarly, a conditional call option on £ may specify an exercise price of $1.70, and a trigger of $1.67. The premium will have to be paid only if the £'s value falls below the trigger value.**
- **In both cases, the payment of the premium is avoided conditionally at the cost of a higher premium.**

European Currency Options



- **European-style currency options are similar to American-style options except that they can only be exercised on the expiration date.**
- **For firms that purchase options to hedge future cash flows, this loss in terms of flexibility is probably not an issue. Hence, if their premiums are lower, European-style currency options may be preferred.**

Efficiency of Currency Futures and Options

- If foreign exchange markets are efficient, speculation in the currency futures and options markets should not consistently generate abnormally large profits.
- A speculative strategy requires the speculator to incur risk. On the other hand, corporations use the futures and options markets to reduce their exposure to fluctuating exchange rates.

Impact of Currency Derivatives on an MNC's Value

Currency Futures
Currency Options

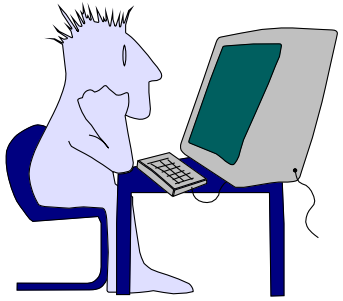
$$\text{Value} = \sum_{t=1}^{n} \left\{ \frac{\sum_{j=1}^{m} \left[E\left(CF_{j,t}\right) \times E\left(ER_{j,t}\right) \right]}{(1+k)^t} \right\}$$

$E(CF_{j,t})$ = expected cash flows in currency *j* to be received by the U.S. parent at the end of period *t*

$E(ER_{j,t})$ = expected exchange rate at which currency *j* can be converted to dollars at the end of period *t*

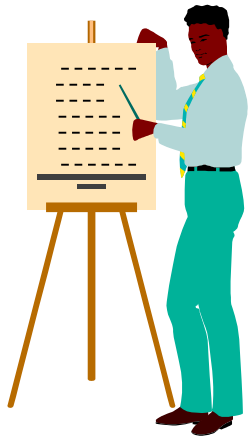
k **= weighted average cost of capital of the parent**

Online Application



- **Check out the Futures magazine website at http://www.futuresmag.com/ for a discussion of the various aspects of derivatives trading.**
- **Also check out http://www.ino.com/.**

Chapter Review



- **Forward Market**
  - How MNCs Use Forward Contracts
  - Non-Deliverable Forward Contracts

Chapter Review

- **Currency Futures Market**
  - Contract Specifications
  - Comparison of Currency Futures and Forward Contracts
  - Pricing Currency Futures
  - Credit Risk of Currency Futures Contracts
  - Speculation with Currency Futures
  - How Firms Use Currency Futures
  - Closing Out A Futures Position
  - Transaction Costs of Currency Futures

Chapter Review

- **Currency Options Market**
- **Currency Call Options**
  - Factors Affecting Currency Call Option Premiums
  - How Firms Use Currency Call Options
  - Speculating with Currency Call Options

Chapter Review

- **Currency Put Options**
  - Factors Affecting Currency Put Option Premiums
  - Hedging with Currency Put Options
  - Speculating with Currency Put Options
- **Contingency Graphs for Currency Options**
  - Contingency Graphs for the Buyers and Sellers of Call and Put Options

Chapter Review

- Conditional Currency Options
- European Currency Options
- Efficiency of Currency Futures and Options
- How the Use of Currency Futures and Options Affects an MNC's Value