

# Financial Markets

Advanced Corporate Finance

Spring 2008

Stephen Sapp

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## What are Financial Markets?

- A *financial market* is a mechanism that allows people to buy and sell financial securities, commodities, and other fungible financial assets with low transaction costs.
  - Markets work by bringing interested buyers and sellers together.
- An economy which relies primarily on the interactions between buyers and sellers to allocate resources is known as a *market economy*. (what is a planned economy?)
- Financial markets facilitate:
  - The raising of capital (capital markets);
  - The transfer of risk (derivatives markets); and
  - Trade (capital, commodity and currency markets).

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## Major Financial Markets

- Stock markets
  - provide financing to firms through the issuing of shares or common stock, and enable their subsequent trading.
- Bond markets
  - provide financing to firms through the issuing of bonds, and enable their subsequent trading.
- Money markets
  - provide short term debt financing and investment.
- Foreign exchange markets
  - facilitate the trading of currencies to facilitate global trade.
- Commodity markets
- Derivatives markets (futures, options, swaps etc.)

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## Alternative Financial Markets

- **Islamic Finance**
  - a system of banking or banking activities that are consistent with Islamic law (Sharia) principles and guided by Islamic economics. In particular, Islamic law prohibits usury, the collection and payment of interest.
- **Microfinance**
  - loans, savings, and other basic financial services to small investors. The financial services of microfinance usually involve small amounts of money – small loans, small savings. The accounts are too small for banks and regular financial institutions.

## Uses of Financial Markets

- **Capital markets (stock, bond, money and many alternative markets)**
  - Suppliers and demanders of capital to come together to provide financing.
    - Will be discussed in detail later in the course
- **Derivatives markets (futures, options, swaps etc.)**
  - Derivative products are financial products which are used to control risk or, in some cases, to exploit risk. (Why called derivatives?)
- **Foreign exchange markets**
  - Allows for the conversion of currencies to facilitate trade or, increasingly, to speculate.
- We will start with the foreign exchange market.

## What is the Role of the FX Market?

- **Transfer of Purchasing Power**
  - Example: A British firm buys US equipment; this will involve a trade of pounds for U.S. dollars.
- **Hedging of Foreign Exchange Risk**
  - There are contracts that allow market participants to convert currencies at known rates on a future date.
- **Participants** – mainly banks, importers, and exporters. Recently speculators, hedge funds, and other large institutional investors have also entered.
- **Four major segments of the FX market:** spot, forward (futures), options and swaps.

## Factors Affecting the Exchange Rate

- The exchange rate is determined by supply and demand:
- If consumers want Canadian products they will buy dollars. This increases the demand for dollars and thus the Canadian dollar will appreciate (current account vs capital account?)
- If investors are concerned about the Canadian political situation, for example, they will sell their Canadian dollars. This increases the supply of Canadian dollars and thus decreases its value.
- What drives the apparent relationship between the price of oil and the Canadian Dollar?
- What role is played by the current account, capital account in the value of the Canadian Dollar? US Dollar?

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## Factors Affecting the Exchange Rate

- The role of economic forces such as: inflation and interest rates?
  - If inflation is higher in Canada than elsewhere, the value of the Canadian dollar will decrease faster than other currencies.
  - If interest rates are higher (after adjusting for inflation) in Canada, investors may choose to invest in Canada increasing demand for the dollar.
- What do higher interest rates in Canada imply about investing in Canada?
- What is the “carry trade”?
- What is the role of Central Banks?

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## Factors Affecting the Exchange Rate

- In the long-run, the exchange rate should equate the value of goods, services and financial assets around the world.
- For goods: the cost of a pound of oranges should be the same in Detroit and Windsor.
  - If prices were lower in Detroit, everyone would buy in the US and the US dollar would appreciate until the prices were the same.
- For financial assets: the value of borrowing or lending in Canada and the US should be the same in the long-run.
  - If interest rates are higher in the US, investors will invest in the US and borrow in Canada *unless* investors view the US as riskier (i.e., expect the US dollar to depreciate relative to the Canadian dollar)
- What is this called? What does it mean in the short-run?

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## Current Events

- What is happening to the value of the Chinese currency and why?
  - “The yuan rose past 7 to the dollar for the first time since China scrapped its fixed-exchange rate in 2005” 04/10/2008
- What is happening to the value of the Icelandic Krona and why?
  - “Last week the Icelandic Krona touched a record low against the Euro, tumbling another 6.2% ... it has fallen almost 25% this year and 17.2% this month” 03/23/2008

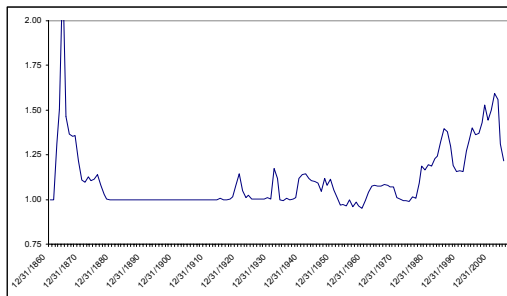
## History of the Foreign Exchange Market

- Following WW II, the world's major currencies were fixed relative to the U.S. dollar (Bretton Woods). Changes were rare and the result of sustained imbalances in global capital flows.
- Since 1973 these currencies have been floating and attempts to explain and predict their movements have been largely unsuccessful.
- Currently the foreign exchange (FX) market is the largest financial market in the world operating 24 hours a day 7 days a week (mainly in Tokyo, London and NY):
  - Avg trading volume in 2007 was \$4.0 trillion US dollars/day
    - 33% in the spot market,
    - 61% in the forward and swap markets, and
    - 6% in options

## History of the Canadian Dollar

- Created for the Province of Canada in 1854 to facilitate trade. Set at a fixed exchange rate versus gold. This lasted until 1914, part way through World War I.
  - The government froze gold's convertibility and the ability to move it abroad.
- Re-instated the Gold Standard in 1926, but broke down in 1929.
- Bretton Woods “fixed” or “pegged” the value of major currencies against the U.S. dollar after World War II (in 1944).
- “Flexible” or “floating” exchange rate from 1950 until 1961. In 1961 reverted to a “fixed” exchange rate.
- “Floating” exchange rate since 1970 (other major currencies have been floating since 1972 and 1973).

## Canada – US dollar, 1860 to 2007



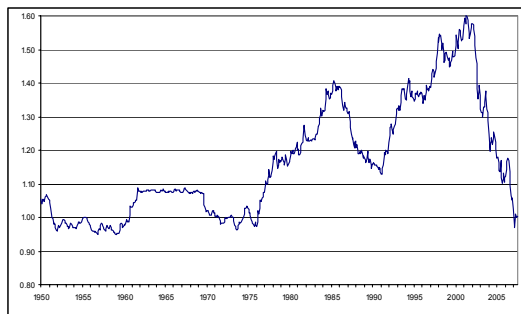
Source: GlobalFinData.com

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## Canada – US dollar, 1950 to present



Source: Bank of Canada

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## Location of FX Trading Activity

|                 | 2001    |           | 2004    |           | 2007    |           |
|-----------------|---------|-----------|---------|-----------|---------|-----------|
|                 | Amount  | Share (%) | Amount  | Share (%) | Amount  | Share (%) |
| United Kingdom  | \$504   | 31.1      | \$753   | 31.3      | \$1,359 | 34.1%     |
| United States   | \$254   | 15.7      | \$461   | 19.2      | \$664   | 16.6%     |
| Japan           | \$147   | 9.1       | \$199   | 8.3       | \$238   | 6.0%      |
| Singapore       | \$101   | 6.2       | \$125   | 5.2       | \$231   | 5.8%      |
| Germany         | \$88    | 5.4       | \$118   | 4.9       | \$99    | 2.5%      |
| Switzerland     | \$71    | 4.4       | \$79    | 3.3       | \$242   | 6.1%      |
| Hong Kong       | \$67    | 4.1       | \$102   | 4.2       | \$175   | 4.4%      |
| France          | \$48    | 3.0       | \$63    | 2.6       | \$120   | 3.0%      |
| Australia       | \$52    | 3.2       | \$81    | 3.4       | \$170   | 4.3%      |
| Netherlands     | \$30    | 1.9       | \$49    | 2.0       | \$24    | 0.6%      |
| Canada          | \$42    | 2.6       | \$54    | 2.2       | \$60    | 1.5%      |
| Italy           | \$17    | 1.0       | \$20    | 0.8       | \$36    | 0.9%      |
| Other countries | \$197   | 12.3      | \$302   | 12.6      | \$571   | 14.3%     |
| Total           | \$1,618 | 100.0     | \$2,406 | 100.0     | \$3,989 | 100.0     |

Source: Bank for International Settlements

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## Global FX Activity by Currency

|                     | 1989 | 1992 | 1995 | 1998 | 2001 | 2004 | 2007 |
|---------------------|------|------|------|------|------|------|------|
| US dollar           | 90.0 | 82.0 | 83.3 | 87.3 | 90.4 | 88.7 | 86.3 |
| Euro                | -    | -    | -    | -    | 37.6 | 37.2 | 37.0 |
| Deutsche Mark       | 27.0 | 39.6 | 36.1 | 30.1 | -    | -    | -    |
| French Franc        | 2.0  | 3.8  | 7.9  | 5.1  | -    | -    | -    |
| Other EU currencies | 4.0  | 11.8 | 15.7 | 17.3 | -    | -    | -    |
| Japanese Yen        | 27.0 | 23.4 | 24.1 | 20.2 | 22.7 | 20.3 | 16.5 |
| Pound Sterling      | 15.0 | 13.6 | 9.4  | 11.0 | 13.2 | 16.9 | 15.0 |
| Swiss Franc         | 10.0 | 8.4  | 7.3  | 7.1  | 6.1  | 6.1  | 6.8  |
| Canadian Dollar     | 1.0  | 3.3  | 3.4  | 3.6  | 4.5  | 5.5  | 4.2  |
| Australian Dollar   | 2.0  | 2.5  | 2.7  | 3.1  | 4.2  | 4.2  | 6.7  |

Note: these add to 200% because each foreign exchange transaction involves two currencies

Source: Bank for International Settlements

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## FX Terminology (cont'd)

- **American terms**
  - number of \$US *per unit of foreign currency*
  - e.g., \$US 0.8614 = \$CAD 1.00 or 0.8614 USD/CAD
- **European terms**
  - number of foreign currency units *per \$US*
  - e.g., \$CAD 1.1609 = \$US 1 or €0.8248 = \$US 1
- **Direct quote**
  - number of *home* currency units bought with one *foreign* currency unit (e.g. \$CAD 1.41 = 1EUR)

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## FX Terminology (cont'd)

- **Bid** – the price at which a *dealer* is willing to buy another currency.
- **Ask or Offer** – the price at which a *dealer* is willing to sell another currency.
  - The Bid is always smaller than the Ask. Banks make a profit from the spread between the rates at which they are willing to buy and sell (why is there a spread?).
  - The “rip-off rule” can be used to help identify the buying and selling price.
- The pound sterling is quoted at 1.4419-28 US\$/£
  - Banks are willing to buy a pound for \$1.4419 (bid)
  - Banks will only sell a pound for \$1.4428 (ask).
    - “buy low, sell high” with respect to pounds.

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## Direct Quotes and Cross Rates

- **Cross Rates** are exchange rates between two currencies neither of which is the US dollar (example EUR/GBP).
- Triangular arbitrage keeps these exchange rates in line with exchange rates quoted relative to the dollar.
- Example: Suppose that the pound sterling is \$1.9800-20 in New York and the Euro is \$0.9250-55 in Frankfurt. At the same time London banks are offering pounds sterling at Euro 2.1390-95 (€ / £).
  - What do these quotes mean with respect to the buying and selling of the different currencies?
  - Is there an arbitrage opportunity?

## Computing Cross Rates

$$\begin{aligned} 1/0.9250 &= 1.081 \text{ (E/$)} \\ 1/0.9255 &= 1.080 \text{ (E/$)} \end{aligned}$$

What is the implied Euro/Pound cross rate?

- We know: 1.9800-20 USD/GBP and 0.9250-55 USD/EUR
- Cross-rate Bid = How many Euros would you get if you sold a Pound? (the price the bank will pay you in Euros to buy a Pound)
  - You sell 1 pound to get dollars, convert these dollars to Euros.
- Bid = 1.9800USD/GBP, then convert the 1.98 USD you would have from the Pound you sold to Euros:  
$$1.98\text{USD} \times 1/0.9255 \text{ USD/EUR} = 2.1394 \text{ EUR for 1 GBP}$$
- Cross-rate Ask = How many Euro for you to buy a Pound?
  - Sell Euros to buy 1 Dollar, convert these to Pounds
- Ask =  $1/0.9250 \text{ USD/EUR} \times 1.9820 \text{ USD/GBP} = 2.1427 \text{ EUR/GBP}$

## Computing Cross Rates

- What if the quoted cross rate in London was: 2.1390-95 EUR/GBP; is there an arbitrage opportunity?
  - (Note: we calculated: 2.1394 EUR/GBP and 2.1427 EUR/GBP)
  - At what rate would we buy pounds in London?
  - At what rate would we sell pounds in Frankfurt/NY?
  - What happens if we sell pounds in London?
- What if the quoted prices in London were 2.1380-85 EUR/GBP?

## Currency Market Terminology

What are Eurodollars?

- U.S. dollar-denominated assets held in a bank *outside the US* (Note: this is different from the Euro, €).
  - The bank may be a foreign bank or the overseas branch of a US bank.
- This started in the 1950's during the Cold War.
  - The Soviet Union decided it would no longer hold its international US dollar reserves as deposits at the Federal Reserve Bank of New York. These reserves were channeled to Western Europe, mainly to London.
  - Being held outside of the US allows these funds to remain beyond the direct influence of the Fed and thus not at risk of being "frozen".
- This led to the creation of the Eurocurrency markets.

## Currency Market Terminology (cont'd)

What is the Eurocurrency market?

- The system of international banks which hold deposits or issue bonds/loans in any currency outside its domestic market (e.g., EuroCanadian dollars are Canadian dollars outside of Canada).
- It has thrived because it remains relatively free from government interference.
  - Low regulation and high competition.
  - Participants are usually sophisticated investors (i.e., banks, governments or large firms).
- LIBOR (London Interbank Offered Rate) is the interest rate on Eurocurrencies traded between banks in London.
  - Also FIBOR (Frankfurt), PIBOR (Paris), HKIBOR (Hong Kong) ...

## Types of Transactions

- Spot currency trading
  - A spot transaction involves payment of one currency and receipt of another in 2 business days (one business day for the North American currencies).
    - One day for back office paperwork and a second day because of time zone differences.
  - It is the most active part of the foreign exchange market.

## Newspaper Spot Rates

|                 | Canadian dollar | U.S. dollar | British pound | Euro   | Japanese yen | Swiss franc |
|-----------------|-----------------|-------------|---------------|--------|--------------|-------------|
| Canadian dollar | --              | 1.0110      | 2.0073        | 1.5885 | 0.009849     | 0.9974      |
| U.S. dollar     | 0.9891          | --          | 1.9855        | 1.5721 | 0.009742     | 0.9866      |
| British pound   | 0.4982          | 0.5037      | --            | 0.7914 | 0.004907     | 0.4969      |
| Euro            | 0.6295          | 0.6364      | 1.2636        | --     | 0.006200     | 0.6279      |
| Japanese yen    | 101.53          | 102.65      | 203.81        | 161.29 | --           | 101.27      |
| Swiss franc     | 1.0026          | 1.0136      | 2.0125        | 1.5926 | 0.009874     | --          |

Source: Globe and Mail (April 8, 2008)

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## Types of Transactions (cont'd)

- Forward currency trading
  - A forward transaction involves both the payment of one currency and the receipt of another at a set point in the future. No upfront payment is required. The most commonly used maturities are 30, 60, 90 or 180 days. Negotiated with a financial intermediary according to your needs.
- Futures contract trading
  - A futures contract is similar to a forward contract except that it involves a standardized quantity (e.g. €125,000) and standardized settlement dates (e.g. the last day of March, June, Sept and Dec). This standardization allows futures to be traded on exchanges. Futures require a small upfront payment and are marked-to-market.

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## Reading Newspaper Quotations

|                 | <u>Cdn\$ per unit</u> | <u>US\$ per unit</u> |
|-----------------|-----------------------|----------------------|
| Britain (Pound) | 2.3029                | 1.9606               |
| 30-Day Forward  | 2.3004                | 1.9605               |
| 90-Day Forward  | 2.2959                | 1.9600               |
| 180-Day Forward | 2.2704                | 1.9527               |

Source: Globe and Mail (January 16, 2007)

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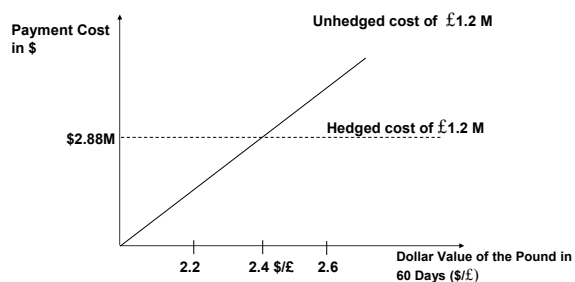
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## Examples: The Forward Market

- A Canadian company imports £1.2 M worth of cars from England. This amount has to be paid in 60 days.
- Since the price of the pound might vary over the 60-day period, the Canadian company is subject to exchange rate risk.
- This risk can be avoided by entering into a 60-day forward contract at, say, a rate of £1 = \$2.4.
- According to this contract, in 60 days the Canadian firm will pay \$2.88 M to the bank and receive £1.2 M with which it can pay the British company (Note:  $\$2.88\text{M} = \text{£}1.2\text{M} \times 2.4\text{ \$/£}$ ).

## The Forward Market



## Types of Transactions (cont'd)

### Options

- A foreign currency option gives the buyer of the option the right but not the obligation to buy or sell a specified amount of foreign currency at a given exchange rate.
- Call Option
  - Gives the right to **buy** a specific amount of foreign currency at the exchange rate stated in the contract.
- Put Option
  - Gives the right to **sell** a specific amount of foreign currency at the exchange rate stated in the contract.

## Foreign Currency Options Quotations

| Option<br>And Underlying     | Strike Price | Jan. | Calls-Last<br>Feb. | Mar. | Jan. | Puts-Last<br>Feb. | Mar. |
|------------------------------|--------------|------|--------------------|------|------|-------------------|------|
| 125,000 Euro -cents per euro |              |      |                    |      |      |                   |      |
|                              | 89.00        | 1.25 | 1.89               | 2.28 | 0.29 | 0.93              | 1.33 |
|                              | 89.50        | 0.92 | 1.59               | —    | 0.46 | 1.13              | —    |
|                              | 90.00        | 0.64 | 1.32               | 1.75 | 0.68 | 1.37              | 1.79 |

## Examples: Foreign Currency Options

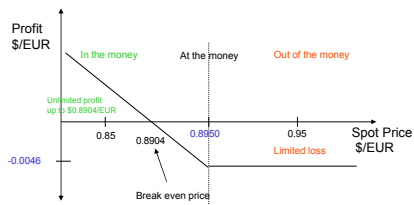
- A German company is purchasing computer equipment for US\$12.5 million. This has to be paid in 6 months.
- Since the price of the Euro has been fluctuating significantly over the past year, the German firm is worried about this risk.
- The CFO believes the Euro can not go down much further, but he can not afford to have the chips cost any more.
- He can limit the increase in cost if the Euro continues to depreciate against the U.S. dollar, and profit if the Euro appreciates against the U.S. dollar by buying an option.

## Euro Put Option Against US Dollars

- Assume the current exchange rate is US\$0.90/Euro
- Suppose you buy a put option on Euros with a strike price of \$0.895/Euro to limit the downside of your investment.
- This gives you the right, but not the obligation, to sell Euros for dollars at the rate of \$0.895/Euro.
- To buy US\$12.5 million, you would need to buy about 112 put option contracts (why?).
  - This would allow the German firm to profit from an appreciation of the Euro, but not suffer too much if it were to continue to depreciate.

## Profit and Loss for Buyer of a Put Option

Suppose you bought the January put option on Euros with a strike price of 8950 (\$0.8950/EUR), which sells for \$0.0046/EUR



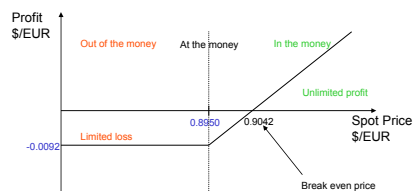
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## Profit and Loss for Buyer of a Call Option

Suppose you buy a January call option on Euros with a strike price of 8950 (\$0.8950/EUR), which sells at \$0.0092/EUR



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## Profit and Loss for Writer of a Put Option

Suppose you wrote a January put option on Euros with a strike price of 8950 (\$0.8950/EUR), which sells for \$0.0046/EUR



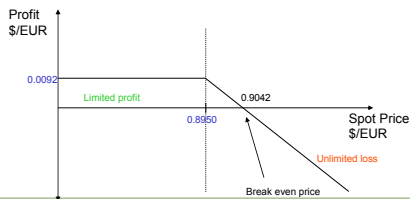
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## Profit and Loss for Writer of a Call Option

Suppose you wrote the January call option on Euros with a strike price of 8950 (\$0.8950/EUR), which sells at \$0.0092/EUR



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## Types of Transactions (cont'd)

### Swaps

- Simultaneous sale and purchase of contracts in different currencies with different maturities.
- *Credit market swaps* – this is like having two offsetting loans. Two firms borrow the same principal but in different currencies. They make the other's payments. This allows firms to have a liability in a different currency, without having to go to the foreign market.
- *Foreign Exchange swaps* – one firm simply exchanges one currency for another today (or some day in the future) for the reverse in the future with another firm. The firms do not need to go to the FX market.

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## Comparison of Hedging Strategies

- A British company submitted a bid stating that it will pay €100M for 75% of the common stock of a French company. The British firm is unsure whether the French investors will tender to it or to a rival bidder. What should it do?
  - Hedging options:
    - a Forward Contract
    - a Futures Contract
    - an Options Contract
  - What happens if the firm does not win the tender?

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## Summary

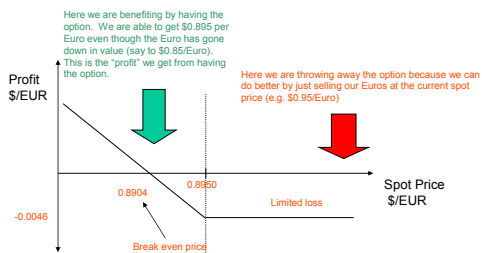
- Spot contracts are for an "immediate" transfer of currency.
  - It is the largest market and the one most people think of when talking about the foreign exchange market.
- Forward (and futures) contracts are such that a set amount of currency changes hands at expiration, a set future date.
- Options contracts are such that the buyer pays the seller at initiation for the right to exercise in the future.
- Swap allows benefits from mutual coincidence of wants.
  - The forward contract is a firm commitment – it must be completed. The options contract is at the buyer's discretion.

## Supplementary Discussion: Euro Put Option Against US Dollars

- When looking at the diagrams presented earlier, we need to think about what using the options really means to investors. For example
  - If the Euro continues to weaken and goes to \$0.85 per Euro, we would have to sell more Euros to buy our \$12.5 million than we would have to by using the option – we could sell each Euro and get \$0.895 using the option.
    - This means we are actually saving money or we can say we are profiting by having the option and using it!
  - If the Euro strengthens and goes to \$0.95 per Euro, we would be better off by ignoring our option and selling our Euros to get \$0.95 per Euro.
    - By "throwing away" the option, this means we are losing what we paid for the option but we are getting more dollars per Euro this way.
  - Now, let's go to the graph for the put option.

## Profit and Loss for Buyer of a Put Option

Suppose you bought the January put option on Euros with a strike price of 8950 (\$0.8950/EUR), which sells for \$0.0046/EUR



## Supplementary Discussion: Euro Call Option Against US Dollars

- With respect to a call, things get reversed. The call is for buying Euros with US dollars (not selling Euros as was the case for the put).
  - If the Euro continues to weaken and goes to \$0.85 per Euro, it would take fewer US dollars to buy Euros at this exchange rate than if we were to exercise the option and buy each Euro for \$0.895. As a result, we would not use the option – why would we pay more than we have to for the Euros?
    - This means we would be spending more than we have to in order to get the Euros if we used the option. As a result we should just throw away the option and lose what we paid for it.
  - If, however, the Euro strengthens and goes to \$0.95 per Euro, it would cost us more dollars to buy the Euros and we would be better off using the option and buying Euros for \$0.895 per Euro.
    - This means we are profiting by having the option!
  - Now, let's go to the graph for the call option.

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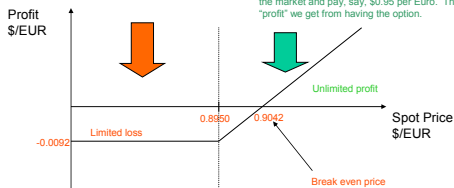
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## Profit and Loss for Buyer of a Call Option

Suppose you buy a January call option on Euros with a strike price of 8950 (\$0.8950/EUR), which sells at \$0.0092/EUR

Here we are throwing away the option because we can do better by just buying our Euros at the current spot price (e.g. \$0.85/Euro)

Here we are benefitting by having the option. We are able to buy Euros for \$0.895 rather than having to go through the market and pay, say, \$0.95 per Euro. This is the "profit" we get from having the option.



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