Chapter 5
The Foreign Exchange Market

Foreign Exchange Markets: Learning Objectives

- Examine the functions performed by the foreign exchange (FOREX) market, its participants, size, geographic and currency composition
- Understand the definitions and distinguish between spot, forward, swap, and other types of foreign exchange financial instruments
- Learn the forms of currency quotations used by currency dealers, financial institutions, and agents
- Analyze the interaction among changing currency values, cross exchange rates and opportunities arising from inter-market arbitrage

Foreign Exchange Markets

- The FOREX market provides the physical and institutional structure through which
  - The money of one country is exchanged for that of another country
  - The rate of exchange between currencies is determined
  - Foreign exchange transactions are physically completed

- A foreign exchange transaction is an agreement between a buyer and a seller that a fixed amount of one currency will be delivered for some other currency at a specified rate

Geographic Extent of the Market

- Geographically, the FOREX market spans the globe with prices moving and currencies trading every hour of every business day
- Major world trading starts each morning in Sydney and Tokyo
- Then moves west to Hong Kong and Singapore
- Continuing to Europe and finishing on the West Coast of the U.S.

Exhibit 5.1 Measuring Foreign Exchange Market Activity: Average Electronic Conversions per Hour
Functions of the FOREX Market

- The FOREX market is the mechanism by which participants
  - Transfer purchasing power between countries
    - This is necessary as international trade and capital transactions normally involve parties living in countries with different national currencies
  - Obtain or provides credit for international trade transactions
  - Inventories in transit must be financed
  - Minimize exposure to exchange rate risk
    - FOREX markets provide instruments utilized in “hedging” or transferring risk to more willing parties

Market Participants

- The FOREX market consists of two tiers, the interbank or wholesale market, and the client or retail market
- Five broad categories of participants operate within these two tiers
  - Bank and non-bank foreign exchange dealers
    - Individuals and firms conducting commercial or investment transactions
    - Speculators and arbitragers
    - Central banks and treasuries
  - Foreign exchange brokers

Bank and Non-bank Dealers

- These participants profit from buying currencies at a bid price and then reselling them at an offer or ask price
- Competition among dealers narrows the spread between the bid and offer rate contributing to the market’s efficiency
- Dealers on behalf of large international banks often act as market makers, often willing to stand in and buy or sell these currencies without having a counterpart with which to unload the “inventory”

Bank and Non-bank Dealers

- They trade amongst other banks and dealers in order to keep their inventory levels at manageable levels
- Currency trading is profitable and often contributes between 10% - 20% of a banks’ average net income
- Small- to medium-sized banks rarely act as market makers yet still participate in the interbank market

Individuals and Firms Conducting Commercial/Investment Transactions

- Importers, exporters, portfolio investors, MNEs, tourists and others use the FOREX market to facilitate execution of commercial or investment transactions
- Some of these participants use the market to hedge foreign exchange rate risk

Speculators and Arbitragers

- Speculators and arbitragers seek to profit from trading in the market itself
- They operate for their own interest, without need or obligation to serve clients or ensure a continuous market
- Speculators seek all their profit from exchange rate changes
- Arbitragers try to profit from simultaneous differences in exchange rates in different markets
- A large proportion of speculation and arbitrage is conducted on behalf of major banks by traders employed by those banks
Central Banks and Treasuries
- Central banks and treasuries use the market to acquire or spend their country’s currency reserves as well as to influence the price at which their own currency trades.
- They may act to support the value of their currency because of their government’s policies or obligations or because of commitments entered through joint float agreements such as the European Monetary System (EMS).
- Consequently their motive is not to profit but rather influence the foreign exchange value of their currency in a manner that will benefit their interests.

Continuous Linked Settlement
- Continuous Linked Settlement (CLS) system (since 2002) eliminates losses if either party unable to settle.
- CLS links with Real-Time Gross Settlement (RTGS) systems in seven major currencies.
- Eventually we expect same-day settlement instead of the current lag of two days.
- The U.S. Commodity Futures Trading Commission (CFTC) regulates foreign exchange trading.

Transactions in the Interbank Market
- Transactions within this market can be executed on a spot, forward, or swap basis.
  - A spot transaction requires almost immediate delivery of foreign exchange.
  - A forward transaction requires delivery of foreign exchange at some future date.
  - A swap transaction is the simultaneous exchange of one foreign currency for another.

Spot Transactions
- A spot transaction in the interbank market is the purchase of foreign exchange, with delivery and payment between banks to take place, normally, on the second following business day.
  - The settlement date is often referred to as the value date.
  - This is the date when most dollar transactions are settled through the computerized Clearing House Interbank Payment Systems (CHIPS) in New York.

Outright Forward Transactions
- This transaction requires delivery at a future value date of a specified amount of one currency for another.
- The exchange rate is agreed upon at the time of the transaction, but payment and delivery are delayed.
- Forward rates are contracts quoted for value dates of one, two, three, six, and twelve months.
  - Terminology typically used is buying or selling forward.
  - A contract to deliver dollars for euros in six months is both buying euros forward for dollars and selling dollars forward for euros.

Swap Transactions
- A swap transaction in the interbank market is the simultaneous purchase and sale of a given amount of foreign exchange for two different value dates.
- Both purchase and sale are conducted with the same counterpart.
- A common type of swap is a spot against forward.
  - The dealer buys a currency in the spot market and simultaneously sells the same amount back to the same bank in the forward market.
  - Since this transaction occurs at the same time and with the same counterpart, the dealer incurs no exchange rate exposure.
Swap Transactions

- **Forward-forward swaps** – A dealer sells £20,000 forward for dollars for delivery in two months at $1.8420/£ and simultaneously buys £20,000 forward for delivery in three months at $1.8400/£
  - The difference between the buying and selling price is equivalent to the interest rate differential
  - Thus a swap can be viewed as a technique for borrowing another currency on a fully collateralized basis

Swap Transactions

- **Non-deliverable forwards (NDFs)** – NDFs possess the same characteristics as traditional forward contracts except that they are settled only in US dollars and the foreign currency being sold or bought forward is not delivered
  - The dollar-settlement feature reflects the fact that NDFs are contracted offshore and are beyond the reach and regulatory frameworks of the home country governments
  - Pricing of NDFs reflects basic interest rate differentials

Size of the FOREX Market

- The Bank for International Settlements (BIS) estimates that daily global net turnover in traditional FOREX market activity to be US$3.2 trillion in April 2007
  - Spot transactions at $1,005 billion/day
  - Outright forward transactions at $363 billion/day
  - Swap transactions at $1,714 billion/day

Exhibit 5.2 Global Foreign Exchange Market Turnover, 1989-2007 (daily averages in April, billions of U.S. dollars)

Size of the FOREX Market

- The United Kingdom (London) and the United States (New York) make up roughly 50% of the foreign exchange market
- The London trade alone makes up 34.1% of daily transactions in the foreign exchange market
- Switzerland has grown in recent years and is now the third largest market with 6.1% of world trading

Exhibit 5.3 Top 10 Geographic Trading Centers in the Foreign Exchange Market, 1992-2007 (daily averages in April, billions of U.S. dollars)
Exhibit 5.4 Foreign Exchange Market Turnover by Currency Pair (Daily averages in April)

Foreign Exchange Rates & Quotations

- A foreign exchange quote is a statement of willingness to buy or sell at an announced rate
  - In the retail market (newspapers and exchange booths), quotes are often given as the home currency price of the foreign currency
- Interbank quotes – professional dealers or brokers may state quotes in one of two ways
  - The foreign currency price of one dollar
    - Sfr1.6000/$, read as 1.600 Swiss francs per dollar
  - The dollar price of a unit of foreign currency
    - $0.6250/Sfr, read as 0.625 dollars per Swiss franc

5-27

Foreign Exchange Rates & Quotations

- The former quote is considered to be in “European terms” and the latter is considered to be “American terms”
- Almost all European currencies, except two, are quoted the European way
  - The Pound Sterling and the Euro are the exceptions
  - Additionally, Australian and New Zealand dollars are also quoted in American terms

5-28

Foreign Exchange Rates & Quotations

- Direct and Indirect Quotes
  - A direct quote is a home currency price of a unit of a foreign currency
    - Sfr1.6000/$ is a direct quote in Switzerland
  - An indirect quote is a foreign currency price in a unit of the home currency
    - Sfr1.600/$ is an indirect quote in the US,
    - $0.625/Sfr is a direct quote in the US and an indirect quote in Switzerland

5-29

Foreign Exchange Rates & Quotations

- Interbank quotes are given as a bid and ask
  - The bid is the price at which a dealer will buy another currency
  - The ask or offer is the price at which a dealer will sell another currency
  - Example: ¥118.27 - ¥118.37/$ is the bid/ask for Japanese yen
  - The bank will buy yen at ¥118.27 per dollar and sell yen at ¥118.37 per dollar making profit on the spread

5-30

Exhibit 5.5 Spot and Forward Quotations for the Euro and Japanese Yen
Foreign Exchange Rates & Quotations

• Expressing Forward Quotations on a Points Basis
  – The previously mentioned rates for yen were considered outright quotes
  – Forward quotes are different and typically quoted in terms of points
  – A point is the last digit of a quotation, with convention dictating the number of digits to the right of the decimal
    • Hence a point is equal to 0.0001 of most currencies

Bid Ask
Outright spot: ¥118.27 ¥118.37
Outright forward: ¥116.84 ¥116.97

Foreign Exchange Rates & Quotations

• Forward Quotations in Percentage Terms
  – Forward quotations may also be expressed as the percent-per-annum deviation from the spot rate
  • This is similar to the forward discount or premium calculated earlier
  – The important thing to remember is which currency is being used as the home or base currency
  – For indirect quotes (i.e. quote expressed in foreign currency terms), the formula is

\[ f^{FC} = \frac{\text{Spot - Forward}}{\text{Forward}} \times \frac{360}{\text{days}} \times 100 \]

Foreign Exchange Rates & Quotations

• Forward Quotations in Percentage Terms
  – For direct quotes (i.e. quote expressed in home currency terms), the formula is

\[ f^H = \frac{\text{Forward - Spot}}{\text{Spot}} \times \frac{360}{\text{days}} \times 100 \]

### Example: Indirect quote

\[ f^{FC} = \frac{105.65 - 105.04}{105.04} \times \frac{360}{90} \times 100 = +2.32\% \text{ p.a.} \]

### Example: Direct quote

\[ f^H = \frac{0.009520183 - 0.009465215}{0.009465215} \times \frac{360}{90} \times 100 = +2.32\% \text{ p.a.} \]

### Exhibit 5.6 Foreign Exchange Rate Quotations on the U.S. Dollar/British Pound in the Financial Press

<table>
<thead>
<tr>
<th>The Wall Street Journal</th>
<th>U.S. Dollar/British Pound</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Currency (GBP)</td>
</tr>
<tr>
<td></td>
<td>Thu</td>
</tr>
<tr>
<td>One-month forward</td>
<td>1.2050</td>
</tr>
<tr>
<td>Three-month forward</td>
<td>1.2070</td>
</tr>
<tr>
<td>Six-month forward</td>
<td>1.2090</td>
</tr>
</tbody>
</table>

Closing Bid | Daily Change
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. (header)</td>
<td>1.2000</td>
</tr>
<tr>
<td>One-month</td>
<td>1.2050</td>
</tr>
<tr>
<td>Three-month</td>
<td>1.2070</td>
</tr>
</tbody>
</table>

Foreign Exchange Rates & Quotations

• Cross Rates
  – Many currencies pairs are inactively traded, so their exchange rate is determined through their relationship to a widely traded third currency
  – Example: A Mexican importer needs Japanese yen to pay for purchases in Tokyo. Both the Mexican peso (MXP) and Japanese yen (¥) are quoted in US dollars
  • Assume the following quotes:
    - Japanese yen ¥110.73/$
    - Mexican peso MXP 11.4456/$

• Intermarket Arbitrage
  – Cross rates can be used to check on opportunities for intermarket arbitrage
  – Example: Assume the following exchange rates are quoted
    - Citibank $1.2223/€
    - Barclays Bank $1.8410/£
    - Dresdner Bank €1.5100/£

Intermarket Arbitrage
The cross rate between Citibank and Barclays is
\[
\frac{1.8410}{1.2223} = 1.5062/€ \;
\]
This cross rate is not the same as Dresdner’s rate quote of €1.5100/£
Therefore, an opportunity exists for risk-less profit or arbitrage

Exhibit 5.7 Key Currency Cross Rates

<table>
<thead>
<tr>
<th>Currency</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canadian</td>
<td>1.00</td>
</tr>
<tr>
<td>Japanese</td>
<td>¥110.73</td>
</tr>
<tr>
<td>Mexican</td>
<td>MXP 11.4456</td>
</tr>
<tr>
<td>US</td>
<td>$1.00</td>
</tr>
</tbody>
</table>

Exhibit 5.8A Triangular Arbitrage

1. Exchange $100,000 with Citibank for euros at $1.2223/€
2. Exchange $100,000 with Barclays for pounds at $1.8410/£
3. Exchange £50,000 with Deutsche for euros at €1.5100/£
Summary of Learning Objectives

- The three functions of the foreign exchange market (FOREX) are to transfer purchasing power, provide credit, and minimize foreign exchange rate risk
- The FOREX is composed of two tiers: the interbank market and the client market. Participants within these tiers include bank and nonbank foreign exchange dealers, individuals and firms conducting commercial and investment functions, speculators and arbitragers, central banks and treasuries and foreign exchange brokers

Summary of Learning Objectives

- Geographically, the FOREX market spans the globe, with prices moving and currencies traded every hour of every business day
- A foreign exchange rate is the price of one currency expressed in terms of another currency
- A foreign exchange quotation is a statement of willingness to buy or sell currency at an announced price
- Transactions within the FOREX market are executed either on a spot basis requiring delivery two days after the transaction or on a forward basis requiring settlement at some designated future date

Summary of Learning Objectives

- European terms quotations are the foreign currency price of one US dollar. American terms are the dollar price of a foreign currency
- Quotations can also be direct or indirect. A direct quote is the home currency price of a unit of foreign currency, while an indirect quote is the foreign currency price of a unit of the home currency
- Direct and indirect are not synonymous for American and European terms, because the home currency will change for calculation purposes

Summary of Learning Objectives

- A cross rate is an exchange rate between two currencies, calculated from their common relationships with a third currency
- When cross rates differ from the direct rates between two currencies, intermarket arbitrage is possible