

Module 3

Introduction to Foreign Exchange



FOREIGN EXCHANGE (FX)

- Foreign Exchange: Contract under which two parties undertake to exchange specified amounts of one currency for specified amounts of another currency on a fixed date
- Money denominated in currency of another nation or group of nations
- Used to hedge existing foreign currency obligations and to speculate on foreign exchange price fluctuations

FOREIGN EXCHANGE RATE

- **Foreign Exchange Rate:** is a mathematical ratio. It is the number of units of one nation's currency sold, i.e., surrendered in exchange, in order to acquire a certain number of units of another nation's currency. Example: units of USD over units of EUR.
- The **reciprocal (or inverse)** of the exchange rate above is units of EUR over units of USD.

FOREIGN EXCHANGE RATE

- Mathematically, the numerator of a ratio tells us what the mind is thinking in terms of and the denominator tells us which of the two currencies' demand and supply is under specific consideration.
- For example, in the ratio USD 1.10 per EUR, or $1.10/1.00$, we are considering the demand and supply for Euros but thinking in terms of U.S. dollars and cents.

HOW EXCHANGE RATES ARE DETERMINED

- Exchange rates are determined by supply & demand for currencies.
- Supply & demand for currencies depends on:
 - Monetary conditions
 - Domestic and foreign interest rates
 - Other factors
- Importance of each factor can change over time

HOW EXCHANGE RATES ARE DETERMINED

Monetary Conditions: Monetary Policies of Central Bank

- Positive (Negative) Economic News Strengthens (Weakens) Currency
 - Growth in Output
 - Non-Farm Payroll, or Income
 - Retail Sales
 - Consumer Confidence

Interest Rates

Theories of Exchange-Rate Change, or Variation:

- The Purchasing Power Parity (PPP) Theory of Foreign Exchange
- The Balance-of-Payments (BOP) Theory of Foreign Exchange

HOW EXCHANGE RATES ARE DETERMINED

- Central banks target rate
 - Home currency strengthened/weakened
- Key factors for 3 commodity currencies (CAD,AUD,NZD):
 - Non-energy commodity terms of trade
 - Real terms of trade for energy
 - Interest rate differential
- Order flow: measures volume of currency transactions initiated by buyers or sellers

CHARACTERISTICS OF FX MARKETS

- Determine FX market size
- Identify market players in FX
- Identify FX conventions
 - Major currency & regional currency codes
 - Quotation of exchange rates

MARKET SIZE

- Huge: Bank for International Settlements (BIS) estimates equivalent of USD 5.067 trillion daily in 2016



BANK FOR INTERNATIONAL SETTLEMENTS

- 24/7
- Not centralized

MARKET PARTICIPANTS

- Dealers
- Customers
- Central Banks
- Brokers
- Speculators

MAJOR CURRENCY CODES

<i>COUNTRY/REGION</i>	<i>CODE</i>	<i>CURRENCY</i>
Canada	CAD	Canadian Dollar
Great Britain	GBP	British Pound
Europe	EUR	European Euro
Japan	JPY	Japanese Yen
Switzerland	CHF	Swiss Franc
United States	USD	US Dollar

MAJOR ASIAN/AUSTRALIAN CURRENCY CODES

<i>COUNTRY/REGION</i>	<i>CODE</i>	<i>CURRENCY</i>
Australia	AUD	Australian Dollar
China	CNY	Chinese Yuan
Hong Kong	HKD	Hong Kong Dollar
India	INR	Indian Rupee
Indonesia	IDR	Indonesian Rupiah
Malaysia	MYR	Malaysian Ringgit
Philippines	PHP	Philippine Peso
Singapore	SGD	Singapore Dollar
South Korea	KRW	South Korean Won
Thailand	THB	Thai Baht
Vietnam	VND	Vietnamese Dong

MANAGING FX MARKET RISK

- Define FX risk
- Identify different types of FX rate risks
- Evaluate risk management of FX

FOREIGN EXCHANGE EXPOSURE

- Sovereign Risk
- Economic Risk
- Translation Risk
- Transaction Risk

FOREIGN EXCHANGE

Bid-Ask (or Offer) Quotations

Quote in New York	Bid	Ask (offer)
Direct (DC/FC) \$/€	\$1.2500	\$1.2506
Indirect (FC/DC) €/€	€0.7996	€0.8000

$$\text{direct spread (\%)} = \left[\frac{\text{ask price} - \text{bid price}}{\text{ask price}} \right] \times 100 = \left[\frac{\$1.2506 - \$1.2500}{\$1.2506} \right] \times 100 = 0.048\%$$

$$\text{indirect spread (\%)} = \left[\frac{\text{ask price} - \text{bid price}}{\text{ask price}} \right] \times 100 = \left[\frac{€0.8000 - €0.7996}{€0.8000} \right] \times 100 = 0.050\%$$

FOREIGN EXCHANGE

Conditions making bid-ask spreads larger:

- Volatile markets, causing exchange rate uncertainty
- Trading volume is lower, common for thinly traded currencies

Bank/dealer positions have no effect on bid-ask spreads:

- Dealer with excess FC will lower midpoint of direct quote
- Example: dealer with excess euros will lower ask price of euros and decrease bid price

FOREIGN EXCHANGE: CROSS RATES

- **Cross rate** is the effective exchange rate between two countries via each country's exchange rate with a third country
 - If we know *dollars per euro* (\$/€)
 - If we know *euros per pound* (€/£)
 - Then we can calculate *dollars per pound* = $\$/\text{£} = (\$/\text{€}) \times (\text{€}/\text{£})$
- Ensure common currency units cancel (euros cancel in our example)
 - In reality \$ is usually the common currency
 - But it can be any currency
- Be careful of direct/indirect quotes and bid-ask spreads

FOREIGN EXCHANGE

	€ and \$ quotes in Frankfurt DC = € and FC = \$		£ and € quotes in London DC = £ and FC = €		Effective \$ and £ quotes in New York DC = \$ and FC = £	
	Bid	Ask	Bid	Ask	Bid	Ask
<i>Direct Quote</i>	€0.8072	€0.8074	£0.7004	£0.7006		\$1.7689
<i>Indirect Quote</i>	\$1.2385	\$1.2389	€1.4274	€1.4278	£0.5654	

$$\text{£/\$ (bid)} = \frac{\text{€}}{\text{\$}} \times \frac{\text{£}}{\text{€}} = 0.8072 \times 0.7004 = \text{£}0.5654$$

$$\text{\$/£ (ask)} = \frac{\text{\$}}{\text{£}} \times \frac{\text{€}}{\text{€}} = 1.2389 \times 1.4278 = \text{\$}1.7689$$

Check: $1 \div \text{\$}1.7689/\text{£} = \text{£}0.5653/\text{\$}$

FOREIGN EXCHANGE

	€ and \$ quotes in Frankfurt DC = € and FC = \$		£ and € quotes in London DC = £ and FC = €		Effective \$ and £ quotes in New York DC = \$ and FC = £	
	Bid	Ask	Bid	Ask	Bid	Ask
<i>Direct Quote</i>	€0.8072	€0.8074	£0.7004	£0.7006	\$1.7678	\$1.7689
<i>Indirect Quote</i>	\$1.2385	\$1.2389	€1.4274	€1.4278	£0.5654	£0.5657

$$£/\$ (\text{ask}) = \frac{€}{\$} \times \frac{£}{€} = 0.8074 \times 0.7006 = £0.5657$$

$$$/£ (\text{bid}) = \frac{\$}{£} \times \frac{€}{\$} = 1.2385 \times 1.4274 = \$1.7678$$

Check: $1 \div \$1.7678/£ = £0.5657/\$$

SPOT MARKET

Spot Rate (or Price): is today's price.

- Spot price instrument is price quoted for immediate (spot) settlement (payment and delivery)
- Spot settlement is normally 1-2 business days from trade date
- Spot transactions account for almost a third of all FX market transactions

VALUE/SETTLEMENT DATES

- Also called “**settlement date**”
- “**Spot**” and “**Forward**” are most common value date designations
- **FX Settlement:** Foreign exchange trades are usually settled two days after the trade date
- On settlement date, payment is made & foreign currency is delivered

FOREIGN EXCHANGE

- **Spot (or cash) market:** buying and selling currency at today's prices with immediate effect (48 hour settlement)
- **Forward market:** contracts to buy or sell currency at a set price for future settlement (beyond 48 hours)
 - Commitment to deliver is made on transaction date
 - Delivery takes place at a future date set in a contract (in currencies usually 1, 3, 6 or 12 months in the future)

FOREIGN EXCHANGE

- Assume indirect quotes from a U.S. perspective (FC units per \$)
- Given an exchange rate of FC/DC, the annualized forward premium on DC is:

$$\text{forward premium (discount)} = \left(\frac{\text{forward rate} - \text{spot rate}}{\text{spot rate}} \right) \times \left(\frac{12}{\text{No. months forward}} \right) \times 100\%$$

FOREIGN EXCHANGE

Annualized forward premium (discount)

- Spot rate of Swiss Franc (SFr) = SFr1.2511/\$
- 3-month forward rate = SFr1.2506/\$
- 6-month forward rate = SFr1.2464/\$

$$\text{forward premium (discount)} = \left(\frac{\text{forward rate} - \text{spot rate}}{\text{spot rate}} \right) \times \left(\frac{12}{\text{No. months forward}} \right) \times 100\%$$

$$3 - \text{mo. forward premium (discount)} = \left(\frac{1.2506 - 1.2511}{1.2511} \right) \times \left(\frac{12}{3} \right) \times 100\% = -0.16\% (\text{disc.})$$

$$6 - \text{mo. forward premium (discount)} = \left(\frac{1.2464 - 1.2511}{1.2511} \right) \times \left(\frac{12}{6} \right) \times 100\% = -0.75\% (\text{disc.})$$

NO ARBITRAGE AND FX FORWARD RATES

Covered Interest Rate Parity is the relationship linking:

- Spot exchange rates, forward exchange rates and interest rates
- The forward discount (premium) equals the discounted interest rate differential between two countries

NO ARBITRAGE AND FX FORWARD RATES

Mathematically the product of the forward rate and one plus the domestic risk-free rate **equals** the product of the spot rate multiplied by one plus the foreign risk-free rate; therefore:

- If foreign interest rate $>$ domestic interest rate, then domestic currency will trade at a premium (forward $>$ spot)
- If foreign interest rate $<$ domestic interest rate, then domestic currency will trade at a discount (forward $<$ spot)

FOREIGN EXCHANGE

For rates in FCU/DCU:

$$\text{Forward Rate} \times (1 + r_{\text{DC}}) = \text{Spot Rate} \times (1 + r_{\text{FC}})$$

$$\text{Forward Rate} / \text{Spot Rate} = (1 + r_{\text{FC}}) / (1 + r_{\text{DC}})$$

r_{DC} is the interest rate of domestic currency (DC)

r_{FC} is the interest rate of foreign currency (FC) and

Exchange rates are number of units of foreign currency FC for one unit of domestic currency DC: FCU/DCU

For rates in DCU/FCU:

$$\text{Forward Rate} \times (1 + r_{\text{FC}}) = \text{Spot Rate} \times (1 + r_{\text{DC}})$$

$$\text{Forward Rate} / \text{Spot Rate} = (1 + r_{\text{DC}}) / (1 + r_{\text{FC}})$$

FOREIGN EXCHANGE

Forward Rate $\times (1 + r_{DC}) = \text{Spot Rate} \times (1 + r_{FC})$ or

Forward Rate / Spot Rate = $(1 + r_{FC}) / (1 + r_{DC})$

Problem (Indirect):

USD: Rate = 1%; Spot FX = 1.3600 SGD/USD

SGD: Rate = 3%; Forward FX = ??? SGD/USD

Solution:

Forward Rate / 1.3600 = 1.03 / 1.01, so Forward Rate = 1.3869 SGD/USD

Problem (Direct):

EUR: Rate = 0%; Forward FX = 1.1000 USD/EUR

US: Rate = 1%; Spot FX = ???/EUR

Solution:

\$1.1000 / Spot = 1.01 / 1.00, so Spot = 1.1111 USD/EUR

VIRTUAL CURRENCY

Virtual currency exploded onto the scene with the introduction of Bitcoin in 2009. In the years since, **Bitcoin** has become the best-known, most widely circulated digital money in history. It, has also inspired the development of many hundreds of other virtual currencies.

By February 2017, more than 500 virtual currencies are traded in digital markets around the world every day. Few, however, come close to Bitcoin in influence, supply, trading volume or market capitalization

Digital currencies, such as **Bitcoin**, **Litecoin** and **Dogecoin**, use cryptography and a public transaction ledger, known generically as a block chain, to ensure the security of peer-to-peer transactions.

VIRTUAL CURRENCY - BITCOIN

Since its launch in 2009, Bitcoin has been hailed as the world's most popular and widely accepted cryptocurrency. The number of private merchants accepting payment in Bitcoin surpassed 300,000 in 2017.

Retail purchases remain a small part of the payment network's overall transaction volume, which peer-to-peer payments dominate.

VIRTUAL CURRENCY

XBT to USD Chart

31 May 2016 00:00 UTC - 31 May 2017 23:45 UTC XBT/USD close:2252.02443 low:503.46781 high:2731.20133



DISCUSSIONS

- What have been the trends in FX rates in the past year?
- How are they tied to inflation and interest rates?
- How are they affected by central bank monetary policy and government fiscal policy?
- What are some of the strength and weaknesses of virtual currencies?