Economics

Exchange Rate Calculations

Exam Focus

- Cross rates
- Forward premium or discount
- Forward quotes
- Arbitrage-free forward price

Spot Market vs. Forward Market

Spot exchange rates: exchange rates for immediate delivery

Forward contract: an agreement to buy or sell a specific amount of a foreign currency at a future date at the quoted forward exchange rate (e.g., 30, 60, or 90 days in the future)

Cross Rates

A cross rate can be derived from two currency pairs sharing a common currency:

$$\frac{\cancel{USD}}{GBP} \times \frac{CHF}{\cancel{USD}} = \frac{CHF}{GBP}$$

> Set up the quotes so the common currency cancels

$$1.5600 \, \frac{USD}{GBP} \times 1.4860 \, \frac{CHF}{USD} = 2.3182 \, \frac{CHF}{GBP}$$

Cross Rates: Example

A research report produced by a dealer includes the following spot rate quotes:

Currency	Spot Rate
USD/EUR	1.1701
CHF/USD	0.9900
USD/GBP	1.3118

The spot GBP/EUR cross-rate is *closest* to:

A. 0.8920.

B. 1.1211.

C. 1.4653.

GBP/EUR =   ×   =

     =   ×   =

-2

Forward Discount or Premium

For FX quote of price currency/base currency

If the forward quote is **greater** than spot price:
- Base currency is trading at a **forward premium**
- Price currency is trading at a **forward discount**

If the forward quote is **less** than spot price:
- Base currency is trading at a **forward discount**
- Price currency is trading at a **forward premium**

Forward Quotes—Point Basis

- Forward quote is points above (below) spot
- Point is last digit of the spot rate quote

> Last digit is 0.0001 (for most currencies except yen)

Spot 1.4320 $/€, forward quote + **22.1** points

Forward = 1.4320   =

Alternatively, divide points by 10,000

-1

Forward Quotes—Percentage Basis

Spot 1.6135 $/£

90-day forward quote is –0.29%

Forward =   =

The GBP is trading at a **forward discount**, and the USD is trading at a **forward premium**.

If the forward quote is –47 points, the **percentage forward quote** is:

                    =   =

No-Arbitrage Forward Exchange Rate

$$\text{forward(P / B)} = \text{spot(P / B)} \times \left(\frac{1 + \text{interest rate}_{price}}{1 + \text{interest rate}_{base}} \right)$$

Follow the numerator-denominator rule: given a quote as price/base, use interest rate of price currency in numerator and interest rate of base currency in the denominator

Key point: the currency with the **higher interest rate** will trade at a **forward discount**

No-Arbitrage Forward Rate: **Example**

If the 270-day Libor rates (annualized) for the euro and British pound are 1.370 percent and 1.325 percent, respectively, and the spot GBP/EUR exchange rate is 0.8489, then the number of forward points for a 270-day forward rate (GBP/EUR) is *closest* to:

A. −22.8.

B. −3.8.

$$F = 0.8489 \times \left(\rule{12em}{0pt} \right) =$$

C. −2.8.

$$\text{points} = \rule{20em}{0pt} =$$

Solutions

Cross Rates: **Example**

A research report produced by a dealer includes the following spot rate quotes:

Currency	Spot Rate
USD/EUR	1.1701
CHF/USD	0.9900
USD/GBP	1.3118

The spot GBP/EUR cross-rate is *closest* to:

A. 0.8920.

B. 1.1211.

C. 1.4653.

GBP/EUR = USD/EUR × GBP/USD =

= 1.1701 × 1 / 1.3118 = 0.8920

Forward Quotes—Point Basis

- Forward quote is points above (below) spot
- Point is last digit of the spot rate quote

Last digit is 0.0001 (for most currencies except Yen)

Spot 1.4320 $/€, forward quote + **22.1** points

Forward = 1.4320 + **22.1(0.0001)** = 1.43421 $/€

Alternatively, divide points by 10,000

-1

Forward Quotes—Percentage Basis

Spot 1.6135 $/£

90-day forward quote is –0.29%

Forward = 1.6135 (1 – 0.0029) = $1.6088 $/£

The GBP is trading at a **forward discount**, and the USD is trading at a **forward premium**.

If the forward quote is –47 points, the **percentage forward quote** is:

–0.0047 / 1.6135 = –0.0029 = –0.29%.

No-Arbitrage Forward Rate: Example

If the 270-day Libor rates (annualized) for the euro and British pound are 1.370 percent and 1.325 percent, respectively, and the spot GBP/EUR exchange rate is 0.8489, then the number of forward points for a 270-day forward rate (GBP/EUR) is *closest* to:

A. –22.8.

B. –3.8.

C. –2.8.

$$F = 0.8489 \times \left(\frac{(1 + 0.01325) \times 270/360}{(1 + 0.0137) \times 270/360} \right) = 0.84862$$

points = (0.84862 – 0.8489) × 10,000 = –2.8