CHARTA LEARNING · LESSON NOTES

Exchange rates: quotes, cross rates and forwards

CFA Level I · Economics

You will learn: Read an exchange rate as price per base, work out what a dealer's bid and offer cost you, build cross rates and forward rates, tell forward premium from discount, and separate real from nominal exchange rates.

Running example: Examples use made-up figures, mostly USD/EUR spot 1.1000 and USD/GBP 1.25.

1. Reading a quote

- An exchange rate is a price: the thing being bought (the base currency, always 1 unit) and the money paid (the price currency). A quote is written price/base, so USD/EUR = 1.10 means 1 euro costs 1.10 dollars. Say per between the two names.
- The reverse quote swaps the currencies and equals one divided by the original. The two are reciprocals and move in opposite directions. Always check which currency is the base: using the number the wrong way round turns every later answer upside down.

Reverse quote B/A = 1 ÷ (A/B)

EXAMPLE 1: USD/EUR = 1.1000

1 EUR costs	read the quote as it stands	**1.1000 USD**
Reverse EUR/USD	1 ÷ 1.1000	**0.9091**
1 USD costs	price EUR, base USD	**0.9091 EUR**

2. Bid and offer

- A dealer shows two prices, from the dealer's point of view. The bid is the price at which the dealer buys the base currency from you. The offer (ask) is the price at which the dealer sells the base to you. The offer is always higher than the bid.
- The gap is the spread, the dealer's pay, quoted in pips (the fourth decimal place, 0.0001). You, the customer, sell at the bid and buy at the offer. A round trip costs you the spread.

EXAMPLE 2: USD/EUR BID 1.0990, OFFER 1.1010, USD 1,000,000

Spread	1.1010 − 1.0990	**20 pips**
Buy EUR at the offer	1,000,000 ÷ 1.1010	**908,265 EUR**
Sell EUR back at the bid	908,265 × 1.0990	**998,183 USD**
Round trip cost	1,000,000 − 998,183	**1,817 USD**

Watch out: Using the wrong side: you sell the base at the bid and buy it at the offer.

3. Cross rates

- Most currencies trade against the dollar and hardly against each other. A cross rate is an exchange rate between two currencies worked out from each one's rate against a common third currency.
- Write the three quotes down and check that the common currency is the price currency in both; if not, flip one first. Then the common currency cancels and what is left is the quote you wanted, price over base.
- With bid and offer: the cross bid is the base's lowest top rate over the highest bottom rate (GBP bid ÷ EUR offer); the cross offer is GBP offer ÷ EUR bid. The cross spread is wider than either input.
- If a direct quote disagrees with the cross rate, there is risk-free triangular arbitrage, which traders exploit until prices are pushed back into line.

EUR/GBP = (USD/GBP) ÷ (USD/EUR); the common currency (USD) cancels

EXAMPLES 4 TO 6

EUR/GBP from USD/EUR 1.10, USD/GBP 1.25	1.25 ÷ 1.10	**1.1364 (reverse GBP/EUR 0.8800)**
Cross bid; USD/EUR 1.0990/1.1010, USD/GBP 1.2490/1.2510	1.2490 ÷ 1.1010	**1.1344**
Cross offer	1.2510 ÷ 1.0990	**1.1383 (spread 39 pips)**
Arbitrage: direct 1.15 vs cross 1.1364; 1 GBP → EUR → USD → GBP	1.15 × 1.10 = 1.265 USD; 1.265 ÷ 1.25	**1.012 GBP, gain 1.2%**

4. Forward rates and covered interest rate parity

- A spot rate is for exchange now (within about two days). A forward rate is a price agreed today for exchange on a set future date. Dealers quote forward points (in pips, so divide by 10,000) to add to spot. Positive points mean forward above spot.
- The forward rate is a contract price, not a forecast. No free lunch: lending at home, or swapping, lending abroad and locking in the swap back, must end with the same amount. This is covered interest rate parity (covered because the forward contract removes exchange risk).
- Price currency interest rate on top, base currency rate below, same order as the quote. For short periods use simple interest and a 360 day year; t is the fraction of a year (90 days = 0.25).
- Forward above spot: the base is at a forward premium (forward ÷ spot − 1). The currency with the higher interest rate trades at a forward discount.

F = S × (1 + i_price × t) ÷ (1 + i_base × t)

EXAMPLES 7 TO 10: SPOT 1.1000, USD 5%, EUR 3%

1 year forward	1.1000 × 1.05 ÷ 1.03	**1.1214**
Check, USD 1,000,000: lend USD at 5%	1,000,000 × 1.05	**1,050,000**
Or swap at 1.10, lend EUR at 3%, swap back at 1.1214	909,091 × 1.03 = 936,364; × 1.1214	**1,050,000**
Euro premium; dollar discount	1.1214 ÷ 1.1000 − 1; 0.8918 ÷ 0.9091 − 1	**+1.94%; −1.90%**
3 month forward (t = 0.25)	1.1000 × 1.0125 ÷ 1.0075	**1.1055 = 55 points**

Watch out: Treating a forward as a forecast; putting the rates in the wrong places (if you flip the quote, flip the rates too).

5. Real exchange rates and percentage moves

- The nominal exchange rate is the price on the board. The real exchange rate adjusts it for price levels in both countries and gives the cost of the foreign basket in terms of the home basket. A rise means foreign goods are getting dearer and home goods cheaper.
- The percentage move in a currency is new ÷ old − 1 for the base currency of the quote. The other currency's move is different, not equal and opposite. Always say which currency you are measuring.
- Purchasing power parity idea: over time, inflation differences tend to push nominal rates to offset them.

Real d/f = nominal d/f × (P foreign ÷ P home); d = home (price) currency, f = foreign (base) currency

EXAMPLES 11 TO 13

Basket: 100 USD at home, 80 EUR abroad, USD/EUR 1.10	80 × 1.10 = 88; 88 ÷ 100	**real rate 0.88 (foreign goods cheaper)**
USD/EUR rises 1.10 to 1.15: euro	1.15 ÷ 1.10 − 1	**+4.55%**
Same move: dollar (EUR/USD 0.9091 to 0.8696)	0.8696 ÷ 0.9091 − 1	**−4.35%**
Nominal 1.1550, prices abroad 101, home 103	1.1550 × 101 ÷ 103	**real 1.1326**
Real change	1.1326 ÷ 1.10 − 1	**+2.96% (nominal +5, prices +1 and +3)**

Key takeaways

- A quote is price per one unit of base; the reverse is 1 ÷ the quote.
- You sell the base at the bid and buy it at the offer; the spread is your round-trip cost.
- Cross rate = top ÷ bottom, with the common currency cancelling; bid and offer cross the other way.
- Forward = spot × (1 + price rate) ÷ (1 + base rate): it is interest rates, not a forecast; the higher-rate currency is at a forward discount.
- A currency's percentage move is new ÷ old − 1, and the other currency's move is different.
- Real rate = nominal × foreign prices ÷ home prices.

Quick check

1. USD/EUR = 1.20, USD/GBP = 1.50. What is EUR/GBP?
   Answer: 1.50 ÷ 1.20 = 1.25 EUR per GBP.
2. Spot 1.30, price rate 4%, base rate 2%, 1 year. Forward?
   Answer: 1.30 × 1.04 ÷ 1.02 = 1.3255 (the narration says 1.325). Base at a premium.
3. A quote rises from 2.00 to 2.20. How much did the base currency appreciate?
   Answer: 2.20 ÷ 2.00 − 1 = 10%.