Lesson 3: Currency Exchange Rate Calculations: Part 2

Forward Rates

In professional FX markets, forward exchange rates are quoted in terms of points (pips), which simply represent the difference between the forward rate and the spot rate.
Note that these points (pips) are scaled so that they can be related to the last digit in the spot quote (usually the fourth decimal place).

- If the forward rate is higher than the spot rate, the points are positive and the base currency is said to be trading at a **forward premium** because it is expected to appreciate in the future. At the same time, the price currency would be trading at a **forward discount**, which means it is expected to depreciate.

If the forward rate is lower than the spot rate, the points are negative and the base currency is trading at a forward discount as it is expected to depreciate. At the same time, the price currency would be trading at a forward premium and is expected to appreciate.

Calculation of Forward Rates

Forward exchange rates are calculated in a manner that ensures that traders are not able to earn arbitrage profits. This means that a trader with a specific amount of domestic currency should be able to earn the exact same amount from both the following investment options:

Option 1: She invests the funds at the domestic risk-free rate (rDC) for a particular period of time.

Option 2: She converts the funds into a foreign currency, invests them at the foreign risk-free rate for the same period of time (as in Option 1), and then converts them back to the domestic currency at the forward exchange rate which she locks in today.

Both these investment options are risk-free because they require the money to be invested at risk-free interest rates.
Further, the exchange rate risk in the second option is eliminated (hedged) by locking in the forward rate at the time of investment. Since these two investments have identical risk characteristics, it follows that they must have the same return (to preclude arbitrage profits).

Example: Calculation of Forward Exchange Rates

A trader is provided with the following information:

Spot AUD-USD = 1.0240
12-month risk-free interest rate in the U.S. = 2%
12-month risk-free interest rate in Australia = 4%

Calculate the one-year forward AUD-USD exchange rate.

Forward rates are sometimes interpreted as expected future spot rates.

- Under this interpretation, the expected percentage change in the spot rate is proportional to the interest rate differential.
- However, such an interpretation should be used cautiously.
- Forward rates are unbiased predictors of future spot rates, but this does not make them accurate predictors of future spot rates:

- The direction of the predicted change in spot rates is counterintuitive.
    - All other factors constant, an increase in domestic interest rates would be expected to lead to an appreciation of the domestic currency.
    - The equation above suggests otherwise.

- Historical data show that forward rates are poor predictors of future spot rates.
    - Aside from interest rate differentials, exchange rates are influenced by several other factors.

Maturity	Spot Rate or Forward Points
Spot	1.2875
One week	– 0.3
One month	–1.1
three months	–5.5
Six months	–13.3
Twelve months	–26.5

Notice that the absolute number of points increases with maturity. This is because the number of forward points is proportional to the yield differential between the two countries *scaled by the term to maturity.*

- Given the interest rate differential, the longer the term to maturity, the greater the absolute number of forward points.
- Given the term to maturity, the higher the interest rate differential, the greater the absolute number of forward points.

Example: Calculation of Forward Exchange Rates

Spot AUD-USD = 1.0240

Calculate:

1. The 30-day forward AUD-USD exchange rate given that the:
   - 30-day risk-free interest rate in the U.S. = 2%
   - 30-day risk-free interest rate in Australia = 3%

2. The 180-day forward AUD-USD exchange rate given that the:
   - 180-day risk-free interest rate in the U.S. = 2%
   - 180-day risk-free interest rate in Australia = 3%

3. The 180-day forward AUD-USD exchange rate given that the:
   - 180-day risk-free interest rate in the U.S. = 2%
   - 180-day risk-free interest rate in Australia = 4%