Forward Exchange Rate Example

Let's illustrate with an example how the payoffs on a forward contract are calculated using a forward exchange rate contract.

Suppose you are an American investor who purchased bonds issued by the government of Mexico. In 6 months, you will receive an interest payment of 1 million Mexican pesos. However, during the last six months the Mexican currency has been losing its value relative to the United States Dollar (USD). This means that an investor will need more Mexican pesos in order to buy one unit of USD. In other words, if you are an investor who holds Mexican pesos, you will need to pay a higher price to exchange the local currency to the United States currency.

In order to hedge the currency risk you decide to purchase a forward exchange rate contract for the amount of 1 Million Mexican pesos. Remember, that forward contracts are customized and traded over the counter, so you have to negotiate this contract with any counterparty that accepts to the terms of the forward contract.

Suppose that you decide to go to a bank in Mexico and negotiate the forward contract. Let's further suppose that currently the exchange rate between the Mexican peso and the USD dollar is 18 Mexican Pesos per USD. You agree on a six-month forward rate of 20 Mexican Pesos per USD. This means that you agree to sell 1 million Mexican pesos at 20 Mexican Pesos per 1 USD and receive $50,000. Conversely, the bank agrees to buy 1 million Mexican Pesos at an exchange rate of 20 Mexican Pesos per 1 USD and pay you $50,000.

Now let's assume that the spot exchange rate after six months – that is, the current exchange rate at the end of six-months – happens to be 25 Mexican Pesos per USD. Let's compute the payoffs for the both the long and the short position – the buyer of Mexican Pesos, the long position in Mexican pesos, and the seller of Mexican Pesos, the short position in Mexican Pesos.

In this case, you are the seller and therefore have the short position in Mexican Pesos. At maturity of the forward contract, you will sell your Mexican Pesos for USD at the forward price. In return, the bank will have to deliver the USD to you at the forward price. The forward price is the forward exchange rate agreed between the parties.

Let's remember what the payoff to each party in the forward contract is.

- The long position's payoff is $(P_T - F_0)\times S$ where P_T is the spot price at maturity, F_0 is the forward price agreed upon in the forward contract, and S is the size of the contract.
- The short position's payoff is $(F_0 - P_T)\times S$.

In our example,

$$P_T = 25\ \frac{Pesos}{USD} = 0.04 \frac{USD}{Pesos}$$

$$F_0 = 20\frac{Pesos}{USD} = 0.05\frac{USD}{Pesos}$$

The payoff to the long position – the bank that has agreed to buy 1 million Mexican pesos at the forward price – is given by $\left(0.04\ \frac{USD}{Pesos} - 0.05\frac{USD}{Pesos}\right) \times 1{,}000{,}000\ Pesos = -\$10{,}000$.

Conversely, the payoff to the short position that has agreed to sell 1 million Mexican pesos at the forward price is given by $\left(0.05\ \frac{USD}{Pesos} - 0.04\frac{USD}{Pesos}\right) \times 1{,}000{,}000\ Pesos = \$10{,}000$.