# Topic 5: Managing Risk with Futures and Forwards

## Introduction

Currency risk is a form of financial risk that arises due to unanticipated fluctuation in the exchange rates between two currencies.

## Objectives

Objectives by the end of this topic you should be able to:

* Delineates the characteristics of currency futures market as distinct from a currency forward market.
* Discuss hedging in currency futures market.
* Explain how speculators go for futures deal.
* Examines the relationship between futures prices, forward prices and the expected spot price on delivery.

## 

## Topic 5: Notes

**5.0 Introduction**

Currency is a risk form of financial risk that arises due to unanticipated fluctuations in the exchange rates between two currencies. For firms that have assets and liabilities dominated in foreign exchange, managing currency risk is very important .Even virtual currencies such as the notable Bitcoin can be subjected to currency risks especially with their booming growth in recent years

A good way of managing such risk is to make use of currency futures and options.

**5.1 Using Currency Futures to Manage Currency Risk**

Currency futures are standard size contracts of a particular currency that are exchanged on a fixed settlement date. Currency futures allow a firm to hedge transactions exposure by locking the price to buy or sell a foreign currency. There are two techniques of using currency futures to manage risk.

The first technique is to buy currency futures to hedge payables in a foreign currency; if appreciation of the foreign currency is expected .The other is to sell currency futures to hedge receivables, if depreciation of the foreign currency is expected.

**5.1.1 Buying Futures to Hedge Payables**

For example,ENG PLC based in England has a payment of 12.5 million JPY to be made in 2 months time to JPN Private Limited based in Japan.Assuming a current spot rate of #0.0048:

Required. What is the expected payment in sterling pound

£0.0048\*Y 12,500,000 = £60000

(spot rate x amount)

Suppose if the Yen appreciates the spot rate increases to #0.00514 in 2 months”time:

What is the expected payment in sterling pound?

£0.00514 \*Y 12,500,000 = £64,250

(spot rate x amount)

Loss = (64,250-60,000)=4,250

The payment will increase to £64250 instead .The additional payment can be offset if ENG PLC hedges its payables initially by buying a futures contract for JPY 12.5million.Assuming a futures rate of £ 0.00468:

£0.00468 \*Y 12500000 = £58,500

Saving from hedging(64,250-58,500)= 5,750

In home currency (pounds), the futures price is calculated to be #58,500, which is lower than the unhedged payment of £64250. Thus, ENG PLC will not have to worry about adverse fluctuations in the spot rates the price is effectively locked in .

**5.1.2 Selling Futures To Hedge Receivables**

Assuming ENG PLC exports products overseas to countries such as the United States and Kenya .Therefore, receivables in the form of foreign currency can be expected for the company. its financial performance is therefore affected by currency risk and hedging its transaction exposure can diminish this risk.

In order to do so, ENG PLC can sell currency futures to hedge its receivables. For example, if ENG PLC sells 45000 pairs of roller-blades at sh 4,594 per pair to its retailer in Kenya and with a current spot rate of £0.0153:

What is expected payment in sterling pound?

45000 \*4,594 SH= 206,730,000 Shillings

£0.0153 \*206730 000 shilling= £3,162,969

Or (Value \*selling price per unit\*current spot rate

However, due to market instability, depreciation of the Kenya Shillings occurs and the the spot rate falls from £0.0153 to £ 0.0133:

What is the expected payment in sterling pound?

£0.0133 \*206, 730,000sh = £2, 749,509

Loss £3,162,969-£2, 749,509=£413,460

The value of the receivables will be decline from £3,162,969 to only £2, 749,509 in value. This is a loss of £413,460. However, if the firm sells currency futures to hedge its receivables , it would be protected from this unticipated depreciation . For example, if the firm sells 3 months currency futures contract at a rate of £0.0143:

£0.0143 \*206,730,000sh = £2,956,239

Loss prevented through hedging will £2,956,239-£2, 749,509=£206,730

It would be guaranteed £ 2,956,239 in receivables that offsets the spot market losses.

**5.1.3 Using Currency Options to Manage Currency Risk**

Currency options grant the right to buy or sell an asset at a specified price (known as strike or exercise price) at or within a given time, before expiration. There are no obligations as the contract does not have to be fulfilled and can be lapsed .For currency options a premium must be paid even if not exercised.

There are two categories of currency options, call and put up options. A firm can make use of a call option to hedge payables, exercising rights to buy a specific amount of foreign currency. This ensures the firm will not have to pay more than a maximum price. A firm can also make use of a put option to hedges receivables, exercising rights to sell off a specific amount of foreign currency, ensuring a minimum amount of receivables.

**5.1.4 Using Currency Call Options to Hedge Payables**

As described in the example earlier,ENG PLC has payables in JPY(Japanese Yen).An appreciation of the Yen can results in the firm paying more than the expected amount.ENG PLC can make use of currency call options to hedge these payables .Call options will have an exercise price in which it can exercises rights within a given period of time ;ensuring payment will not exceed a maximum price.

Unlike currency futures, the price is not locked in as there no obligation to buy. If the spot rate of upon payment is lower than the exercise price, the firm can choose to lapse the call option and purchase Yen at the cheaper spot rate .However, if the spot rate exceeds the exercise price, the firm can exercise the call option , purchasing Yen at the exercise price.

For example, assuming an exercise price and premium at £0.00504 and £0.00010 respectively and the

Assume a (hedging)spot rate spot rate increases to £0.00524:

Actual £0.00504 +£0.00010 = £0.00514

Even with premium included, the rate of £0.00514 is still lower than the appreciated spot rate of £0.00524 . The maximum loss that ENG PLC can suffer is the premium of £0.0001=(0.00524-0.00514) =0.0001

to purchase call options contract initially.

**5.1.5 Using Currency Put Options to Hedge Receivables**

ENG PLC has receivables in foreign currency from its export business as described earlier.For example , if the company sells 50,000 pairs of roller – blades at $80 each in the United States , it can expect receivables of $4 million in sales. Assuming a current spot rate of #0.66: Premium 0.01

(50,000\*80)=4,000,000

£066 \*$4,000,000 = £2,640,000

ENG PLC can expect receivables worth £2,640,000. If there is depreciation of the US Dollar , the firm will receive less than what is initially expected .For example, if the spot rate decreases to £0.56:

£0.56 \* $4000000 = £ 2,240,000

The firm will receive a smaller amount at £2,240,000 instead. To manage this risk , the firm can use currency put options to hedge its receivables , exercises its rights to purchase at the exercise if necessary. There is no obligation for the firm to sell at the exercise price , the firm can lapse its put option. The firm can then sell the foreign currency at this prevailing spot rate .However , if the spot rate falls, the firm can exercise its put to sell at the exercise price. Assuming an exercise price of spot rate of £0.68 : 4,000,000\*0.68=2,720,000

#0.68 \*$4,000,000= £2,720,000

ENG PLC will be guaranteed £2,720,000 in receivables, regardless of spot rate fluctuations .

Note that a premium is still required and will have to be deducted accordingly to calculate the profit.

(Total value x premium)

0.01\*4,000,000=400,000

Net Profit if there is premium = 2,720,000-400,000= 2,320,000

**5.2 Forward Premium**

A forward premium is frequently measured as the difference between the current [spot rate](https://www.investopedia.com/terms/s/spot_rate.asp) and the [forward rate](https://www.investopedia.com/terms/f/forwardrate.asp), so it is reasonable to assume that the future spot rate will be equal to the current futures rate. According to the forward expectation's theory of exchange rates, the current spot futures rate will be the future spot rate. This theory is rooted in empirical studies and is a reasonable assumption to make over a long-term time horizon.

Typically, it reflects possible changes arising from differences in the interest rate between the two currencies of the two countries involved.

Forward currency [exchange rates](https://www.investopedia.com/terms/e/exchangerate.asp) are often different from the spot exchange rate for the currency. If the forward exchange rate for a currency is more than the spot rate, a premium exists for that currency. A discount happens when the forward exchange rate is less than the spot rate. A negative premium is equivalent to a discount.

**5.2.1 Forward Rate Premium Calculation START**

The basics of calculating a forward rate require both the current spot price of the currency pair and the interest rates in the two countries (see below). Consider this example of an exchange between the Japanese yen and the U.S. dollar.

1. The ninety-day yen to dollar (¥ / $) forward exchange rate is 109.50.
2. The spot rate ¥ / $ rate is = 109.38.

Calculation for annualized forward premium

(Forward exchange rate-spot rate)/spot rate\*(360/no of days given )\*100%

 = ((109.50-109.38÷109.38) x (360 ÷ 90) x 100% = 0.44%

In this case, the dollar is "strong" relative to the yen since the dollar's forward value exceeds the spot value by a premium of 0.12 yen per dollar ie(109.50-109.38=0.12). The yen would trade at a discount because its forward value regarding dollars is less than its spot rate.

To calculate the forward discount for the yen, you first need to calculate the forward exchange and spot rates for the yen in the relationship of dollars per yen.

1. ¥ / $ forward exchange rate is (1÷109.50 = 0.0091324).

(1/Forward exchange rate)

1. ¥ / $ spot rate is (1÷109.38 = 0.0091424).

(1/spot rate)

1. The annualized forward discount for the yen, in terms of dollars = ((0.0091324 - 0.0091424) ÷ 0.0091424) × (360 ÷ 90) × 100% = -0.44%

(Forward exchange rate-spot rate)/spot rate x (360/90) x100

(Forward exchange rate-spot rate)/spot rate)\*(360/90)\* 100%

1. For the calculation of periods other than a year, you would input the number of days as shown in the following example. A three-month forward rate is equal to the spot rate multiplied by (1 + the domestic rate times 90/360 / 1 + foreign rate times 90/360).
2. To calculate the forward rate, multiply the spot rate by the ratio of interest rates and adjust for the time until expiration. So, the forward rate is equal to the spot rate x (1 + foreign interest rate) / (1 + domestic interest rate).
3. As an example, assume the current U.S. dollar to euro exchange rate is $1.1365. The domestic interest rate, or the U.S. rate is 5%, and the foreign interest rate is 4.75%. Plugging the values into the equation results in: F = $1.1365 x (1.05 / 1.0475) = $1.1392. In this case it reflects a forward premium.

**5.2.2 What is a Forward Discount?**

A forward discount is a term that denotes a condition in which the forward or expected future price for a [currency](https://www.investopedia.com/terms/c/currency.asp) is less than the [spot price](https://www.investopedia.com/terms/s/spotprice.asp). It is an indication by the market that the current domestic exchange rate is going to decline against another currency. This forward discount is measured by comparing the current spot price with the spot price plus net interest payments over a given length of time, to the price of a forward exchange contract for that same length of time. If the forward contract price is less than the spot plus expected interest payments, then the condition of a forward discount exists.

**5.2.3 How a Forward Discount Works**

While it often occurs, a forward discount does not always lead to a decline in the currency exchange rate. It is merely the expectation that it will happen because of the alignment of the spot, forward, and [futures](https://www.investopedia.com/terms/f/futures.asp) pricing. Typically, it reflects possible changes arising from differences in [interest rates](https://www.investopedia.com/terms/i/interestrate.asp) between the currencies of the two countries involved.

Forward currency exchange rates are often different from the spot exchange rate for the currency. If the forward exchange rate for a currency is more than the spot rate, a [premium](https://www.investopedia.com/terms/p/premium.asp) exists for that currency. A discount happens when the forward exchange rate is less than the spot rate. A negative premium is equivalent to a discount.

**5.2.4 Example of Calculating Forward Discount**

The basics of calculating a forward rate requires both the current spot price of the currency pair and the interest rates in the two countries (see below). Consider this example of an exchange between the [Japanese yen](https://www.investopedia.com/terms/j/jpy.asp) and the U.S. dollar.

* The ninety-day yen to dollar (¥ / $) forward exchange rate is 109.50.
* The spot rate ¥ / $ rate is = 109.38.

Calculation for an annualized [forward premium](https://www.investopedia.com/terms/f/forwardpremium.asp) = (109.50-109.38÷109.38) x (360 ÷ 90) x 100% = 0.44%

In this case, the dollar is "strong" relative to the yen since the dollar's forward value exceeds the spot value by a premium of 0.12 yen per dollar. The yen would trade at a discount because its forward value regarding dollars is less than its [spot rate](https://www.investopedia.com/terms/s/spot_rate.asp).

To calculate the forward discount for the yen, you first need to calculate the forward exchange and spot rates for the yen in the relationship of dollars per yen.

* ¥ / $ forward exchange rate is (1÷109.50 = 0.0091324).
* ¥ / $ spot rate is (1÷109.38 = 0.0091424).

The annualized forward discount for the yen, in terms of dollars = ((0.0091324 - 0.0091424) ÷ 0.0091424) × (360 ÷ 90) × 100% = -0.44%

For the calculation of periods other than a year, you would input the number of days as shown in the following example. For a three-month forward rate: Forward rate = spot rate multiplied by (1 + domestic rate times 90/360 / 1 + foreign rate times 90/360).

To calculate the forward rate, multiply the spot rate by the ratio of interest rates and adjust for the time until expiration.

Forward rate = Spot rate x (1 + foreign interest rate) / (1 + domestic interest rate).

As an example, assume the current U.S. dollar to [euro](https://www.investopedia.com/terms/e/euro.asp) exchange rate is $1.1365. The domestic interest rate or the U.S. rate is 5%, and the foreign interest rate is 4.75%. Plugging the values into the equation results in: F = $1.1365 x (1.05 / 1.0475) = $1.1392. In this case, it reflects a forward premium.

**Revision Questions**

1. Explain the basic differences between the operations of a currency forward market and a futures market.

2. Which among the following exchange rates allows to enter into a contract at a fixed price today to buy or sell a currency 30 days from now?

a. Exchange rate option

b. Effective exchange rate

c. Reciprocal exchange rate

d. Forward exchange rate