

Example:

- Today you sign a contract specifying that you are to buy 1000 computers à 1.000 EUR.
- The computers will be delivered and the payment is due in 6 months.
- Today's exchange rate: 10.00 SEK/EUR.
- The exchange rate in 6 months: X .
- Payment due in 6 months:

$$1.000.000 \cdot X \text{ SEK.}$$

Today we have no way of knowing X .

Strategies to protect against the currency risk:

1. Buy 1.000.000 EUR today and deposit them in a bank account for six months. This will cost you 10.000.000 SEK.
2. Buy a **forward contract** for 1.000.000 EUR with delivery in six months.

A **forward contract** for 1.000.000 EUR with delivery in six months between a bank and your company stipulates that

- the bank will deliver 1.000.000 EUR to your company in six months,
- you have to pay the **forward exchange rate/forward price** K SEK/EUR.

Note that the forward exchange rate (forward price) K is determined today!

Suppose that $K = 10.10$ SEK/EUR.

- $X = 10.30$

You make a “profit” of $10.300.000 - 10.100.000 = 200.000$, thanks to the forward contract.
(Good)

- $X = 9.80$

You make a “loss” of $10.100.000 - 9.800.000 = 300.000$, because of the forward contract. (Bad)

A third possible strategy is to buy a **European call option**.

The holder of this contract has the right to
buy

1.000.000 EUR

on

September 20 2018

at the rate of

10.10 SEK/EUR

With a European call option

(strike price 10.10)

- $X = 10.30$

You exercise the option and buy 1.000.000 EUR at the price of 10.100.000 SEK, despite the fact that the market price is 10.300.000 SEK. (Good)

- $X = 9.80$

You abstain from exercising the option and buy 1.000.000 EUR at the price of 9.800.000 SEK. (Good)

Financial derivatives

A financial derivative

- involves an uncertain claim in the future, often called a **contingent claim**
- is a **derivative** asset in the sense that it is defined in terms of an underlying asset.

Examples of financial derivatives:

- European call and put options
- American options
- Forward rate agreements
- Convertibles
- Futures
- Bonds and bond options
- Caps och floors
- Interest rate swaps

Question:

What is a “fair” price for the option?

Two common guesses:

1. The price of the derivative is the expectation of the discounted future payoff.
2. There is no “correct price”, since such a price is determined by supply and demand on each particular market.

Both answers are wrong!

Note: The stock already has a price!

It is possible to determine a “correct” price for a derivative and this price is not the price given by the guess 1.

The philosophy behind pricing with arbitrage theory

- The call option is defined **in terms of** the underlying stock.
- The price of the call option will therefore have a certain relation to the stock price or there will be mispricing on the market.
- We want the pricing on the market to be **consistent**.
- We can not given the price in “absolute” terms, but will price the call option **in terms of** the price of the stock.