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: 9.50 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 9.500.000 SEK.

2. Buy a **forward contact** 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 $K = 9.60$ SEK/EUR.

- $X = 9.80$

  You make a "profit" of 9.800.000 - 9.600.000 = 200.000, thanks to the forward contract. (Good)

- $X = 9.30$

  You make a "loss" of 9.600.000 - 9.300.000 = 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 2017

at the rate of

9.60 SEK/EUR

With a European call option

(strike price 9.60)

- $X = 9.80$

  You exercise the option and buy 1.000.000 EUR at the price of 9.600.000 SEK, despite the fact that the market price is 9.800.000 SEK. (Good)

- $X = 9.30$

  You abstain from exercising the option and buy 1.000.000 EUR at the price of 9.300.000 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.