Financial Management

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Lecture 9

Content:

- Leasing
- Option basics
- Option payoffs at expiration

Leasing

Leasing is a contract between two parties:

- the **lessor**, who owns the asset (a car, land, equipment, etc.) and grants the lease;
- the **lessee**, who obtains use of the property in exchange for ease payments.

Finance (or capital) leases are generally longer term, and the lessee has the option or obligation to purchase the ownership of the asset at the end of the lease, usually for a low price. They are recorded in the balance sheet.

Leasing

A special kind of finance lease is the **sale and leaseback** agreement. Here the owner sells the asset and then retains its use by entering a leasing agreement. This is generally done to free up cash.

Operating leases are typically short-term, and the asset is generally returned to the lessor at the end of it.

Reasons for entering a leasing agreement instead of buying the asset involve lower initial costs, more flexibility, and tax benefits.

Option basics

Financial option: a contract that gives its owner the right (but not the obligation) to purchase or sell an asset at a fixed price at some future date.

- **Call option:** gives the owner the right to buy the asset;
- **Put option:** gives the owner the right to sell the asset.

Option writer: the person who takes the other side of the contract, who sells the option for a **premium** (the price of the option). This person has the obligation to sell the asset at the stipulated price if the owner of the call option exercises it, and to buy it if the owner of a put price exercises it.

Option basics

The **buyer** (or “holder”) of an option has a **long** position.

The **seller** (or “writer”) of an option has a **short** position.

When the holder of an option enforces the agreement and buys or sells a share of stock at the agreed-upon price, he is **exercising** the option.

Strike price (or exercise price): the price at which the holder buys or sells the share of stock when the option is exercised.

Open interest: the total number of outstanding contracts of an option.

Option basics

American options: allow their holders to exercise the option on any date up to and including a final date (**expiration date)**.

European options: allow their holders to exercise the option only on the expiration date, not before.

Asian options: the payoff depends on the average price of the underlying asset over a certain period of time.

Option basics

The option is said to be **at-the-money** when its exercise price is equal to the current price of the stock

The option is **in-the-money** if the payoff from exercising it immediately is positive. This happens when the strike price is:

- is below the current stock price for call options
- is above the current stock price for put options

The option is **out-of-the-money** if the payoff from exercising it immediately is negative. This happens when the strike price:

- is above the current stock price for call options
- is below the current stock price for put options

Option payoffs at expiration

Options are only exercised when they are in-the-money. Otherwise they are useless and their value is zero.

Thus, for the holder (long position), if S is the stock price at expiration, K is the exercise price, C is the value of the call option and P is the value of the put option:

- the value of the call at expiration is

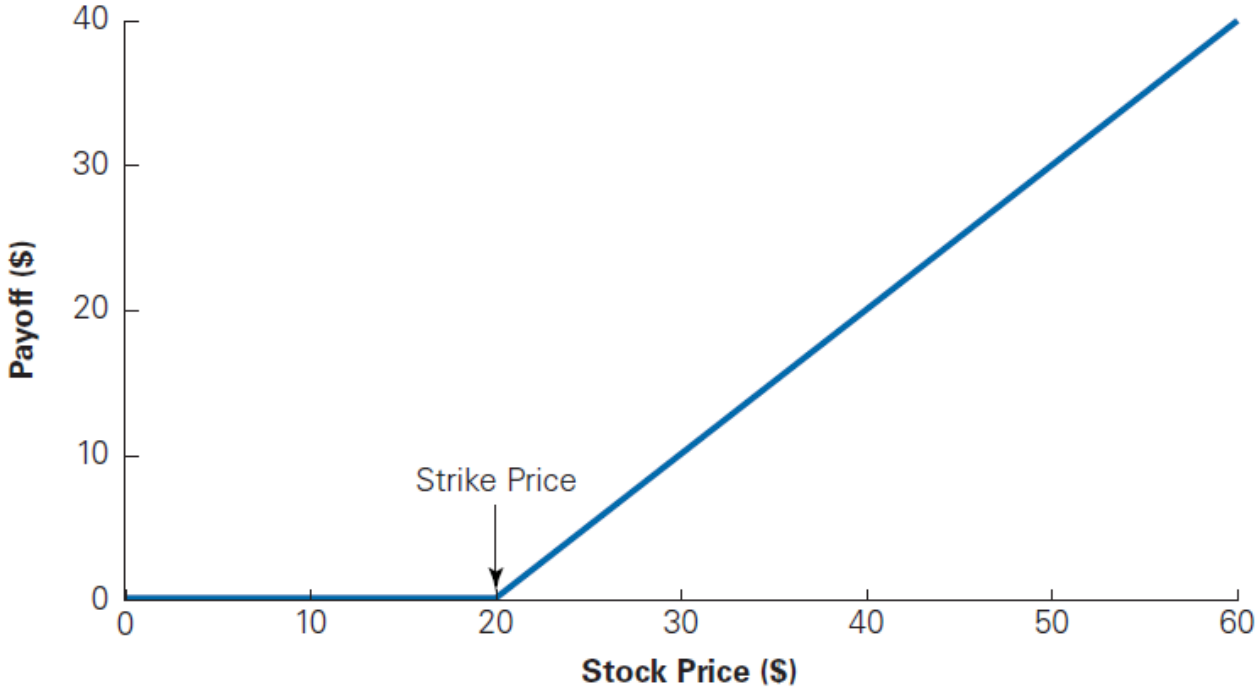
$$C = \max(S - K, 0)$$

- the value of the put at expiration is

$$P = \max(K - S, 0)$$

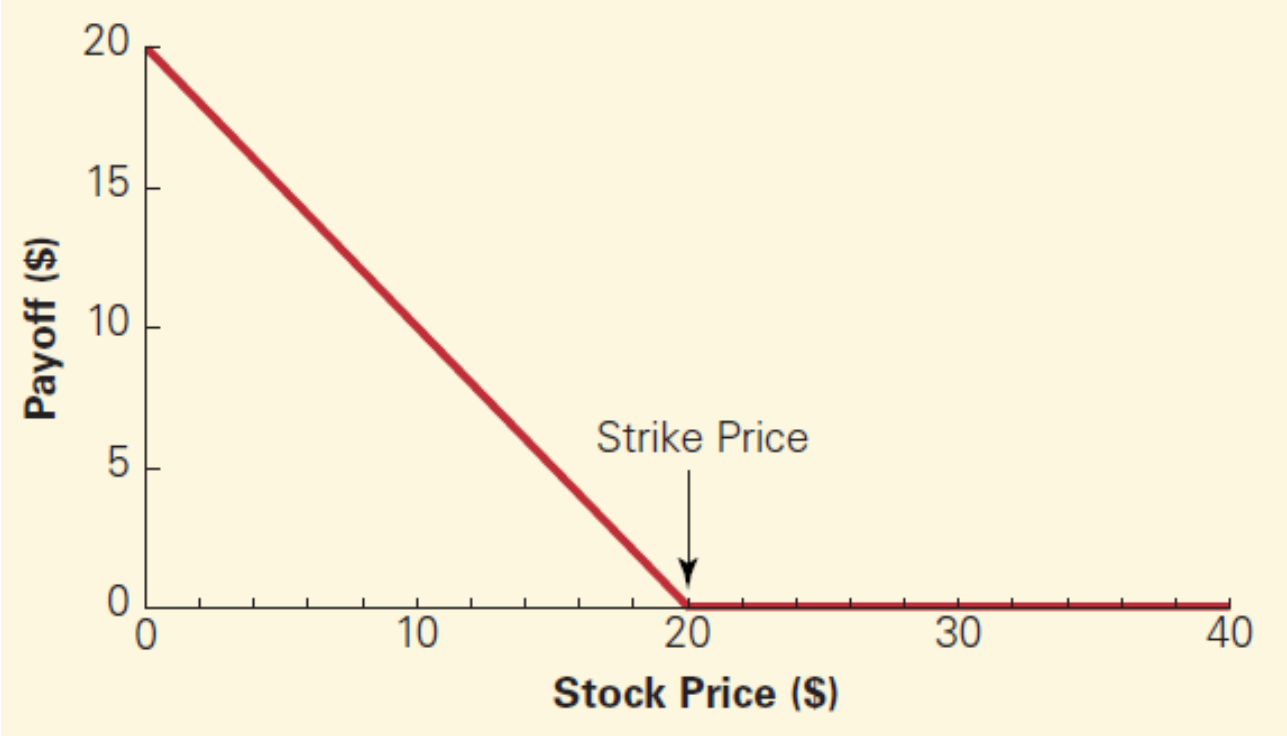
Option payoffs at expiration

Example: holder's payoff of a call option with a strike price of 20$ (i.e., it gives the owner the right to buy the stock at a price of 20$)



Option payoffs at expiration

Example: holder's payoff of a put option with a strike price of 20$ (i.e., it gives the owner the right to sell the stock at a price of 20$)



Option payoffs at expiration

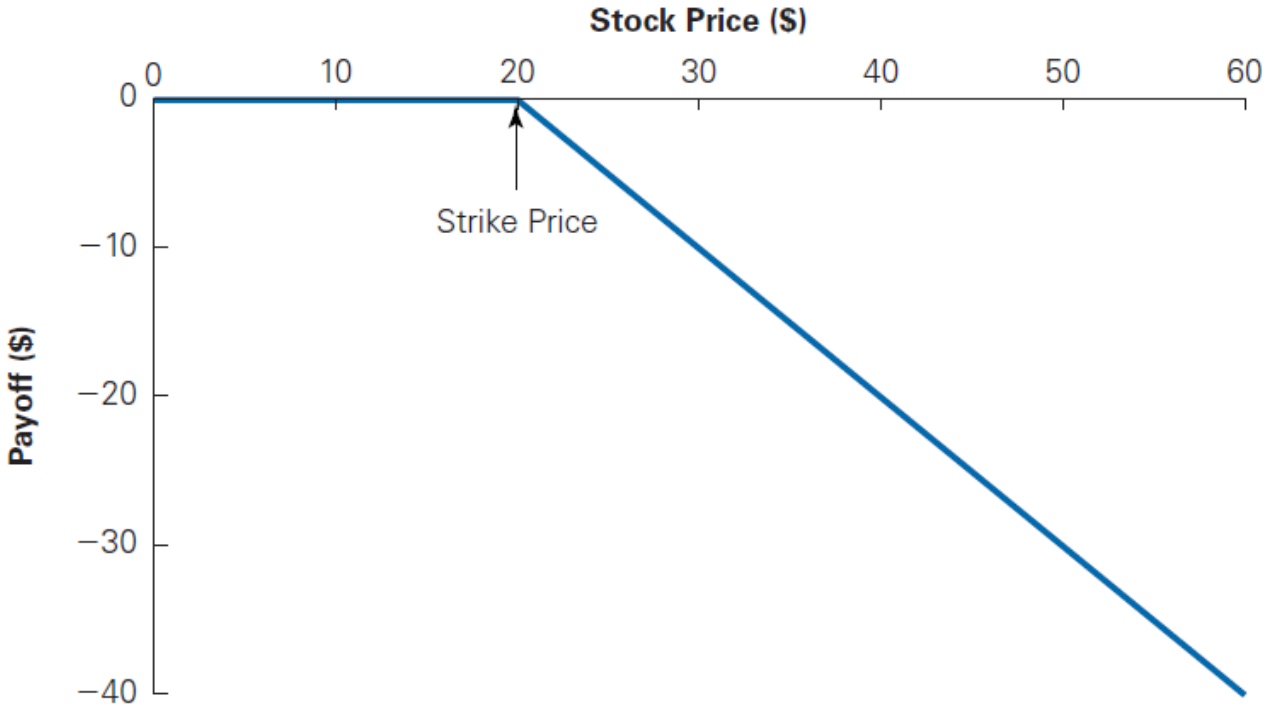
The seller (short position) only profits from the premium (i.e., the price paid by the holder to buy the option contract). The payoff at expiration for the seller can thus only be zero or negative: the short position's cash flows are the negative of the long position's cash flows.

If S is the stock price at expiration and K is the exercise price:

- the seller's cash flow of the call at expiration is
$$-\max(S - K, 0)$$
- the seller's cash flow of the put at expiration is
$$-\max(K - S, 0)$$

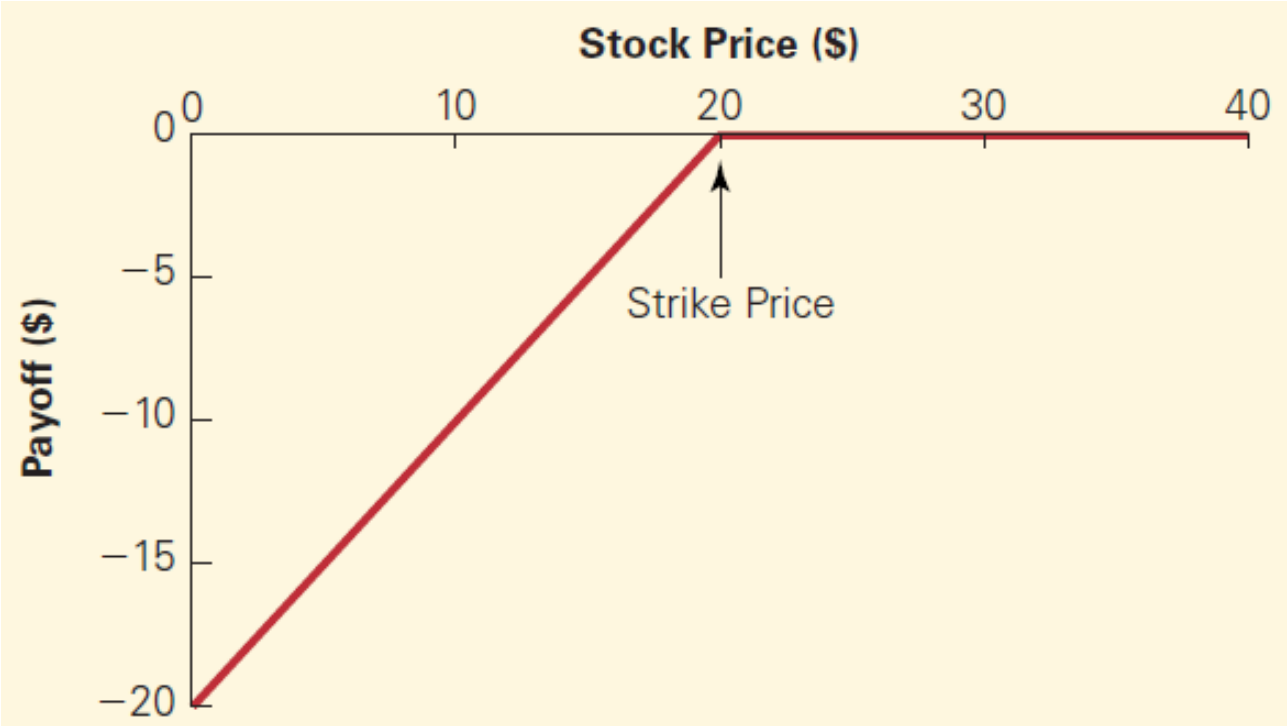
Option payoffs at expiration

Example: writer's payoff of a call option with a strike price of 20$ (i.e., it gives the owner the right to buy the stock at a price of 20$)



Option payoffs at expiration

Example: writer's payoff of a put option with a strike price of 20$ (i.e., it gives the owner the right to sell the stock at a price of 20$)



Option payoffs at expiration

As the stock price cannot fall below 0, but can always rise:

- the upside (downside) of a call option for the holder (writer) is unlimited
- the upside (downside) of a put option for the holder (writer) is limited to the strike price

To compute the overall profit or loss of a position in an option, we should also account for the option price p.

Option payoffs at expiration

Thus, for the holder, if S is the stock price at expiration, K is the exercise price, and p is the price paid to buy the option, the overall cash flow of the contract it:

- for a call: $\max(S - K, 0) - p$
- for a put: $\max(K - S, 0) - p$

While for the writer the overall cash flow of the contract is:

- for a call: $-\max(S - K, 0) + p$
- for a put: $-\max(K - S, 0) + p$

Option payoffs at expiration

Option positions can be combined to achieve various goals.

One of the simplest combinations is the **straddle**: buying both a call and a put option on a certain stock.

The payoff of this portfolio of options at expiration is zero if the stock price is exactly equal to the strike price, and positive in all other cases.

However, we need to account for the cost of implementing the strategy (i.e. the money paid to buy the options).

The profits are therefore negative if the stock price at expiration is equal or close to the strike price.

Option payoffs at expiration

Payoff and profit at expiration for the investor who buys a portfolios of options to implement a straddle: