

# **Introduction to Options: Rights, Insurance and Trading Decisions**

A Simple Introduction for Non-Experts

---

## From Stocks to Options

---

# From Owning to Having a Right

Up to now we talked about:

- **Stocks**: you own a tiny piece of a company.
- Your profit or loss moves directly with the stock price.

An **option** is different:

- It is a **contract**, not a share.
- It gives you a **right**, not an obligation:
  - A right to **buy** later (a **call** option).
  - Or a right to **sell** later (a **put** option).
- Because you get this right, you pay a **premium** today, like paying for an insurance policy.

## The Ingredients of an Option

Every option contract has a few key parts:

- **Underlying:** the thing the option is about (e.g. Apple stock).
- **Strike price  $K$ :** the special deal price in the contract.
- **Expiration date:** last day when the right can be used.
- **Premium:** the price you pay *today* to buy the option.
- **Call option:** right to **buy** at  $K$ .
- **Put option:** right to **sell** at  $K$ .

**Story:** It is like paying a small fee now to reserve a deal for later:

- Pay a fee to keep the right to buy a house at a fixed price.
- Pay a fee to keep the right to sell your house at a fixed price.

## Long Call: Right to Buy

---

## Long Call: Basic Idea

A **long call** means: you **buy** a call option.

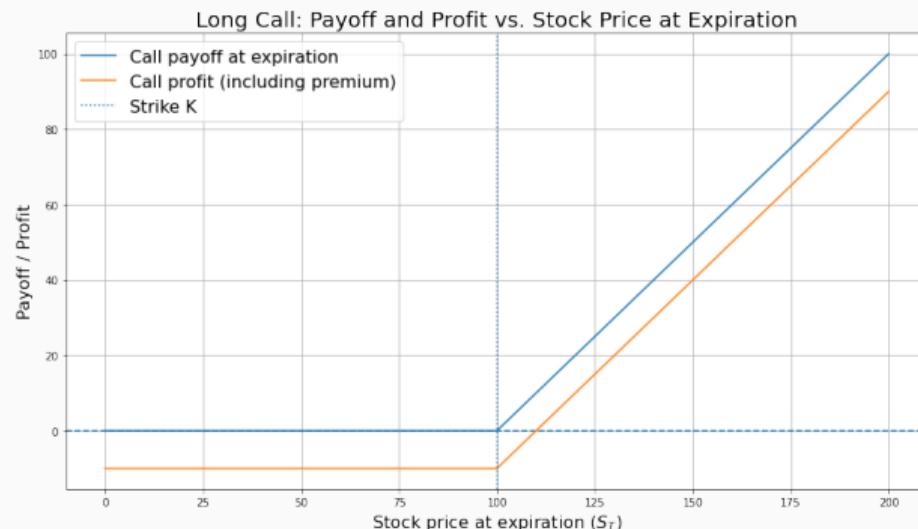
- You pay a premium  $C$  today.
- At expiration, if the stock price is  $S_T$ :
  - If  $S_T \leq K$ , you **do nothing**. Buying at  $K$  would be worse than buying in the market.
  - If  $S_T > K$ , you use your right to buy at  $K$ , which is cheaper than the market price.

**Mathematical shape:**

$$\text{Call payoff} = \max(S_T - K, 0).$$

**Story:** This is “how much better” your special deal  $K$  is than the real price  $S_T$ . If the stock ends below  $K$ , your deal is useless, so the payoff is zero.

# Long Call: Payoff and Profit in Pictures



The plot shows:

- **Blue line** = payoff  $\max(S_T - K, 0)$  at expiration.  
Below the strike  $K$ , it is flat at zero.  
Above  $K$ , it rises with slope 1.
- **Orange line** = profit, after subtracting the premium  $C$  we paid.

Key points:

- Maximum loss is the premium  $C$  (flat orange line for low  $S_T$ ).
- If the stock goes far above  $K$ , profit grows almost like stock, just shifted down by  $C$ .
- This is like buying a lottery ticket that only pays if the stock goes high

## **Long Put: Right to Sell**

---

## Long Put: Basic Idea

A **long put** means: you **buy** a put option.

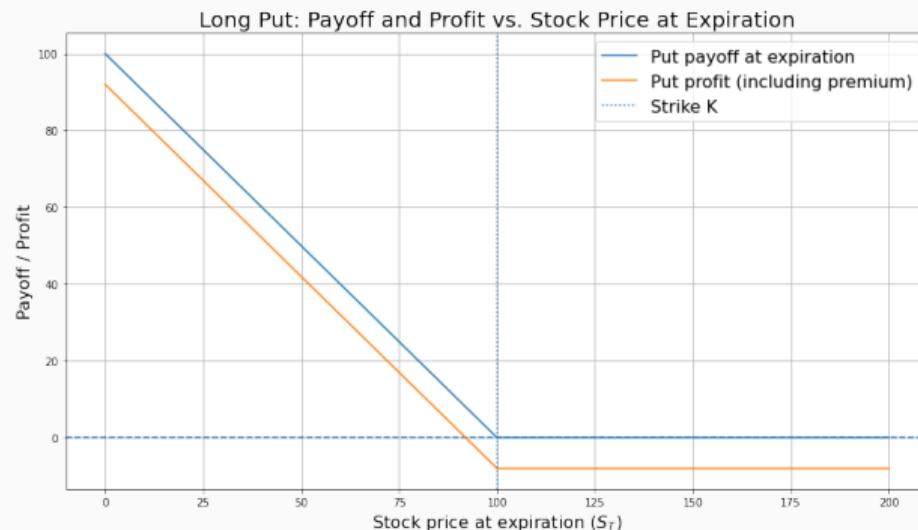
- You pay a premium  $P$  today.
- At expiration, stock price is  $S_T$ :
  - If  $S_T \geq K$ , you **do nothing**. Selling at  $K$  would be worse than selling in the market.
  - If  $S_T < K$ , you use your right to sell at  $K$ , which is better than the low market price.

**Mathematical shape:**

$$\text{Put payoff} = \max(K - S_T, 0).$$

**Story:** The put behaves like **insurance**: if the price crashes far below  $K$ , your contract lets you sell at  $K$  anyway.

# Long Put: Payoff and Profit in Pictures



The plot shows:

- **Blue line** = payoff  $\max(K - S_T, 0)$ . On the right (high  $S_T$ ), it is zero. On the left (low  $S_T$ ), it rises as the stock falls.
- **Orange line** = profit after subtracting premium  $P$ .

Key points:

- If the stock stays high, the put expires worthless; loss is limited to  $P$  (the insurance cost).
- If the stock crashes, the profit grows as price falls, because your right to sell at  $K$  becomes very valuable.

## **Using Puts as Insurance**

---

## Protective Put: Insurance for Your Stock

Suppose you:

- Already **own** 1 share of stock, bought at price  $K$ .
- Buy a put option with the same strike  $K$  to **protect** yourself.

At expiration:

- You still have the stock, worth  $S_T$ .
- The put gives you extra value  $\max(K - S_T, 0)$ .

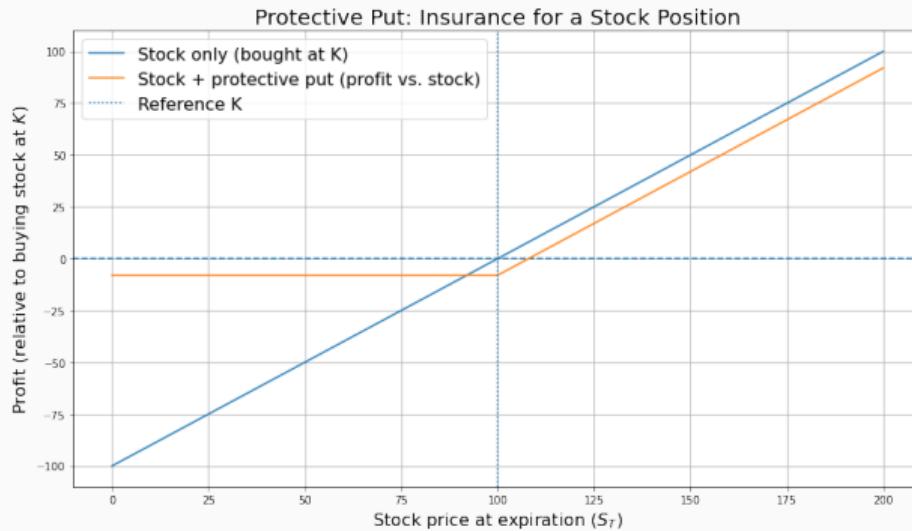
So, ignoring the original cost of the stock, the extra profit from the put is:

$$\text{Extra profit from put} = \max(K - S_T, 0) - P.$$

**Story:** This is exactly like home insurance:

- You pay  $P$  every year.
- If nothing bad happens, you “lose” the premium, but keep your house.
- If disaster strikes, the insurance covers the big loss.

# Protective Put in Pictures



The plot compares:

- **Blue line:** profit from owning the stock only (relative to buying at  $K$ ). It falls without bound if  $S_T$  goes to zero.
- **Orange line:** stock plus protective put, after paying  $P$ .

Key points:

- With the put, your loss is **capped** beyond a certain level.
- You have traded some upside (cost of  $P$ ) for **safety** on the downside.

## Selling Options: Being the Insurer

---

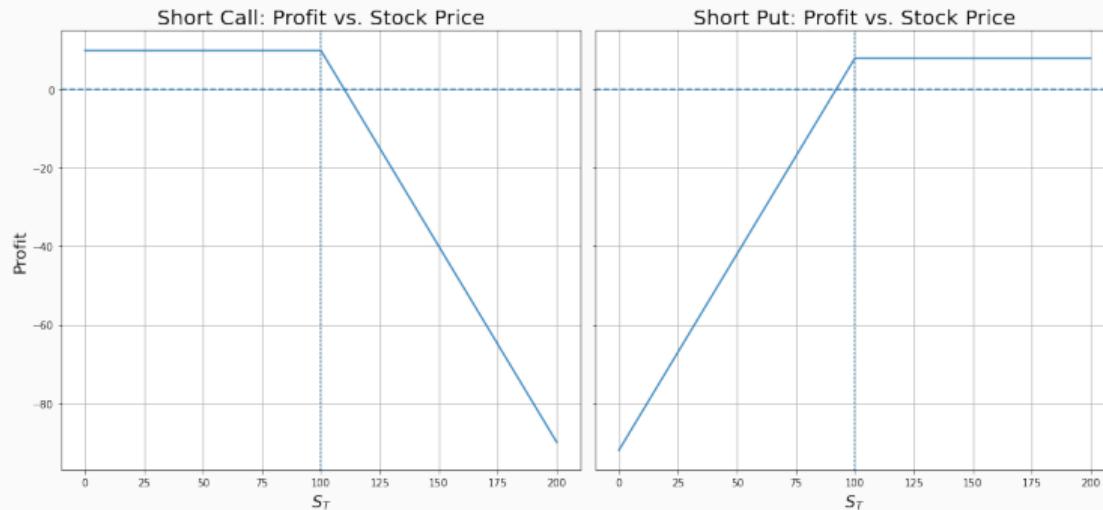
## Short Options: Collecting Premium, Taking Risk

Until now we were the **buyer** of options. We can also be the **seller** (writer) of options.

- **Short call:** you sell someone else the right to buy from you at  $K$ .
  - You receive the premium  $C$  now.
  - If the stock explodes upward, you may have to sell cheaply at  $K$ .
- **Short put:** you sell someone else the right to make you buy at  $K$ .
  - You receive premium  $P$  now.
  - If the stock crashes, you must buy at  $K$ , taking a large loss.

**Story:** Selling options is like being the **insurance company**: you earn small money most of the time, but take big hits in bad scenarios.

# Short Call and Short Put in Pictures



On both panels:

- The flat, horizontal region is where the option expires worthless: you keep the premium (small gain).
- The sloping region shows where your losses grow as the stock moves strongly against you.

Message:

- Selling options can look calm and profitable in normal times.
- But the *shape* of the payoff hides the possibility of very large losses on rare, extreme moves.

## Time and Option Value

---

## Time to Expiration: Why Time Has a Price

An option's price has two parts:

- **Intrinsic value:** what you would get if you exercised it *right now*.
  - Call:  $\max(S - K, 0)$ .
  - Put:  $\max(K - S, 0)$ .
- **Time value:** extra value because there is still time for the stock to make a big move.

**Story:** Time is like extra *lottery draws*:

- More time  $\Rightarrow$  more chances for a big favorable move  $\Rightarrow$  option is worth more.
- As expiration gets close, those chances disappear, and time value **melts away**.

# Call Price vs Stock Price for Different Times



The plot shows the model price of a call option for:

- $T = 1.0$  year (blue),
- $T = 0.5$  years (orange),
- $T = 0.1$  years (green).

**Key observations:**

- For the same stock price  $S$ , a longer time  $T$  means a higher option price: more time, more possibilities.
- As  $T \rightarrow 0$ , the curve gets closer to the straight line  $\max(S - K, 0)$ , which is pure intrinsic value.
- This illustrates **time decay**: if the stock does not move enough, the option can lose value just because the clock is ticking.

## Why Traders Use Options

---

# How Options Are Used in Trading

Options are not magic; they are just flexible tools. Traders and investors use them mainly for three purposes:

- **Insurance (hedging):**

- Example: own a stock, buy a put to cap the downside.
- Like buying home or health insurance.

- **Speculation:**

- Example: buy calls if you believe the stock will jump up.
- Small upfront cost, large potential gain, but easy to lose 100% of the premium.

- **Income strategies:**

- Example: sell options to collect premium, often with some hedge.
- Like being the insurance company: many quiet days, occasional storms.

**Important:** The nice payoff shapes do not remove risk; they simply reshape *how* and *when* gains and losses can happen.

## What You Should Remember

- A **call** is a right to buy; a **put** is a right to sell.
- The payoff shapes are simple:
  - Long call:  $\max(S_T - K, 0)$ .
  - Long put:  $\max(K - S_T, 0)$ .
- Buying options:
  - Limited loss (premium), potentially large gain.
  - Time works **against** you (time decay).
- Selling options:
  - Limited gain (premium), potentially large loss.
- Options can be powerful for:
  - Protecting portfolios,
  - Expressing views on direction and volatility,
  - Structuring payoffs that match your risk appetite.