

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.

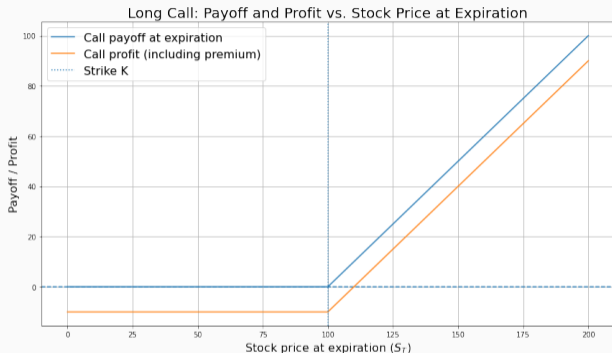
- You pay a premium C today.
- At expiration, if the stock price is S_T :
 - If $S_T \leq K$, you **do nothing**. Buying at K would be worse than buying in the market.
 - If $S_T > K$, you use your right to buy at K , which is cheaper than the market price.

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.

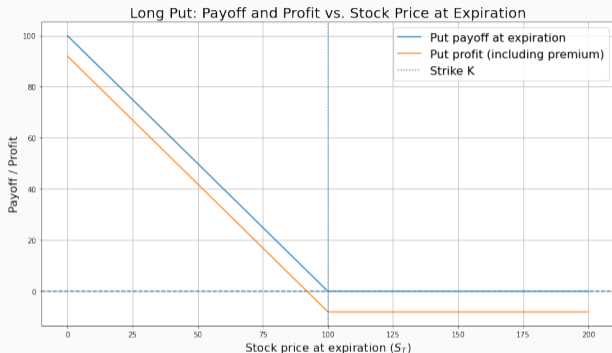
- You pay a premium P today.
- At expiration, stock price is S_T :
 - If $S_T \geq K$, you **do nothing**. Selling at K would be worse than selling in the market.
 - If $S_T < K$, you use your right to sell at K , which is better than the low market price.

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 $\max(K - S_T, 0)$.

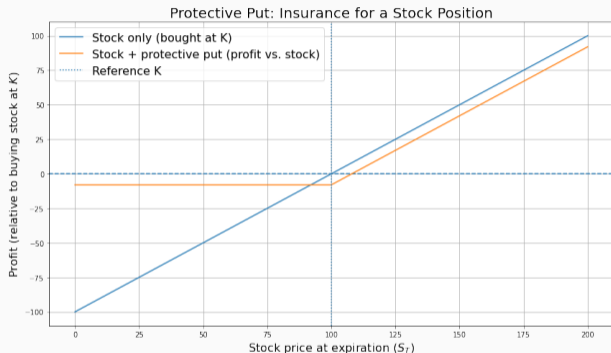
So, ignoring the original cost of the stock, the extra profit from the put is:

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

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

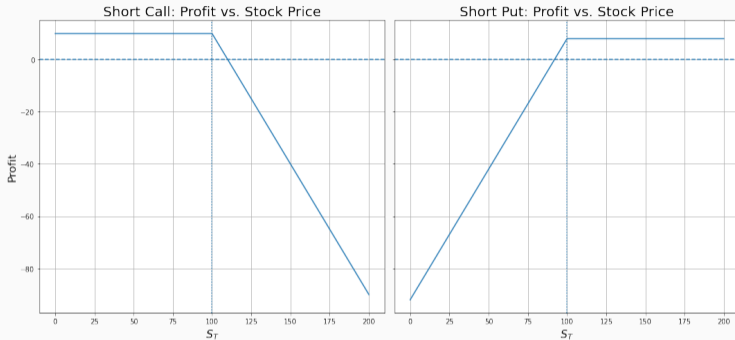
Short Options: Collecting Premium, Taking Risk

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.