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# Put Options

**Scenario:** Suppose you hold a share of stock  $X$  and

- you're afraid the price of stock will plummet, but
- you're unwilling to sell it lest you lose out on any potential advances in the stock price.

There is a financial product for you!

## Definition

A put option is the right, but not an obligation, to sell a share of stock at some time in the future at a fixed, predetermined price.

- The time interval  $T$  is called the **time to expiry**, and
- the fixed price is called the **strike price**  $K$ .

**Benefits:** Suppose that the current price of stock  $X$  is  $K$  and you own a put option to sell a share of the stock 1 year from now for  $K$ . Suppose that  $S$  is the market price of the stock after one year. There are three possibilities:

- $S < K$ . You hold the right, but not obligation, to sell the stock at the price  $K$ ; you should choose to do so! If you **exercise** the option, you can start by buying the stock at  $S$ , then sell it at  $K$ , for a net profit of  $K - S$ .
- $S > K$ . You should not **exercise** the option. You can sell the stock for more on the open market!
- $S = K$ . You can exercise the option or not. Either way, your price for selling the stock is the same.



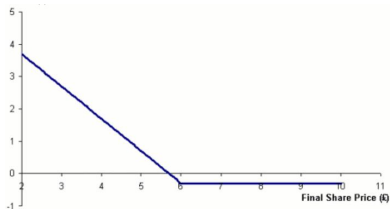
# Put Options

Generally, the put option is an agreement entered into with **another party**: the person who will have to buy the share from you at the strike price  $K$  at the time of expiry  $T$ .

**Note:** This seems like a losing proposition for the other party. From the above description, there is only upside for you! Tails you lose, heads I win!

**However:** Since no reasonable person will enter into such a contract with you, you will have to **pay** them to do so. The amount is called the **price** of the option.

Payoff Diagram



- strike price  $K = 6$
- cost of option  $C = .30$

Note that payoff is greater than 0 when  $S < 5.70$ .



## Put Options: Original Scenario

**Scenario:** Suppose you hold a share of stock  $X$  and

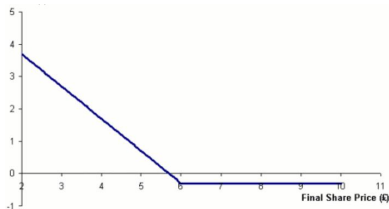
- you're afraid the price of stock will plummet, but
- you're unwilling to sell it lest you lose out on any potential advances in the stock price.

**Solution:** Buy a put option with a strike price equal to the current price of the stock.

- If the stock price falls, you will be compensated by executing the put option.
- If the stock price rises, your put option will be worthless, **but** you get to keep the gains in the stock price.

All this just for the price of buying one put option!

Payoff Diagram



- strike price  $K = 6$
- cost of option  $C = .30$

Note that payoff is greater than 0 when  $S < 5.70$ .

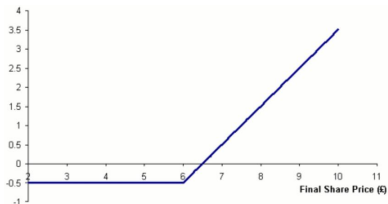


# Call Options

## Definition

A call option is the right, but not an obligation, to purchase a share of stock at some time in the future at a fixed, predetermined price.

- The time interval  $T$  is called the **time to expiry**, and
- the fixed price is called the **strike price  $K$** .

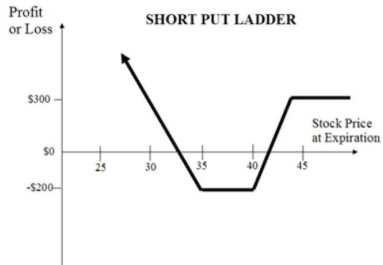
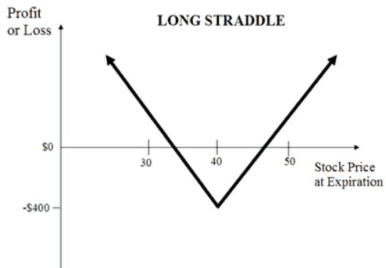


**Benefits:** Suppose that the current price of stock  $X$  is  $K$  and you own a call option to purchase a share of the stock 1 year from now for  $K$ . Suppose that  $S$  is the price of the stock after one year. There are three possibilities:

- $S < K$ . You hold the right, but not obligation, to purchase the stock at the price  $K$ ; hence you will choose not to **exercise** the option. You can buy the stock cheaper on the open market!
- $S > K$ . You should exercise the option to purchase the stock for  $K$ ; its current price is  $S$ , so you can turn around and make a profit of  $S - K$ .
- $S = K$ . You can exercise the option or not. Either way, your price for the stock is the same.



# Funkier Options



Images from theoptionsguide.com

