

2 MATH3733

2.1 European Put Option: example

Assume today is April 2001 and the price of one share of stock XYZ is \$47. A corresponding line in a newspaper would read

XYZ July-2001 50 put 8

How to understand this?

1. XYZ is a name of a company.
2. July 2001 is an *expiry date*; remember in the UK the expiry date is always *18.00 of the third Wednesday of a month*.
3. \$ 50 is an *exercise price* or *strike price* of this *put* option. That is, at expiry the owner has a right to *sell* a share of stock for \$50. If the real market price will be *less*, the owner will exercise his right, i.e. he will *buy a share of stock for the market price and immediately sell it to the writer of the put option contract for the strike price*; hence, he gets a profit. If the market price at expiry is greater than \$50 the owner of this put would lose money invested in this option.
4. Put means put option.
5. \$8 is the price of this option today (in April 2001). This is the trading price or *premium price* of the option. Notice it is much less than the strike price.

What may happen in July if I buy the European option put and wait till July?

- (a) One share of stock costs \$45 (for example). Then I will exercise my right to sell a share of stock for the exercise price, \$50. I buy a stock *shortly* for \$45 and immediately sell it for \$50. My gain or payoff is $50 - 45 = 5$ (ignoring for the moment initial payment \$8).
- (b) The stock costs \$54. Then it is not reasonable to exercise my right. The gain or payoff is zero.

Notice that the **profit or loss (P&L)** might be negative even if the payoff is positive: in our example in case (a) the payoff is equal to \$5 but the correspondent P&L is - \$3. However, if the stock at expiry costs less than \$42, the P&L would be positive.

2.2 Why buy options, not bonds, or commodities?

1. **First reason - speculation.** There are chances to win a profit spending a small amount of money (it is called *leverage* or *gearing*), much less than if buying or selling underlying stocks: an option price is much less than that of a share of stock.
 - (a) **For the European call option.**
 - i. **For the owner** (called **long position**). A possible **loss** of the owner of a call option is bounded by its premium which is always much less than the price of the corresponding underlying asset – share of stock. On the other hand, a possible profit is only slightly less than a possible profit for the share of stock.
 - ii. **For the writer** (called **short position**). A possible loss is unbounded, but still it is less than that for the share of stock. Also, there is a possibility that the price of a share of stock at expiry will be less than the strike price (=exercise price); in this case the writer keeps his premium.
 - (b) **For the European put option.**
 - i. **For the owner (long position)**. A loss is bounded by the premium – which is much less than the stock price, – while there is a chance to gain a profit if the strike price at expiry is greater than the stock price.
 - ii. **For the writer (short position)**. A loss = strike price minus stock price (provided this difference > 0) minus premium: this is less (- premium) than if selling a share of stock, and there is a chance to keep the premium.
2. **Second reason - hedging.** This is a very essential concept: options are used as some sort of **insurance** by dealers on the market. If a dealer is
 - (a) **buying** some asset (**long position**) and wishing to reduce possible losses because of **decreasing** of its price, he might buy a corresponding put option; this will
 - i. reduce possible profit, but
 - ii. give a cheap way to eliminate possible losses;
 - (b) if he is **selling** some asset (**short position**), he might also wish to reduce his possible loss because of a possible **increase** of the price for this stock; then he might buy correspondent call option which again
 - i. reduces his profit in the case if the stock price goes down, but
 - ii. eliminates any risk in the case of the increase of the stock price.