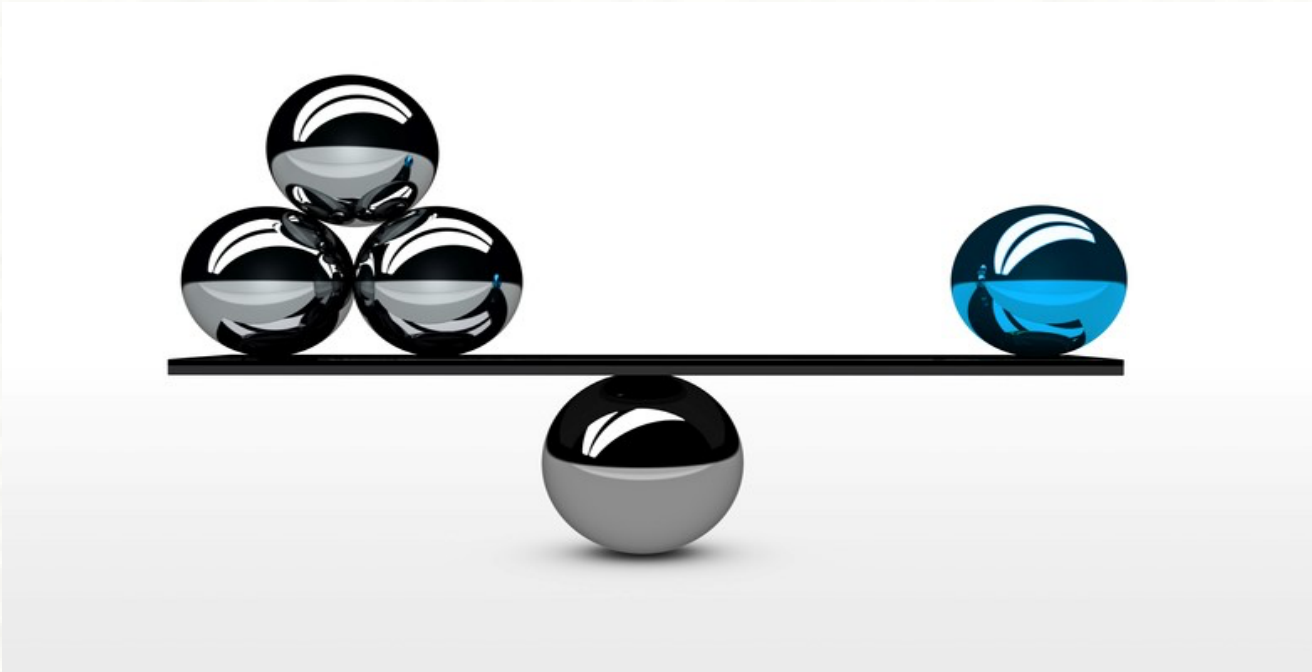


The Advanced Derivatives Program



Reference Handout

An Introduction to Derivatives

Derivatives are an important class of financial instrument and represent a financial market segment that has long exceeded the growth rates of both equity and bond markets. Derivatives are very different from securities. They are financial instruments that derive their value from that of an underlying financial product, commodity or market variable. While derivatives instruments are mainly designed to protect against and manage risks, they are often also used for arbitrage, speculative and investment purposes. They facilitate the pricing of risk and play an important role in price discovery across financial markets. A derivative is a contract concluded between a buyer and a seller concerning a transaction to be affected at a future point in time. The life of a derivatives contract (i.e. the period of time between the conclusion of the contract and its fulfilment or termination) varies greatly, ranging from a few days to several decades. In the course of its life, the value of the derivatives contract will fluctuate in line with the fluctuations in the value of the underlying asset.

Role of Derivatives

The economic role of underlying markets is investment and consumption. In contrast, the economic role of derivatives is risk management.

The market price of underlying assets is subject to change by demand-supply forces. All market participants know what the current market price is, but every market participant is not certain about what would be the price on a future date. This uncertainty is called price risk or market risk. Derivatives are tools to manage this price risk.

We must note here that risk is related to the return. Return is the change between the current price (which is known) and the future price (which is unknown). The return could be favourable, resulting in profit; or unfavorable, resulting in loss. Profit and loss are thus two faces of return: profit is positive return and loss is negative return. Whether there will be profit or loss is uncertain, and this uncertainty is called risk. Thus, risk is defined as the uncertainty about future return. Derivatives are risk management tools for price risk. They are not financing, liquidity or cash management tools. Examples of financing tools are bonds and equity instruments; and examples of liquidity or cash management tools are money market instruments (e.g. repo/reverse repo in the fixed income market, FX swap in forex market, etc).

Business situations that demonstrate the use of Derivatives Buyers of Products: illustration

Golden Bakes is looking to launch a range of branded cookies nationwide. As a part of its marketing strategy it wishes to price its cookies lower than national brands. It also needs to hold its price steady for the next 18 months.



How is Golden Bakes to hold prices steady if it does not know the price of wheat for the next 18 months? It needs to fix the price of inputs as far into the future as possible. It should not happen that after it fixes the sale price, the price of wheat goes up significantly. In this case, Golden Bakes will either make a loss; or it will have to increase the price – thereby damaging its marketing strategy.

To further compound its problem, Golden finds that the price of wheat has been all too unpredictable.

Sellers of Products



Saudi Arabia would like to make sure that the next 100 million barrels of oil it sells generates at least USD 6 billion in revenues. (\$ 60 / barrel).

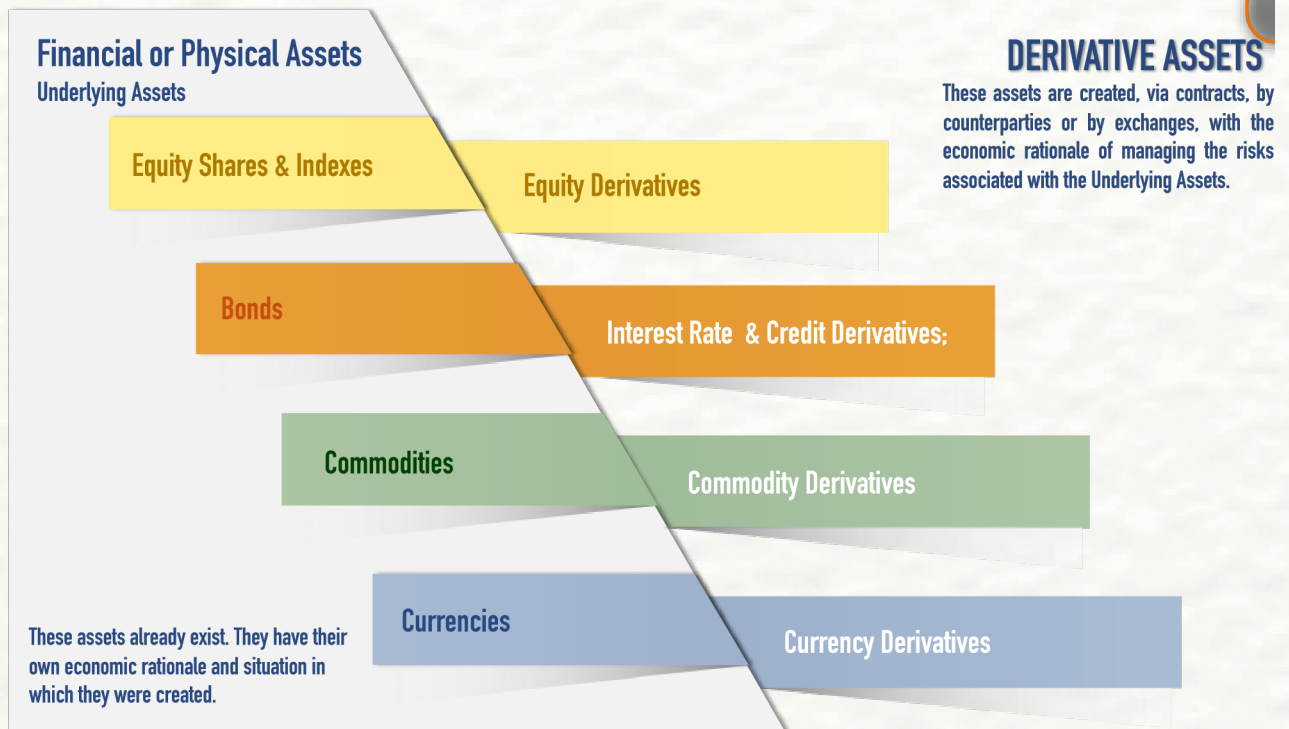
As an oil producing state, the Kingdom of Saudi Arabia is heavily dependent on oil revenues. If oil prices drop, the country goes into deficit. Oil used to be closer to \$ 140/- (2007). In 2015 it has hovered as low as \$ 40/-. The fluctuations in oil price confound the best brains in the business.

The Role of Derivatives – applied

Golden Bakes will buy wheat at a price agreed today. The wheat and cash will exchange hands at the settlement date in the future. With the price thus fixed, Golden Bakes will know at what rate to price its biscuits.

Saudi Arabia will sell oil at a price agreed today. The oil and cash will exchange hands at the settlement date in the future. With the sales price fixed, Saudi can manage its budget based on this price.

Classes of Underlying Products and Derivatives



Basic Trade Characteristics

The Separation between Trade and Settlement Dates

Derivatives are traded on a particular date with an agreement to settle the trade sometime in the future.



There exists a price and a future expectation of price for the underlying asset today: the Trade Date. There emerges a price in the cash market on that future settlement date. A difference between the two is inevitable and there lies story of derivatives pricing.

Types of Settlements:

It is important to understand the types of settlements to understand how derivatives operate.

Physical Settlement

If a product is physically settled, it means there will be TWO flows.

- The BUYER must pay CASH for the purchase.
- The SELLER must deliver SECURITIES for the sale.

In Cash Markets (the market for immediate delivery) you can only carry out physical settlements.

Cash Settlement

In a cash settlement, there is only one flow: the loser in the trade must pay the gainer in the trade in cash. It is sometimes called a financial settlement. There is no difference in the two phrases.

Who loses in a Trade?

So, how to determine who is the loser in a trade? This is done by comparing:

- the Agreed Price which was fixed on the Trade Date with
- the Market Price which is fixed on the Settlement Date

If the Agreed Price is HIGHER than the Market Price the loser is the person who “Agreed to Buy” (colloquially referred to as the buyer).

For example:

- Agreed to buy oil at \$50 a barrel on Jan 1.
- Market price on settlement date (Jan. 1): \$ 45.

The person who agreed to buy at \$50 has lost \$5 per barrel and must pay this amount per barrel to the person who agreed to sell.

If the Agreed Price is LOWER than the Market Price the loser is the person who “Agreed to sell” (colloquially referred to as the seller).

For example:

- Agreed to sell oil at \$50 a barrel on Jan 1. → Market price on settlement date: \$ 55.

The person who agreed to sell at \$50 has lost \$5 per barrel and must pay this amount per barrel to the person who agreed to sell.

Types of Derivatives

There are four types of Derivatives:



Forwards

An agreement to buy (sell) an agreed quantity of a particular product at an agreed price on the trade and to be settled at a date in the future. This agreement is made between the two parties one-to-one; i.e. Forwards are OTC trades.

Example: an agreement to buy 1000 barrels of oil, made today, at Rs. 3,750 per barrel. Settlement (cash and oil to be exchanged) a month from now.

Futures

Structurally, it is exactly the same as above. A futures is traded on an exchange (as opposed to forwards, which are one-to-one or OTC traded.)

Options

A right [but not an obligation] to buy (sell) an agreed quantity of a particular product at an agreed price on the trade and to be settled at a date in the future. These are further discussed in this document.

The right to buy is termed a CALL; the right to sell is termed a PUT. The holder of an option uses it only if it is favourable.

Swaps

Swaps are agreements between two parties to exchange cash flows in the future according to a prearranged formula. They can be regarded as portfolios of forward contracts. The two commonly used swaps are:

- ✓ Interest rate swaps
- ✓ Currency swaps

Application of Forwards – a simple derivative: Fx example.

For an Importer

L&T buys equipment worth USD 100,000 from Caterpillar of USA receiving 3 months credit; Caterpillar gives L&T time to pay the dues.

On that date the Spot Rate for the US dollar-Indian rupee was: 1 USD = INR 60/-

The situation of a future payment worries the L&T Treasury Head:

- * Will INR appreciate or depreciate vis-à-vis USD?
- * What if rupee goes to Rs. 80/\$? Will I end up paying Rs. 8 million instead of Rs. 6 million three months from now?
- * Can I crystallize my liability? * Can I hedge my risk?

Solution:

- ✓ Enter into a Forward
- ✓ Buy USD 100,000
- ✓ Delivery 31/12/20XX
- ✓ @ 1 USD = INR 60.50

The Forward Contract is entered into on 01/10/XX, when L&T comes to know of the obligation to pay. The USD and INR change hands only on 31/12/XX which is the contracted date. Now the Treasury Head knows that on 31/12 INR 6.05 m is needed and that it will convert to the required \$ 100,000.

On Settlement Date (31/12/XX) :

1. L&T will transfer INR 6,050,000 to MyBank.
2. MyBank will transfer USD 100,000 to L&T.

A forward is Physically Settled, which means the asset (US dollars) changes hands for payment in Indian rupees.

For an Exporter

Glaxo Smithkline of UK sells capsules worth USD 1 m to Walmart in the USA. Glaxo extends 3 months credit to Walmart giving them time to pay the dues..

On 01/10/XX - Spot Rate: 1 GBP = 1.95 USD

The situation of a future realisation of sales proceeds worries the GSK Treasury Head:

- * Will GBP appreciate or depreciate vis-à-vis USD?
- * What if GBP/USD goes to 3/-? Will I get only GBP 333,333 instead of GBP 512,000 three months from now?
- * Can I crystallize my asset? * Can I hedge my risk?

Solution:

- ✓ Enter into a Forward:
- ✓ SELL USD 1000,000 –
- ✓ Delivery 31/12/20XX
- ✓ @ 1 GBP = USD 2

The Forward Contract is entered into on 01/10/XX, when GSK comes to know how much it is to get. USD and GBP change hands only on 31/12/XX which is the settlement date.

Now the Treasury Head knows that on 31/12 GBP 500,000 will arrive and plan expenses/cashflows accordingly.

On Settlement Date (31/12/XX) :

1. GSK will transfer USD 1 m which it gets from WalMart to MyBank.
2. MyBank will transfer
3. GBP 500,000 to GSK.
4. The forward is a Physically Settled

The Forward Contract Definition

| | THE DEFINITION | THE TERMINOLOGY |
|---|---------------------------------------|----------------------------|
| 1 | An agreement | A Contract that is binding |
| 2 | Made 'today' | Trade Date |
| 3 | To Buy, or to Sell | Direction of the trade |
| 4 | A particular product/ financial asset | Underlying Asset |
| 5 | In exchange for money | Physical Settlement |
| 6 | At an agreed price | Contracted Rate |
| 7 | At an agreed future date | Settlement Date |

Margining in Derivatives Contracts

Margins are needed as a "security" by the exchange to ensure that both parties to a trade stick to their obligations. Who is more likely to default: a buyer or a seller?

Anyone who could lose is a potential defaulter, so s/he need not pay for losses made. This can happen to both buyers as well as sellers. Therefore, both parties to a trade need to place margins.

An Initial Margin is required to be placed (paid in) as soon as a trade is initiated. The exchange may specify:

- Margin as a % of Contract Value as the initial margin OR
- Margin as a sum of money per contract.

For instance, for Corn, the margin required is \$ 1,650 per contract which works out to approximately 9% of contract value at current price levels.

Once a trade has been initiated the trader makes or loses money as the market prices move.

A order buys one contract on Gold at \$1,560/-.

- If markets, go to \$ 1,570/- he is a gainer.
- If markets, go to \$ 1,550/- he is a loser.
-

It should be remembered that this is \$ 10 per ounce and the contract is for 100 oz.

As a trader makes losses the initial margin that he placed gets eroded. Conversely, if he makes gains the margin account swells.

Initial Margin (IM)

- Is a good faith margin
- Paid by both Buyer and Seller (Why? Because either party could lose money)
- Is set by the Exchange for ET Derivatives; no interest is paid by the margin taker on the amount.
- Is set by mutual agreement for OTC Derivatives. In OTC margins in cash may fetch interest at an agreed rate.

Maintenance Margin (MM)

Is the level below which margin should not drop. The initial margin is constantly adjusted by losses and as a result it drops. This drop should not go below MM level.

Variation Margin (VM)

Positions are 'marked to market' (MtM). MtM involves comparing the original agreed price with the market value on the MtM date. If MM level is breached, or if no MM is set, then the Variation amount must be topped up immediately. At every succeeding MtM date, the market value previously noted is compared with with market value on the new MtM date.

Assume the original agreed price to be 10. On MtM #1 if the market value is 12, 12 is compared to 10 to arrive at the gain or loss.

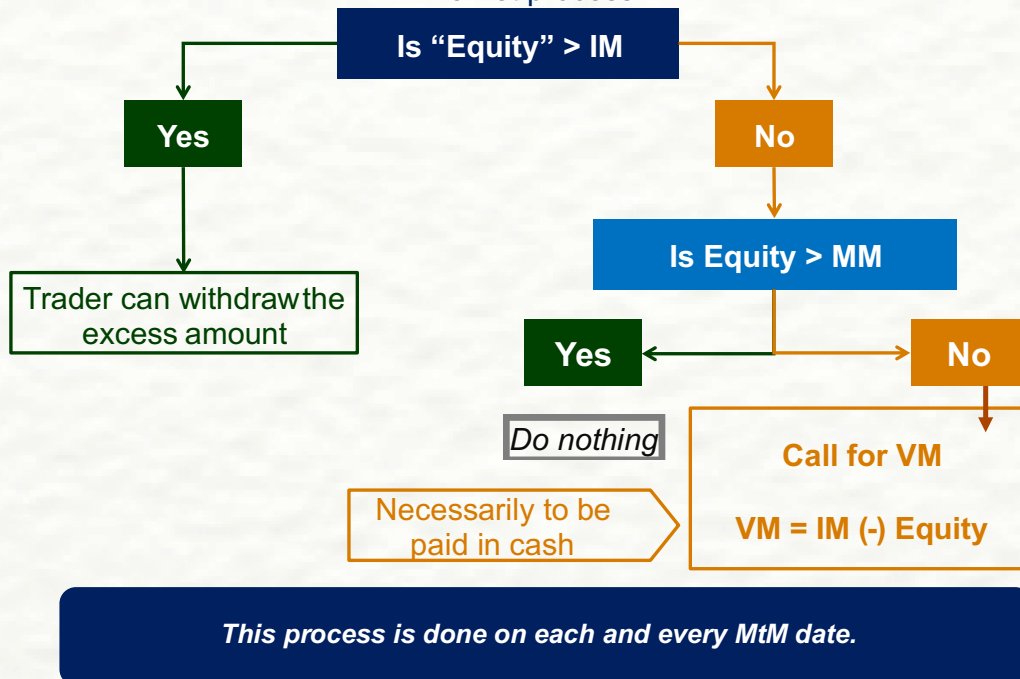
On MtM #2, if the market value is 15, then 15 is compared to market value at MtM# 1 and not the original agreed price.

In this manner, ongoing gains and losses are computed from the last calculation date to the present calculation date.

Evaluation of MtM positions follows the rule-set given below:

Evaluate all outstanding positions on the basis of current traded price of the contract.

Compute "EQUITY". Equity = Margin +/- gain or loss from the Mark to Market process



SPAN

SPAN as a method of margining was developed by Chicago Mercantile Exchange. The name SPAN comes from combining the letters highlighted here: **S**tandard **P**ortfolio **A**nalysis. Now, it is used in most exchanges today to compute the margining for clearing members. However, trading members that operate OTC continue to follow the traditional form of margining.

SPAN considers the entire portfolio in a client account – not trade by trade – in calculation of margins. The Portfolio approach captures the diversification effect and lowers the overall risk – and therefore the margin is lower, overall.

Initial margin is linked to a 'daily updated' VaR model. Value at Risk is a measure denominated in dollars and represents:

1. the MAXIMUM amount that could be lost
2. Over a period of time
3. With a measure of certainty (its never 100% certain!)

For instance:

1. "\$ 43 million could potentially be lost."
2. 'Over a day, due to volatility during this period.'
3. 'We can say this with a 99% confidence level.'

SPAN generates 16 different VaRs based on scenarios.

Lets develop our understanding of SPAN from a working perspective.

SPAN takes measures of risk and applies them on a Portfolio

It considers the data points: *What are the risk measurements looking like at this time? It applies them to the portfolio position:* *What are positions the trader holds?*

Both inputs contribute to the development of the span margin number. SPAN considers specific variables that reflect market risk – and takes the measures as often as needed: but at least once a day

VARIABLES are the driving factors that result in outcomes – in this instance, these are the contributory factors to Market Risk.

Then a data feed inputs the value of the each Variable at that point in time.

Portfolio data is already available internally with the broker. It includes the products known as Futures & Options; It includes positions: both Longs & Shorts. By developing specific scenarios more VaR numbers are generated.

Specifically:

1. A change in the **price of the underlying** can cause the value of derivatives to change:
→ SPAN considers 8 possible price movements (**price scenarios**)
2. A change in volatility can cause the value of derivatives to change:
→ SPAN considers 2 possible volatility levels (**volatility scenarios**)

So we have **8 price scenarios X 2 volatility scenarios** = 16 VaR numbers.

Pick the **WORST** Number from this array: that shall be the initial margin.

| Price Changes | Volatility | |
|--------------------------|------------|------|
| | UP | DOWN |
| No Change (base case) | # 1 | #8 |
| Up: 33% | #2 | #9 |
| Up: 66% | #3 | #10 |
| Up: 100% | #4 | #11 |
| Down: 33% | #5 | #12 |
| Down: 66% | #6 | #13 |
| Down: 100% | #7 | #14 |
| Extreme Up 300% | #15 | |
| Extreme Down 300% | #16 | |



You can see in the chart above that 16 numbers are generated. (The cells are numbered just to help you count 16. Each cell would actually be filled with a value)

Remember: this is done for each portfolio comprising a number of trades.

Pick the WORST number: that's the Initial Margin that each trader has to deposit.

You cannot just 'look' at this table and know which the worst number will appear. It is a factor of number of things. Just to give you an intuitive sense of that, a portfolio that is short will GAIN as prices go DOWN.

This calc can be done a number of times during the day, too, to update the risk assessment/ margins. (More frequent assessments and popups are important on high volatility trading days.)

SPAN applies to all those that have taken positions – and are exposed to Market Risk. It therefore applies to every client. Client margin obligations are aggregated at the broker-level. There is no offsetting of one clients position or obligations with another. All are simply to be added. A broker may have a proprietary portfolio or positions, so those, too, have to be added.

Brokers usually work through Clearing Members. These Clearing Members are larger brokerages that have the infrastructure necessary to help process other smaller broker's transactions and aggregate them on behalf of the exchange as a service.

In so far as margins are concerned it is just an aggregation once again of the sums to be deposited as Initial Margin. There is no offsetting of positions.

Story Time!

Bill Ackman of Pershing Square decided to short Herbalife stock using all possibilities and for his short exposure was required to place significant margins.



Herbalife would simply not go down And Bill would not towel. In terms of Variation Margins Bill Ackman paid ir millions of dollars each year for severa years, to carry forward.

Bill Ackman gave up after about 5 years losing about a billion dollars; may be more!

The margins he paid in were collected by the counterparties to his trades who made over a billion in profits, including the famous activist shareholder Carl Icahn.



throw in the hundreds of his position



Futures Contracts

A futures contract is simply a forward contract traded on an Exchange.

Its features are:

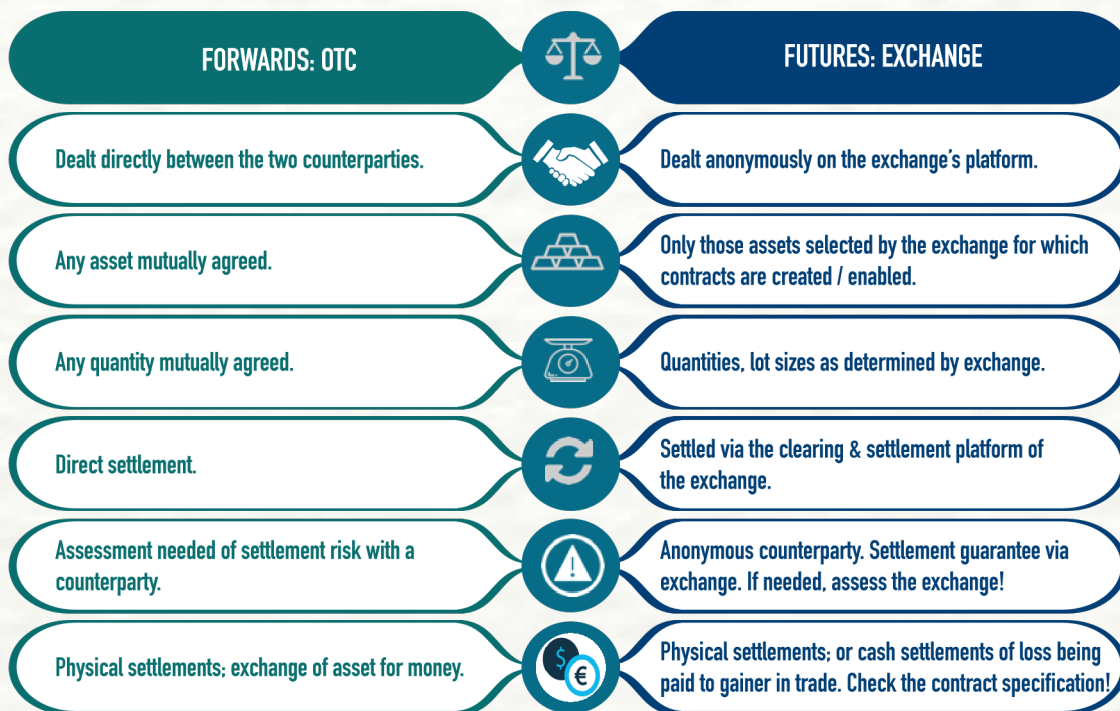
- ✓ Listed and Traded on an exchange
- ✓ On various underlying assets as offered by the Exchange
- ✓ On standardized terms and conditions set by the Exchange
- ✓ All operational features seen in an EXCHANGE are seen in futures orders, trades, confirmation, settlement

Forwards & Futures - Differences & Similarities

Forwards & Futures are Identical

- ✓ Both are obligations.
- ✓ Whether to buy or to sell. ✓ A particular financial asset ✓ In exchange for money.
- ✓ To be made on future date (the Settlement Date)
- ✓ At a price agreed today (on Trade Date)

Forwards & Futures are different



Options

Options are distinct from all other contracts. While the buyer and seller in other contracts are defined with respect to the underlying asset, the buyer and seller in option contracts are defined with respect to the rights and obligations.

In other financial contracts, both the counterparts have an obligation to perform the contract.

Options are different.

One counterparty has the 'right but not the obligation' to use (or exercise) the option.

The other counterparty to the option contract has an obligation to fulfil. That obligation is triggered when the first party exercises the option.

The counterparty that has the 'right without the obligation' is called the Buyer. The other party to the trade is the one who gave that right; the Writer of the option. The Writer has an obligation. It is useful to think of this counterparty as the Writer, rather than the Seller, at least till one is completely familiar with options and associated dynamics of operation.

The Option Buyer pays a Premium (P) to buy the right.

This premium (P) is an immediate cash inflow to the Writer. Whether it is a profit or not is determined by whether the option is exercised or not.

Options confer the right, to either Buy or to Sell, the underlying asset. There is a specified price at which the underlying asset is exchanged called the Strike Price. This 'right without the obligation' is available only for a specific period, a limited life. The end of that period is called 'expiry'.

Thus, the option contract specifies five features.

1. Underlying asset on which the privilege of right-without-obligation exists
2. Nature of privilege (i.e. whether to buy or sell underlying asset)
3. Price of privilege (premium; P)
4. Price of underlying asset (strike price, K)
5. Period of privilege (expiration)

Take note of the difference between the price of privilege (P) and price of the underlying asset (K).

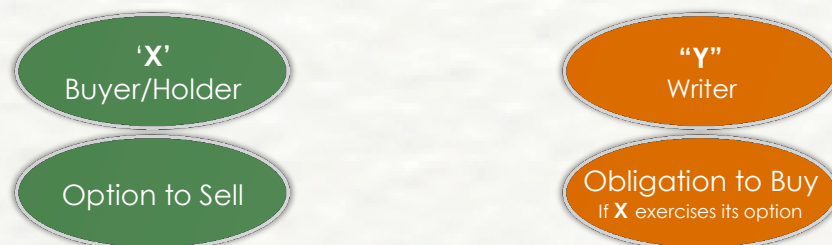
Option Basics Nature of Buyer's Right and Option Type

The option buyer's right can be:

- The right to buy the underlying asset; or
- The right to sell the underlying asset Those are **two** types of options.

Call option: the 'option buyer' has the right (but not the obligation) to buy the underlying asset from the writer. (A good way to remember this term is to note that the option buyer "calls" for the underlying asset from the writer.)

Put option: the 'option buyer' has the right (but not the obligation) to sell the underlying asset to the writer. (A good way to remember this term is to note that the option buyer "puts" the underlying asset to the writer.)



Options can be Profitable for the Buyer

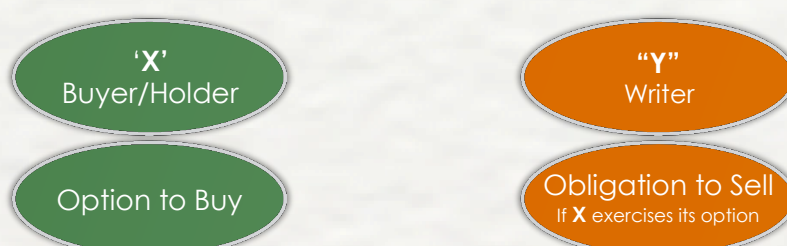
An option can be profitable for an option buyer *but* only if the price of the underlying moves in its favor.

Here is how that can happen:

The Profitability of a Call Option

The buyer of a Call has the right (but not obligation) to buy the asset, paying the agreed price, the strike price (K) for it.

When is it likely to exercise this option? When it is profitable to do so!



When is that? When, after buying the asset for K it can sell it off in the open market at the current market price (CMP) which is higher.

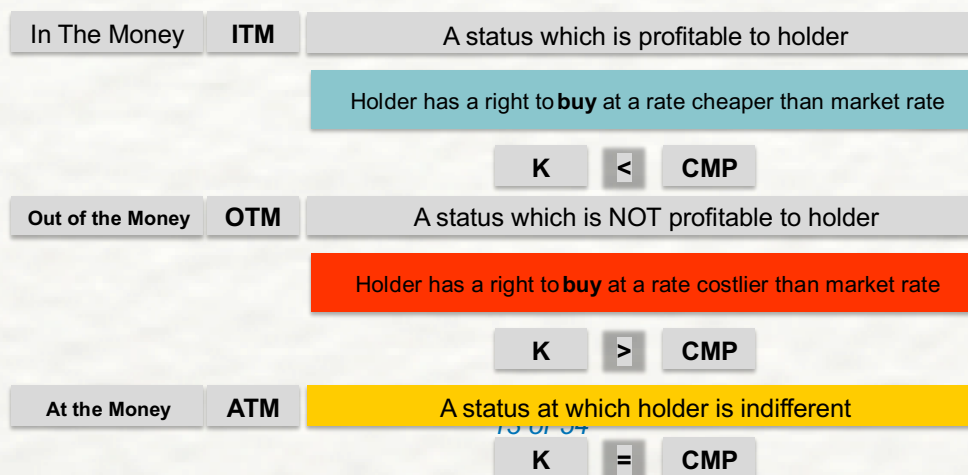
Example: a trader bought a Call on crude oil at K: \$ 90 a barrel. After some time, the price of oil rises and goes to \$ 102. The trader can exercise the call and buy it for \$90 from the writer of that call. It now goes on to the open market and sells the oil for \$ 102 making a neat profit of \$ 12 a on a barrel of oil. If the trader had bought Calls on a million barrels of oil the total money made would be \$ 12 million.

- Call Options that yield a profit (K is lower than CMP) on exercise are called “In The Money” or ITM.
- Call Options that do not yield a profit (K higher than CMP) are called ‘Out of the Money’ or OTM.

In the above example if the price of oil had fallen to \$ 75 why would the trader buy at K:90 when oil is available in the market at \$ 75. The trader would simply let the option expire. That is what is meant by ‘right but not the obligation’.

The trader will exercise the option if it is ITM and yields a profit. That is a right. But the same trader will ignore an OTM option; it is not obliged to use the call it holds.

A Call option that is at K (K = CMP) is called “At the Money”; this option too, will be left unused by the holder of the Call.



The Profitability of a Put Option

The buyer of a Put has the right (but not obligation) to sell the asset, receiving the agreed price, the strike price (K) for it.

When is it likely to exercise this option? When it is profitable to do so!

When is that? When, the trader can buy the asset in the open market for a lot less and then sell it to the writer of the option at the higher price, K. That means CMP is lower than K.

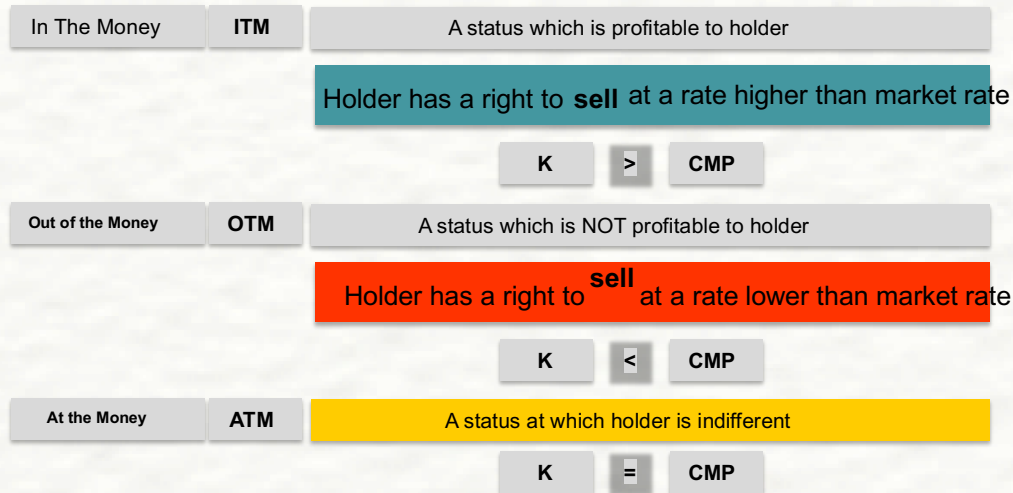
Example: a trader bought a Put on crude oil at K: \$ 90 a barrel. After some time, the price of oil falls to \$ 75. It now goes on to the open market and buys oil from there for \$ 75. It then exercises the put and sell it for \$90 collecting that amount from the writer of that put. It thus makes a neat profit of \$ 15 a on a barrel of oil. The trader If the trader had bought Puts on a million barrels of oil the total money made would be \$ 15 million.

- Put Options are that yield a profit (K is higher than CMP) on exercise are called “In The Money” or ITM.
- Put Options that do not yield a profit (K lower than CMP) are called ‘Out of the Money’ or OTM.

In the above example if the price of oil had risen to \$ 102 why would the trader sell at K:90 when that same oil could be sold in the market at \$ 102. The trader would simply let the option expire. That is what is meant by 'right but not the obligation'.

The trader will exercise the option if it is ITM and yields a profit. That is a right. But the same trader will ignore an OTM option; it is not obliged to use the call it holds.

A put option that is at K (K = CMP) is called "At the Money"; this option too, will be left unused by the holder of the Put.



The Position of the Writer

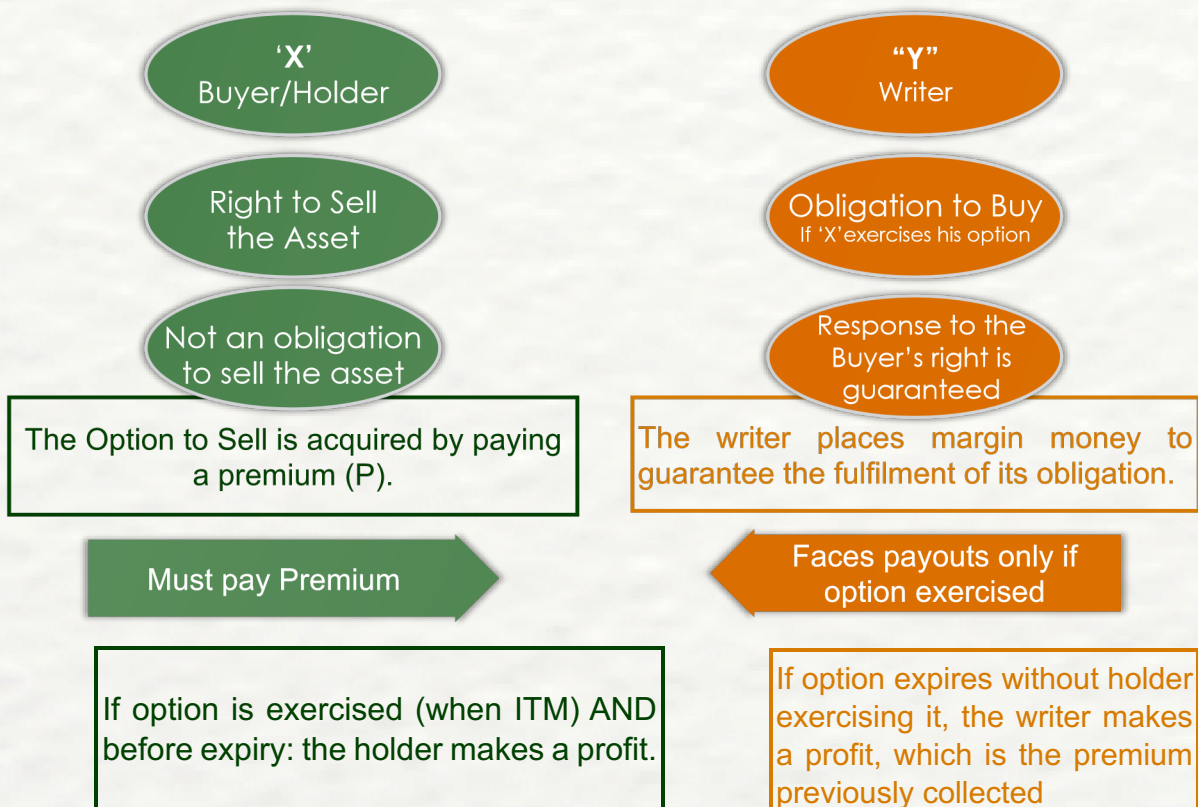
In each instance, the gain made by the buyer/holder of an option is the loss of the writer. If the option buyer does not use the option / exercise it then the premium (P) collected earlier when the option was written is the profit of the writer. The P cannot be treated as profit till after the expiry of the option, unused.

The charts below summarise the relative positions of the two counterparties and the essentials of each Option Type.

The Call



The Put

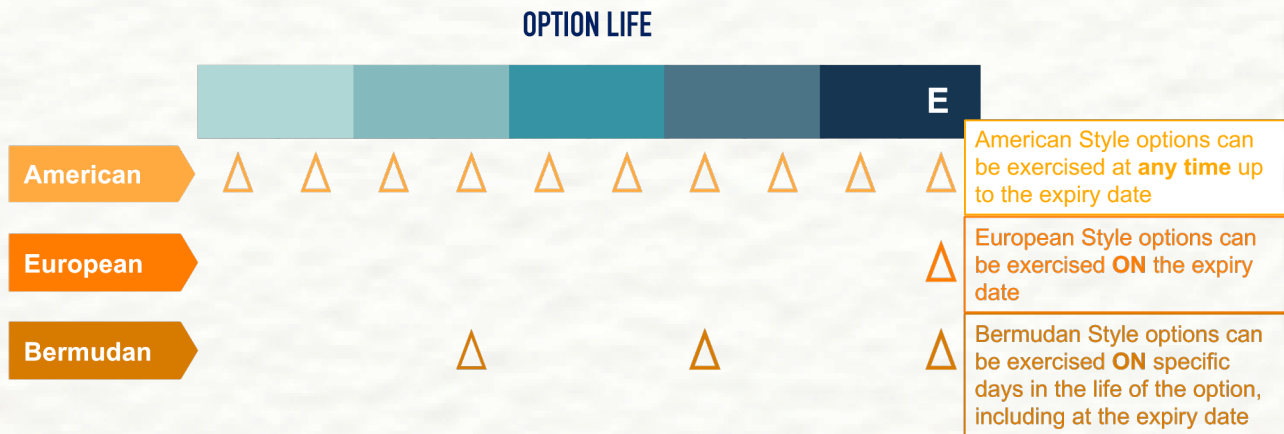


It might seem as if an American-style option offers to its buyer more than other styles offer, and therefore carry a slighter higher price. However, having a right to exercise anytime may not always confer additional benefits. Exercising the option kills the option and premature exercise, in some cases, is like killing the goose that lays the golden eggs.

Option Styles

Option style defines the time of exercise by option buyer. Three styles are distinguished as follows.

- ➔ European style: buyer can exercise his right only on the last day of option's life
- ➔ American style: buyer can exercise his right anytime during option's life
- ➔ Bermudan style: buyer can exercise his right on select, specified dates (e.g. last day of every month/quarter, etc) during option's life

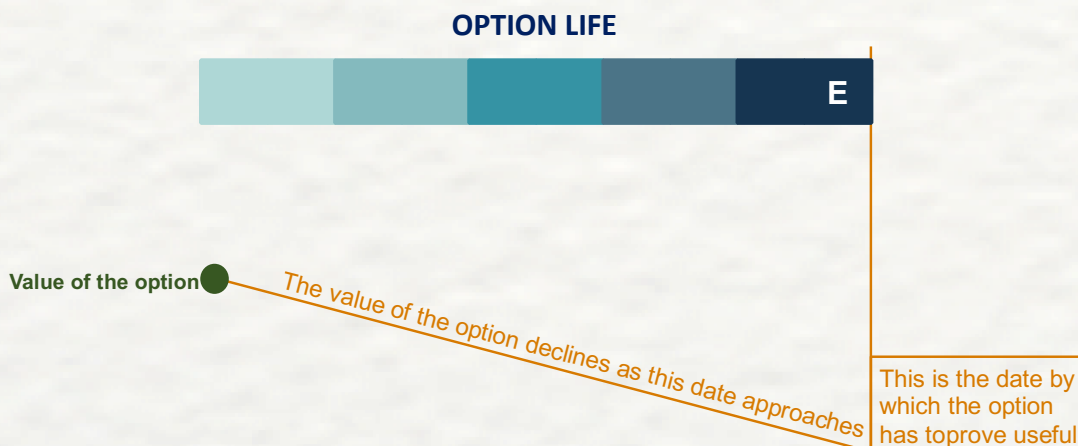


The Decay of an Option

As seen from the Option Styles, an option has only a limited life. If it is going to yield profits to the holder it needs to go ITM before expiry. If it is OTM / ATM on expiry, it will expire worthless.

As time moves on and expiry nears, the probability that an option goes ITM declines and this is seen in the reducing value of the option as seen in the premium for that option.

Option writers typically are looking to earn money from option decay and their views will look to options that they write (whether calls or puts) expiring worthless. We will see more of this thought process in the section on options strategies



Overall Profit & Losses

In considering the Option Status we only consider K and CMP to determine if a particular option (whether Call or Put) is ITM, ATM or OTM.

Calculating profitability of an exercised option requires us to consider the cost of premium to calculate overall Profit & Loss of the trader.

In the first example considered previously, of an ITM Call, the trader had a Call on crude oil at K: \$ 90 a barrel.

With CMP at \$ 102 it was ITM and a profit on exercise was made: \$ 12.

To calculate overall P&L, from this one would have to deduct the P paid to buy the Call. If that was \$ 2 then the Overall P&L is \$ 10.

In the other example of an ITM Put, the trader had a Put on crude oil at K: \$ 90 a barrel. With CMP at 75 a profit on exercise was made: \$15.

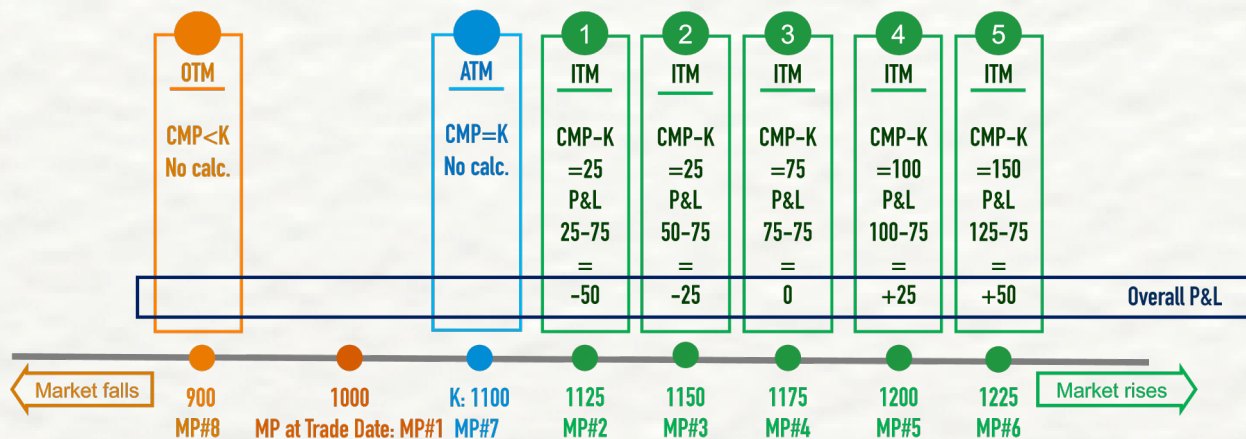
To calculate overall P&L, from this one would have to deduct the P paid to buy the Call. If that was \$ 2.50 then the Overall P&L is \$ 12.50.

Just to emphasise option holders do not exercise ATM or OTM options so the question of overall P&L does not arise.

We can gain further insights into how this works by looking at these calculations as the market moves. Below is the spectrum of movements possible in market prices. We assume some asset not specifying anything in particular. We take the starting point as the Market Price on the Trade Date.

Assume a call is bought at K: 1100 paying a premium of 75.

We show in the timeline below what happens as market prices increase, which is marked in green, going from # 1 to # 5.



The Call goes ITM. 5 different levels, each 25 apart are taken. You can see the Overall P&L rising from an initial negative figure in the column-box marked 1, in green..

That initial figure is negative because while the Call is ITM, the rise is not enough to offset the P. But at the green column box #3, the gains of the ITM Call offset P fully and breakeven is achieved for the trader; no overall profits but no overall losses either. Beyond that, column-box #4 and #5 reflect overall profits and further on it is profits all the way for the trader who bought this Call.

The market might move by some and reach up to K, but not beyond. In that case (marked in blue) the option is ATM. Nothing needs to be done and no calculations are needed. If the market stays below K,

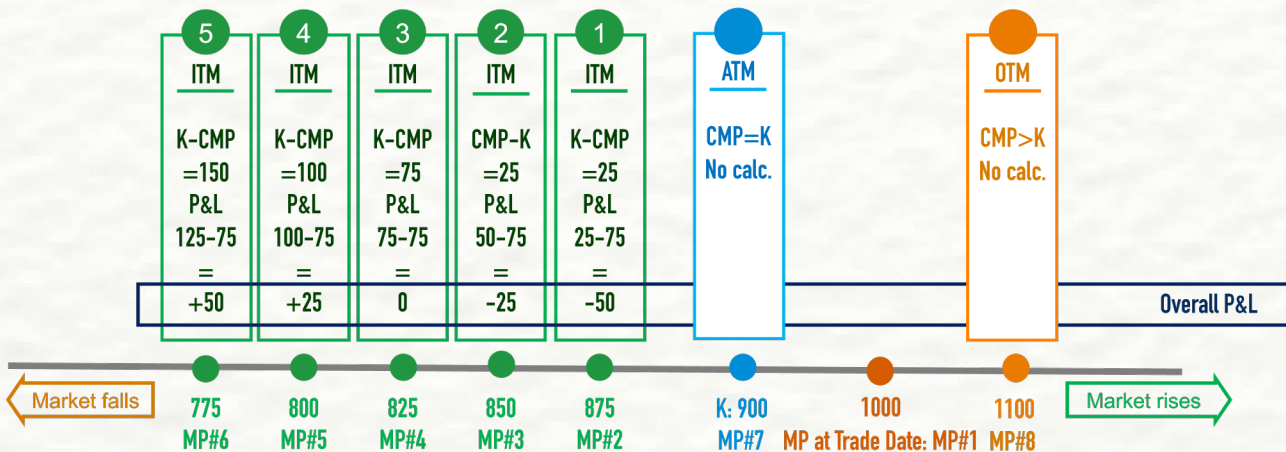
or goes down, then the option is OTM. It will not get exercised so no overall P&L is required to be calculated.

You can see that Calls yield profits if the markets rise, which is what those buying calls hope for – that the market will indeed, rise.

Let's examine the same dynamic with respect to a Put held.

Assume a put is bought at K: 900 paying a premium of 75.

We show in the timeline below what happens as market prices decrease, which is marked in green, going from # 1 to # 5.



The Put goes ITM. 5 different levels, each 25 apart are taken. You can see the Overall P&L rising from an initial negative figure in column-box # 1. That initial figure is negative because while the Put is ITM, the fall is not enough to offset the P. But at #3, the gains of the ITM Put offset P fully and breakeven is achieved for the trader; no overall profits but no overall losses either. Beyond that, #4 and #5 reflect overall profits and further on it is profits all the way for the trader who bought this Put.

The market might move by some and fall up to K, but not beyond. In that case (marked in blue) the option is ATM. Nothing needs to be done and no calculations are needed.

If the market stays above K, or goes up, then the option is OTM. It will not get exercised so no overall P&L is required to be calculated.

You can see that Puts yield profits if the markets fall, which is what those buying puts hope for – that the market will indeed, fall.

The Status of the Writers

This is exactly the opposite of what happens with Buyers. Wherever the Buyer is ITM, there is a loss to the writer. If the market price moves far enough, the loss wipes out the P collected by the writer initially.

The writer makes unlimited losses beyond that.

It should be obvious that the writer is hoping for the exact opposite of what the Buyers hope for.

Call writers hold a view that the market will not go up and that the premiums will become profits as the calls expire worthless, without being exercised.

Put writers hold a view that the market will not go down and that the premiums will become profits as the puts expire worthless, without being exercised.

The motivation in writing options is to earn the P. At the time of writing, writers have to deposit a margin amount to guarantee that they will perform obligations. The P as a percentage return on the margin money deposit provides attractive rates of return to the writer, with the downside risk of making unlimited losses. These losses, based on market movements against the position held is called Market Risk.

Trading Related Inputs

The information in this section is generally linked to trading and is good to know not just in the context of options. Some of the ideas here need to be understood in the context of options and those are specified.

As noted earlier on, options exist for all sorts of underlying assets. To be sure, to be able to follow every twist and turn in the options story you need to know the movement in the price of the option for every movement in the price of the underlying.

Each underlying (stocks, interest rates, forex rates) have their own dynamic and logic. You might not be familiar with each or all of those. To layer the option payoff strategies on to that complexity is not efficient learning.

Therefore, we will opt for an underlying called the Index and assume its price in the spot market, the market for immediate delivery, is 1,000/-. An increase in the price takes it to 1001 and beyond. And a decrease in that price takes it to 999 and further below.

That simplification in the dynamic of the underlying will help you focus on the option. It also insulates us from making unwitting inferences about real products which may cause readers to speculate and lose their hard earned money.

There are three distinct ways in which an Options Trader can make money.

1. Trading to book profits
2. Exercise and physical settlement
3. Exercise and financial settlement

Trading the option:

This can be done on an exchange; or any new platform which automates / digitizes an OTC market. To initiate positions, all options have to be bought; so one may say all options involve trading. However, we make a small but important distinction: closing an options position can also be done by trading.

Basic Trading Terminology:

✦ **To BUY is to go LONG**; in Options buying means holding either:

- the Right to Buy (Call);
- or the Right to Sell (Put).

✦ **To SELL is to go SHORT**; in Options it also means “Writing”.

- Writing a Call is an obligation to meet the counterparty’s Right to Buy – which is done by selling to the counterparty **when (and if)** that counterparty exercises the Call.
- Writing a Put is an obligation to meet the counterparty’s Right to Sell – which is done by buying from the counterparty **when (and if)** that counterparty exercises the Put.

- * **When a Trader says it is LONG:** it means it bought more than it sold in the overall.
- * **When a Trader says it is SHORT:** it means it sold more than it bought in the overall.
- * **Opening or taking a position** is straightforward, regardless of exchanges or OTC platforms.
- * **Going Long in the Option** (whether Call or Put) requires the trader to BUY the Option.
- * **Going Short in the Option** (whether Call or Put) is the same as writing the option – and the term “Write” or “Writing” provides certain clarity to a person new to the study of options.
- * **Squaring the position**, requires the trader to do the opposite of what it did in opening the position.
- * **If a trader went LONG Call or Long Put;** it needs to SELL to square its position. When a person that went Long previously, squares its position by selling, it is NOT writing; it is reversing its opening position.
- * **If a trader went SHORT Call or SHORT Put:** its need to buy to square its position.

WE can summarise these terminologies to serve us as a ready referencer while looking at options strategies.

LONG CALL

- Buying a Call.
- Buying involves paying a premium.
- Premium paid by Long Call is immediate – cash goes out; T +2 in the exchange cycle.
- The holder has a Right to Buy.
- Position to be squared by Short Call; selling the Call.

SHORT CALL

- Is the counterparty / counter-position to Long Call.
- Is the act of ‘writing’ a Call.
- It is the counter-position to Long Call; if Long Call chooses to buy, Short Call MUST deliver and collect money; Short Call must sell the underlying.
- The writer has an ‘Obligation to Sell’ when the Holder exercises the Right to Buy.
- The writer’s obligation is open-ended. The market might rise significantly. The writer could make significant losses. The writer is exposed to Market Risk.
- The writer must place Margin Money immediately to cover its Market Risk.
- The premium earned is immediate; received on a T + 2 basis in the exchange cycle

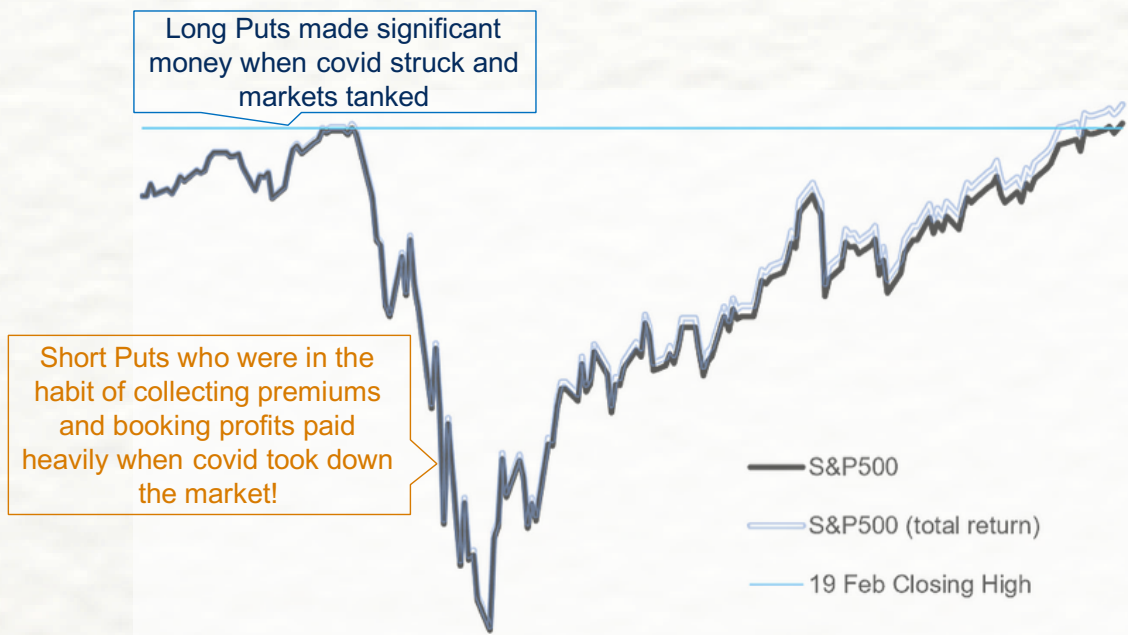
LONG PUT

- Buying a Put.
- Buying involves paying a premium.
- Premium paid by Long Put is immediate – cash goes out; T +2 in the exchange cycle.
- The holder has a Right to Sell.
- Position to be squared by Short Put; selling the Put.

SHORT PUT

- Is the counterparty / counter-position to Long Put.
- Is the act of ‘writing’ a Put.

- It is the counter-position to Long Put; if Long Put chooses to sell, Short Put MUST take delivery of the underlying by paying for it. Short Put must buy the underlying.
- The writer has an 'Obligation to Buy' when the Holder exercises the Right to Sell.
- The writer's obligation is open-ended. The market might fall significantly. The writer could make significant losses. The writer is exposed to Market Risk.
- The writer must place Margin Money immediately to cover its Market Risk.
- The premium earned is immediate; received on a T + 2 basis in the exchange cycle



The Options Product

It is important to understand the 'trading aspect' of the Options Product, particularly in an exchange environment.

The exchange 'creates' Call and Put options contracts for various strike prices around the current price levels in the markets. These contracts have various specifications regarding the underlying asset but very relevant at this point in our discussion is:

- Definition of Underlying Asset
- Option Type
- Strike Price
- Option Style
- Exercise Process
- Lot Size
- Tick size

All these fields should be considered together as a package and defined as Product.

To be clear, a Call with Strike Price (K) 1,100 is one product; and a Call K: 1200 is another, different product.

Therefore, if the exchange creates Calls with 20 different strike prices, they should be considered as 20 different and distinct products. It is accurate and relevant to consider Call K: 1100 as equivalent to an apple and Call K: 1200 equivalent to a pineapple, if that analogy helps.

When we go to the trading screen of an exchange, what actually see on the trading screen are two broad product groups:

- Calls
- Puts

Under Calls we see a full range of Call products; each product is different in terms of its Strike Price and might share all other features of other calls.

Under Puts we see a full range of Put products; each product is different in terms of its Strike Price and might all other features of other calls.

A trader looking at that screen makes certain choices based on views it has:

- ✱ Is the market likely to go up or down?
- ✱ Am I interested in Calls or am I interested in Puts? Which
- ✱ Strike Price am I interested in?

Once a trader has decided in the product, it might choose the quantity it wishes to trade. It could trade one or more lot of the product. each lot represents an exchange- determined units of the underlying asset. For instance:

- 50 shares of Apple Inc. (equity / Single Stock exposures)
- One lot of S&P500 (equity / index exposures)
- 100,000 barrels of brent crude; (commodities)
- US \$ 1 million worth of borrowing. (Rates)
- One lot of GBP 62,500 (Currency)

Having picked a product to trade (One lot of S&P500) and a direction to trade (buy or sell) there are only two things that truly appear on a trading screen:

- Buy price and buy quantity
- Sell price and sell quantity

In the case of options the **'price' is the premium**. This is a bit counter-intuitive as most literature on options talks about the math involved in pricing options. However, in trading, after those model inputs are received one has to go to the trading platform and 'bid to buy' or 'offer to sell'.

This is no different from any other financial product.

There are models on the basis of which prices of any financial asset or its derivative can be arrived at; lets call this fundamentally sound value; or the 'true' value
The same asset is traded on the markets at prices which can be above or below this level

Ashwath Damodaran is famous for the price vs. value theoretical approach to stock selection, as is that famous practitioner Warren Buffet.

Price vs. Value in Trading

The trade, which is a matching of a buy order with a sell order is an outcome of the basic market dynamic. This dynamic is common to potatoes and onions in a bargain market as it is to exchanges and other market forms.

Each has in mind a price it considers 'good' and bargains to get what it wants. Buyers look to buy cheap; in options, to go Long paying a lower premium. Sellers look to sell high; in options going Short receiving a higher premium.

Whether the price was reflective of value or not; whether the value was accurately calculated or not – these are all put to test in the market place.

Someone who makes a gain would claim that its version of value turned out to truer than that of the loser. That is the nature of markets.

Options available on an exchange may be listed as shown here.

The screen of a particular option product might look as below:

Here is how CALLS look on the screen of an exchange.

| CALLS | Buy | Write |
|-------|-----|-------|
| K | P | |
| 1950 | 5 | |
| 1850 | 15 | |
| 1750 | 20 | |
| 1150 | 50 | |
| 1100 | 75 | |
| 1050 | 100 | |
| 1000 | 125 | |
| 950 | 100 | |
| 900 | 150 | |
| 850 | 190 | |
| 550 | 470 | |
| 450 | 560 | |
| 350 | 655 | |

Current Market Levels (CMP) →

All these K's are ITM

All these K's are OTM

All numbers are imaginary; no math to them – though there is solid logic backing them.

Here is how PUTS look on the screen of an exchange.

| PUTS | Buy | Write |
|------|-----|-------|
| K | P | |
| 1950 | 955 | |
| 1850 | 860 | |
| 1750 | 770 | |
| 1150 | 190 | |
| 1100 | 150 | |
| 1050 | 100 | |
| 1000 | 125 | |
| 950 | 100 | |
| 900 | 75 | |
| 850 | 50 | |
| 550 | 20 | |
| 450 | 15 | |
| 350 | 5 | |

Current Market Levels (CMP) →

All these K's are ITM

All these K's are OTM

All numbers are imaginary; no math to them – though there is solid logic backing them.

Based on this simple understanding let us look at how profits may be made from trading options.

Trading the Option to Open and Close Positions:

- * If a trader went **Long Call** K: 1200 at P = 110 and later that same Call K: 1200 traded at 125, it is possible to simply square off the position by **selling Call** K: 1200 at 125 and book a gain of 15/-. Once a **position is squared**, expiry dates, exercise and physical or financial settlement do not matter.
- * If a trader went **Short Call** K: 1200 at P = 110 and later that same Call K: 1200 traded at 125, it is possible to simply square off the position by **buying the Call** K: 1200 at 125 and book a loss of 15/-. This trader might have lost its nerve once the price moved against it and the losses started to mount. Once a **position is squared**, expiry dates, exercise and physical or financial settlement do not matter.
- * If a trader went **Long Put** K: 850 at P = 125 and later that same Put K: 850 traded at 155, it is possible to simply square off the position by **selling Put** K:850 at 155 and book a loss of 30/-. Once a **position is squared**, expiry dates, exercise and physical or financial settlement do not matter.
- * If a trader went **Short Put** K: 850 at P = 125 and later that same Put K: 850 traded at 155, it is possible to simply square off the position by **buying Put** K: 850 at 155 and book a profit of 30/-. Once a **position is squared**, expiry dates, exercise and physical or financial settlement do not matter.

Exercising Options on an Exchange

When an option is exercised through the exchange's settlement mechanism, it is randomly assigned (the process is called Options Assignment) to any one of the writer's (Shorts). Two points to note:

- * Remember that the option can be exercised by the holder, the Longs.
- * The counterparty remains anonymous in an exchange. The counterparty at trade initiation might be Goldman Sachs and the counterparty to whom the trade is assigned might be Morgan Stanley. There are always as many buyers (longs) as writers (shorts). It is just that there is no one to one name-matching.

Fulfilling an Assignment:

Assigned options can be settled in two ways:

- * Physically
- * Financially

Physical Settlements

The Short has to perform the obligation it undertook when it wrote the option. Lets take some methodical examples: *Short Calls*

These have an obligation to Sell the underlying asset to the Longs and accept cash in exchange.

- * The Short will deliver 10 million barrels of oil (assume that to be 10 lots) at the designated port where the Long has to show up with a tanker to collect. Through the exchange system the equivalent dollars will arrive in the bank account of the Short.
- * The Short will deliver 100,000 bushels of (assume that to be 10 lots) at the designated grain silo where the Long has to show up trucks to collect.

Through the exchange system the equivalent dollars will arrive in the bank account of the Short.

- * The Short will deliver USD 1 million (1 lot) through the settlement system of the exchange to arrive at the bank of the Long. Through the exchange system the equivalent pound sterling will arrive in the bank account of the Short.

In each of these examples the money that comes into the account of the Short is determined by the Strike Price K.

For example if in example # 1 the K for oil was \$90 a barrel, the Long will pay \$ 90 million into the bank account of the Short via the settlement system of the exchange.

You can easily visualize the first two examples to be producers of those products. The third example involves financial institutions, probably banks, but not exclusively so.

Short Puts

These have an obligation to Buy the underlying asset from the Longs and accept cash in exchange.

- * The Short Put will take delivery of 10 million barrels of oil (assume that to be 10 lots) at the designated port showing up with a tanker to collect. Through the exchange system the equivalent dollars will arrive in the bank account of the Long.
- * The Short Put will take delivery of 100,000 bushels of (assume that to be 10 lots) at the designated grain silo showing up with trucks to collect. Through the exchange system the equivalent dollars will arrive in the bank account of the Long Put.
- * The Short Put will deliver USD 1 million (1 lot) through the settlement system of the exchange to arrive at the bank of the Long Put. Through the exchange system the equivalent pound sterling will arrive in the bank account of the Long Put.

In each of these examples the money that comes into the account of the Short is determined by the Strike Price K.

For example if in example # 2 the K for corn was \$4 a bushel, the Long will pay \$ 400,000 into the bank account of the Short via the settlement system of the exchange.

Cash or Financial Settlements

Every trade involves one party that gains and a corresponding counterparty that loses. Financial or cash settlements involve the loser paying the gainer. It is as simple as that if you know how to calculate how much the gain/loss is; and of course the names of the counterparties.

While physical settlement has no reference to Current Market Prices, financial settlements require comparing K to CMP.

In example of oil above, if oil was contracted to be delivered at \$ 90 a barrel and the market price on that day is \$ 82 the Long Put has a right to sell at \$ 90/- what is trading in the open market for \$ 8 less. Corresponding to this, the Short Put has the obligation to buy oil paying more than its market price. Its an \$ 8 loss for that trader.

Instead of having to show up with an oil tanker all that the Short has to do is transfer \$ 8 per barrel, for a million barrels, (that's \$ 8 million) to the account of the Long Put via the exchange's settlement system.

Similarly, if this was a Call at $K = \$90$ and the CMP was $\$96$, the Short Call is obligated to sell at $\$90$ that which is saleable in the open market for $\$96/-$. That is a $\$6$ loss which it must transfer to the Long Call via the exchange's settlement system.

It is an insight to realise that the Longs will never have a loss to pay up for. They are on the secure side of the option and not running market risk! If the CMP went against them, they will simply NOT exercise the option and allow it to lapse. It is only the shorts that are exposed to Market Risk and therefore losses apply only to the shorts. Shorts have an unavoidable obligation every time a Long exercises an option.

Physical or Financial?

Look into the contract specification of the product as set out by the Exchange. Each contract will have one of the two designated as a default of the setting. The Long might be given a choice of specifying which settlement it prefers.

For instance, for corn, physical settlement might be the default setting and if one wants a financial settlement one will have to specify; else by default, one has to show up at the delivery point with transportation to haul corn off.

The correct way to get this right is to look up the contract specification. Traders on the floor know this through sheer experience and practice. And yet, they know they have to look up the contract specification if they venture into a new product; or if a new product is launched.

The Economic Equivalence of Physical and Financial Settlements

The financial impact of the two different types of settlement is identical. There are only operational differences.

Physical settlements are associated with the real world where oil needs to be extracted, refined and used; grain needs to be grown and then consumed and so on.

Let us work through that with an example.

Saudi Aramco drills crude and ensures it will get a minimum price using a Long Put at $K = \$90/-$.

It turns out to be In-The-Money as oil's then current market price is $\$82/-$.

Physical Settlement: Saudi Aramco merely delivers oil and collects $\$90$ which is what it seeks as a commercial organization.

Cash or Financial Settlement: Saudi Aramco asks for a cash settlement and collects $\$8$ a barrel.

Now it still has a million barrels of oil which it needs to dispose of. It goes into the open market where the price is $\$82/-$. It sells for that price and gets $\$82/-$. If we add the $\$8/-$ it collected on the options contract the total comes to $\$90/-$.

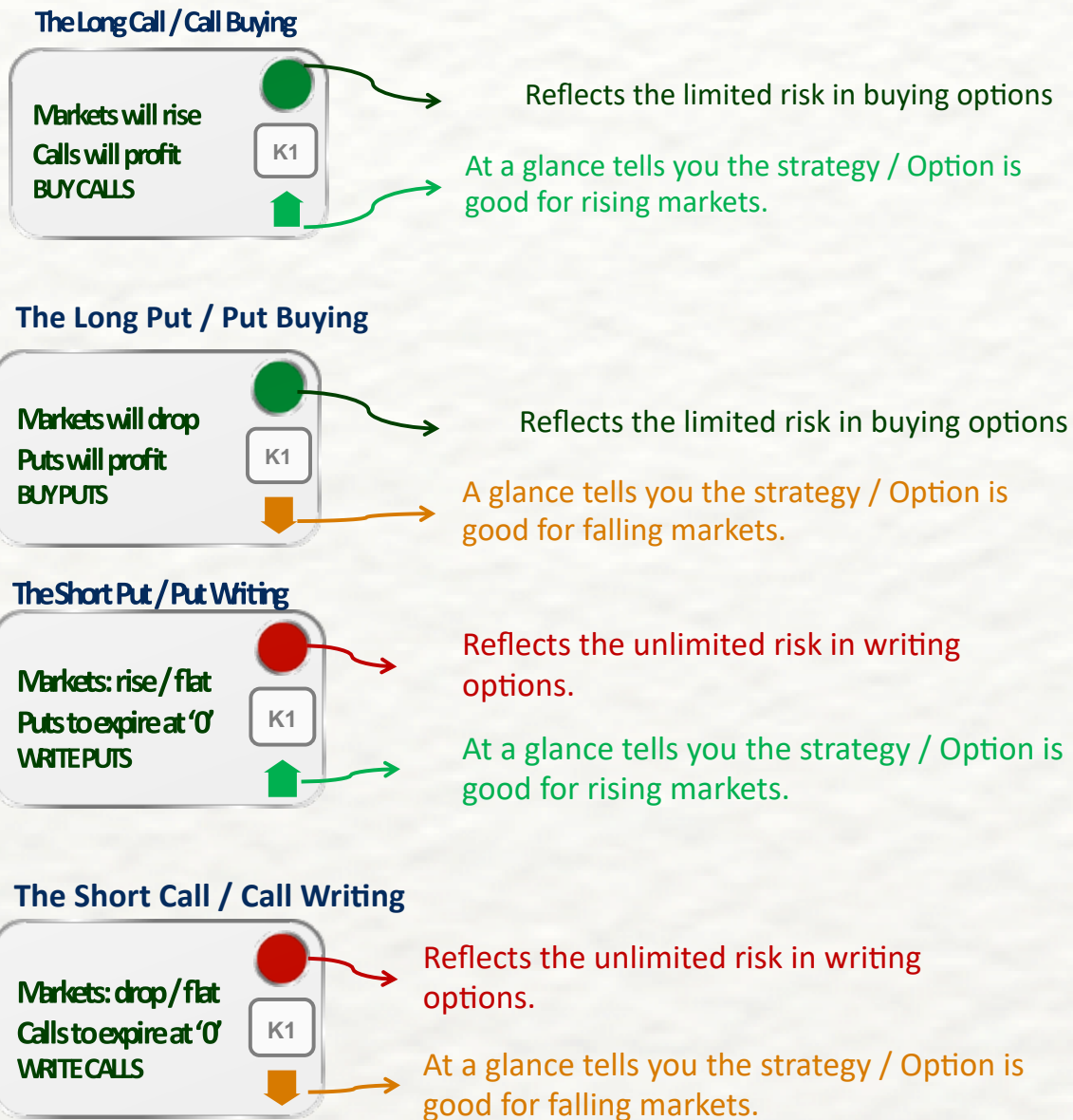
That is the same as its realisation by exercising a physical delivery of oil.

Options Strategies

Icons to Help you Along

As we head into Options Strategies let us put in place a simple tool at your disposal, to help you instantly recall the basics. There are 2 option types and 2 positions that be held in each, long and shot. That gives us a total of 4 possibilities. All options strategies that are later discussed are an outcome of these 4 alone, and nothing else.

When discussing strategies look for these icons to know at a glance the features. Over time you will become familiar with these basic characteristics and perhaps no longer need these icons!



The market call (right bottom of each icon) indicated in these icons are generalisations and will be refined as we get into each strategy.

Options Strategies

The study of these strategies varies from the trading outcomes of options. The reason is the assumptions that go into discussing options strategies:

All options are assumed to be American and therefore can be exercised at any time. All options are exercised or are considered for settlement at expiry.

We know that the trade price of an option (the Premium P) can vary from the exact economic value of the option (as per any pricing model you prefer) due to trading conditions.

That does not come into strategy considerations.

For analyzing Option Strategies the only relevant numbers are: K, CMP and P paid when going Long, which is an assumed number.

The interest cost for margins placed by Shorts are considered in Option pricing models but do not find consideration in Options Strategies.

The four basic positions on options are at the heart of Options Strategies. We have created the icon for each basic so that a learner does not have to rethink the basics each time a strategy is discussed.

As you go through the discussion you will find that the basics become more familiar to you.

There are only 4 things a trader can do:

- * Long Call
- * Long Put
- * Short Call
- * Short Put

There are two ways in which these 4 can be made to look different:

- * Change strike prices
- * Change expiry dates

We will restrict ourselves to changing strike prices to develop options strategies in the first instance. Before that, let us understand the payoff charts for the 4 basic positions by developing them for ourselves.

Prices Move

- As the price of the underlying moves, so too does the price of the option, i.e., the premium move. The premiums on Calls also change the premiums on Puts also change.
- The premiums of OTM options also change and of ITM options also change.
- All change are different rates.
- The discussion on changes in different option prices (P) based on different variables is a different topic called option Greeks.
- What is important to note is that the P determined on the Trade Date, based on the Market Price on that Trade Date does not stay the same. For a each product, (each call or put, of each given K) P moves.

The next section discusses what happens to Market Price and the resultant impact on option profitability. To repeat, in options strategy outcomes are calculated based on comparisons of CMP and K. Overall Profit & Loss is calculated by including the impact of the original P paid at the time of trading the option.

The Long Call Payoff

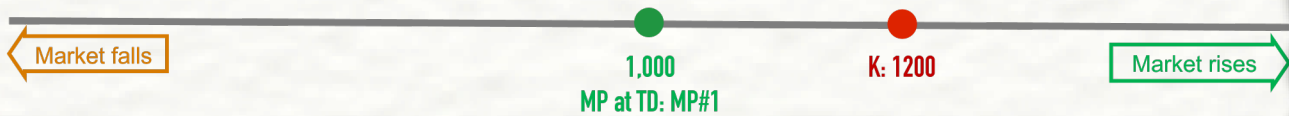
The trader has a Call to exercise at K: 1200. It paid a premium of 125 at the time of going Long.



We look at the continuum that represents the market prices and plot K on that continuum. The left end represents a decline from the prices that prevailed on the date of entering into the option trade. The right end represents an increase in prices since that date.

We place our market price at 1000 to mark the start of the evolution of this chart.

The trader buys a Call (it is called going Long on a Call; or simply Long Call) with a K of say, 1200 when the market was at 1000 at that point. It is an OTM Call.

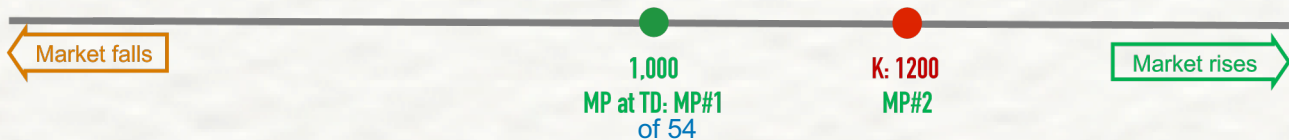


The implication of this is that the trader expects the market to go up. This is the initial view of the trader. This market view key to understanding the Option Strategy being undertaken.

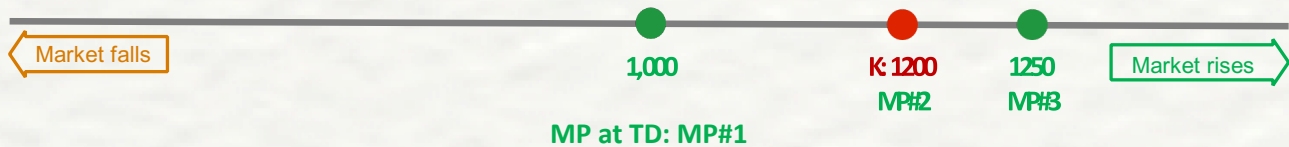
That is because every trader hopes to profit from the trade it makes. The trade reflects the trader's view of what will happen in the market at a given point in time.

Between MP # 1 and K, the Long Call remains OTM. There is nothing to be done with an OTM option.

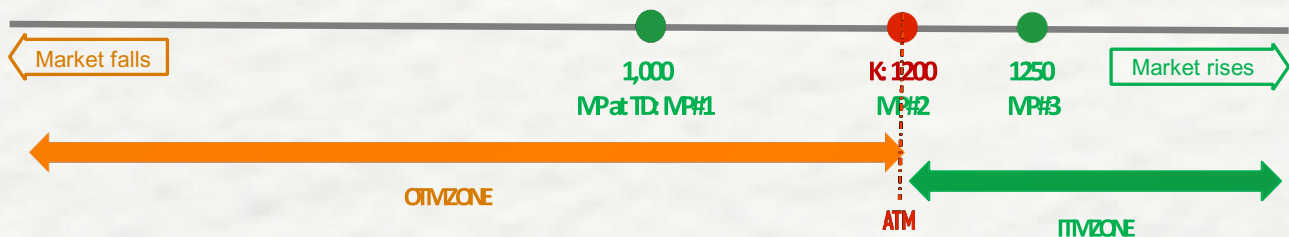
When market price reaches 1200 (MP #2) the option is ATM; and there is still nothing to be done.



When the market rises further, the option goes ITM and now there is money to be made for the Long Call.



Let us generalize that to describe some zones in this continuum.

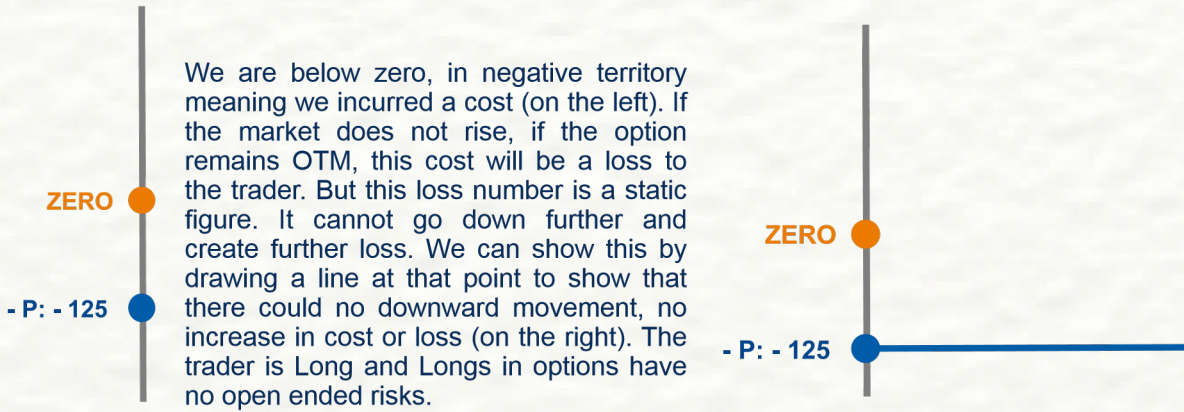


Overall Profit & Loss

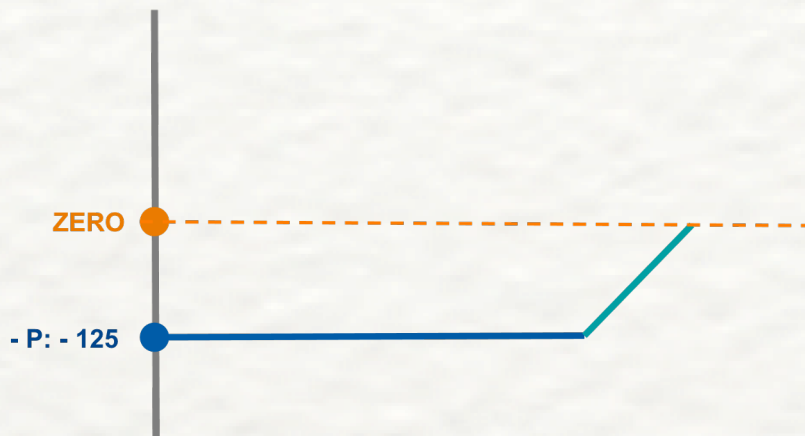
We know that option statuses do not consider the premium paid. The comparison between K and CMP merely tells us whether to exercise the option or not.

So, how do we calculate overall profit? We covered that before; let's develop it to get to a payoff chart.

Firstly, as a buyer of an option the Long Call paid premium P. This directly starts off with a negative: the cost of buying an option. Let us assume this P for the Call K:1200 is 125.



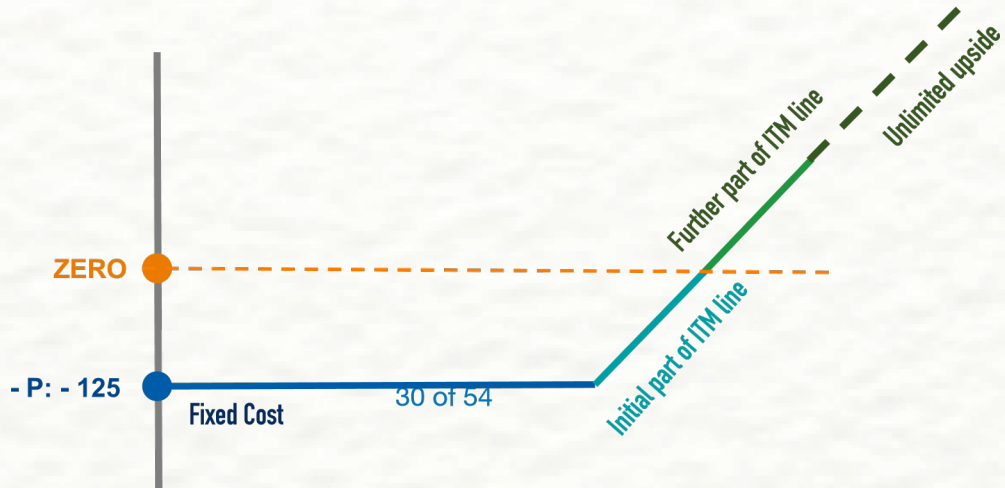
As the market starts to rise this option moves to the ITM zone which as we saw before is after the market price crosses K. That upward climb is seen in the graphic below:



When market price – K is greater than the P of 125, when that 'zero' line is crossed - that is when

overall profit is achieved.

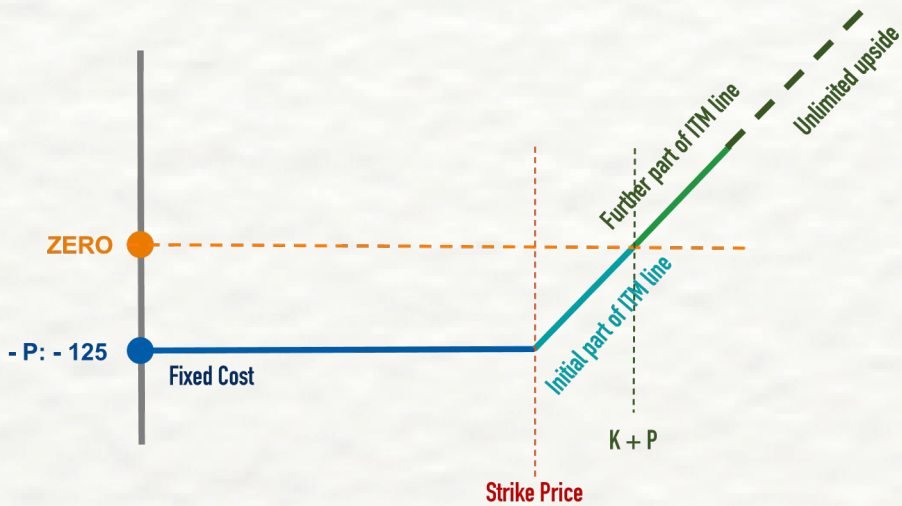
So we have one line reflecting the fixed nature of the cost of an option and that is the maximum possible loss to



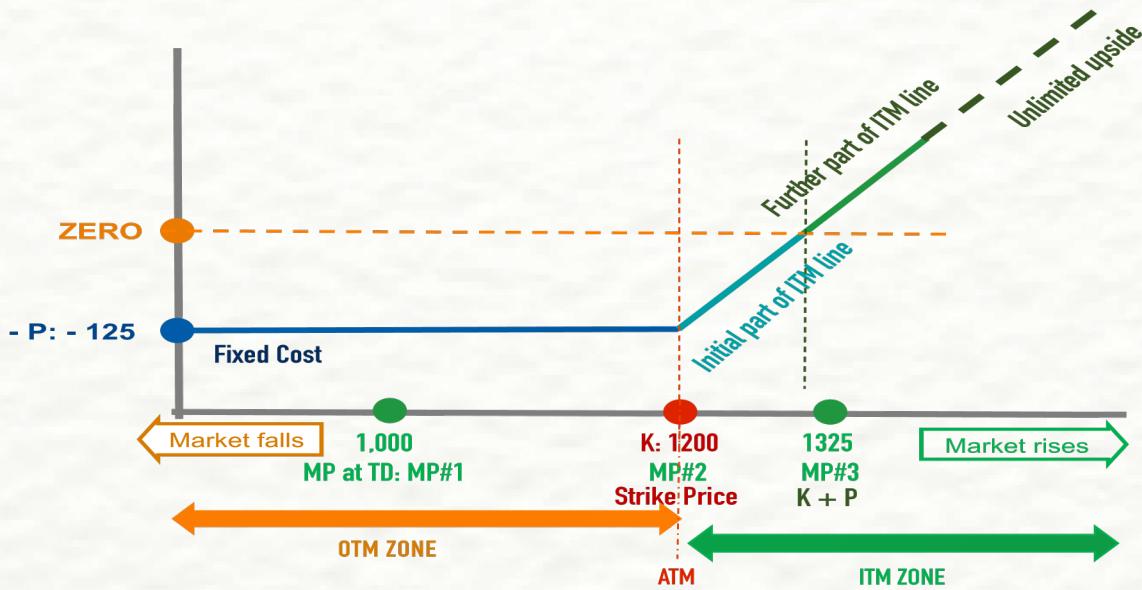
the Long Call.

We have an upward sloping line reflects the call going ITM and the premium cost is recovered. The Profit zone is after it crosses zero and this line has an unlimited upside potential.

Let us mark those spots where the line starts to move up and the moment it crosses the zero line in the overall.



Looking at the vertical line (Y-axis) and horizontal line (X-axis) that we developed independently, and bringing them together creates the payoff chart seen in options literature in general.



Overall profit is achieved when the market price moves up by more than 125 (the P) beyond the K (1200); i.e., Market Price has to cross 1325 for an overall profit.

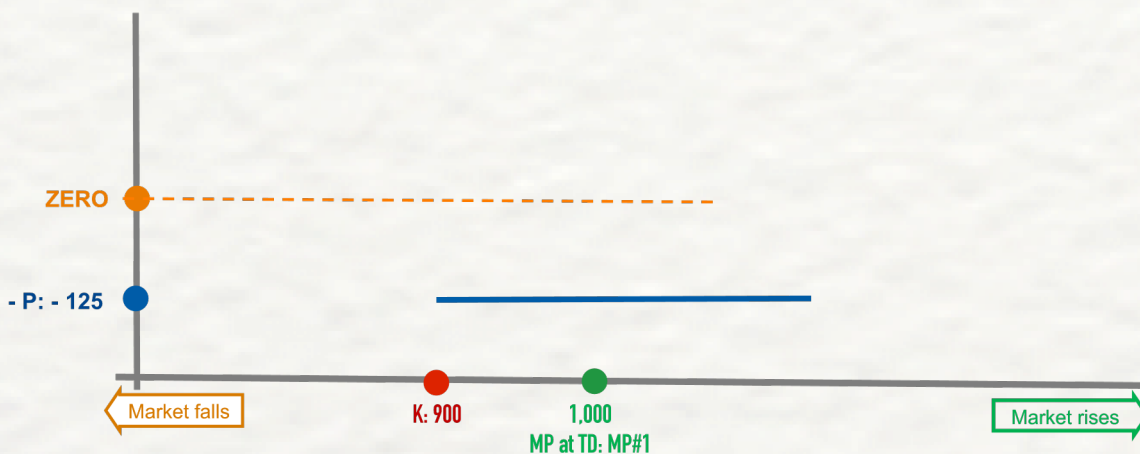
The Long Put Payoff

The Long Put is at a K: 900. Assume the premium paid at 75.

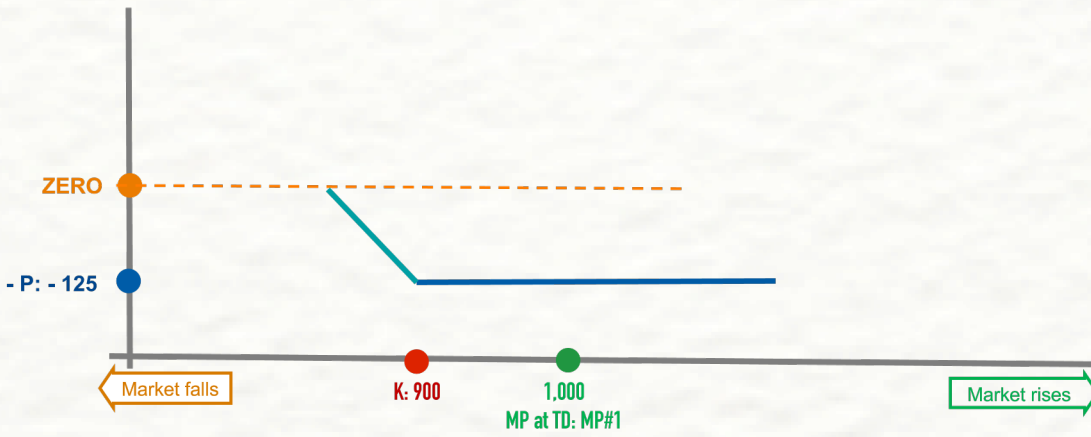
The view and expectation is that the market will go down.



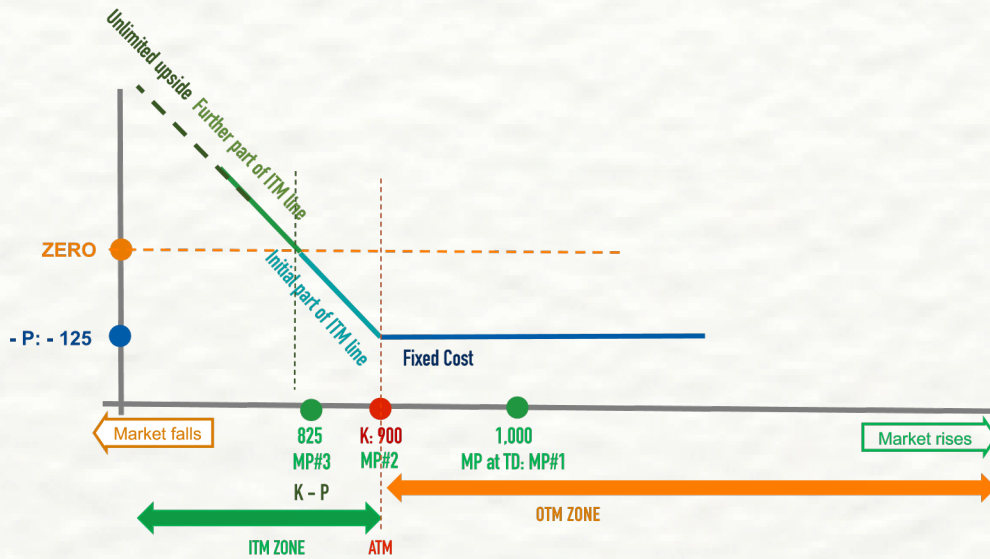
As soon as the buyer of the Put pays premium it incurs the cost. That premium line would typically extend to the left but we have need some space blank because the option makes money only when market prices move to the left: so it is deliberately left blank!



The option moves into ITM zone when markets drop. Initially, all that happens with the price movement is that the premium cost (P) is recovered and the position moves to one of no-profit / no-loss, i.e., the zero line.



Beyond that lies the profit zone.



As before (and as always) profits require that the market price moves by more than P. in this case if the decline in market price exceeds P then we get profits. So markets lower than 825 (K-P) favor the

Long Put.

The Short Call

The short call is the counterparty to the Long Call. We will assume that the writer wrote that call option of K: 1200 and collected 150 as premium.

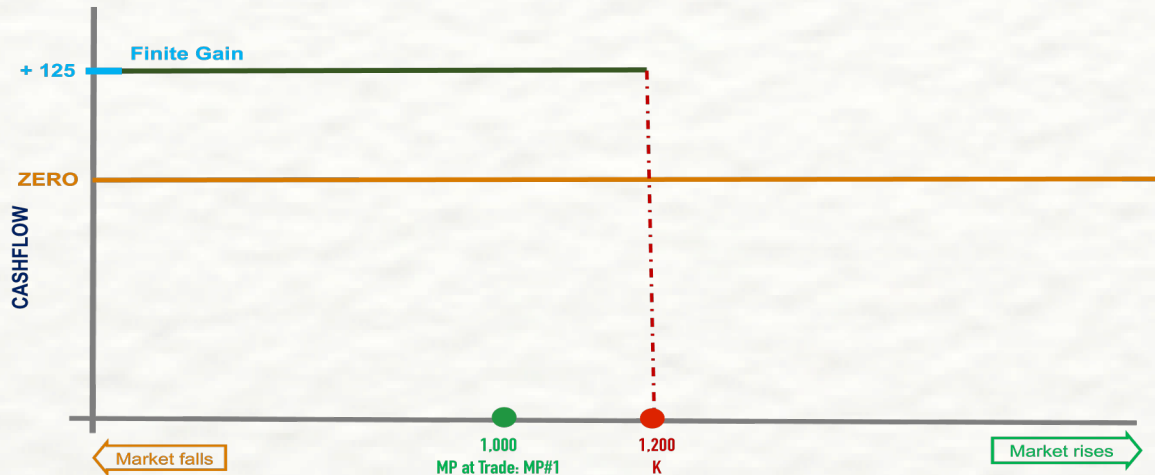
This is the income of the Short Call, the writer and is the maximum gain that the Short Call.

Markets: drop / flat

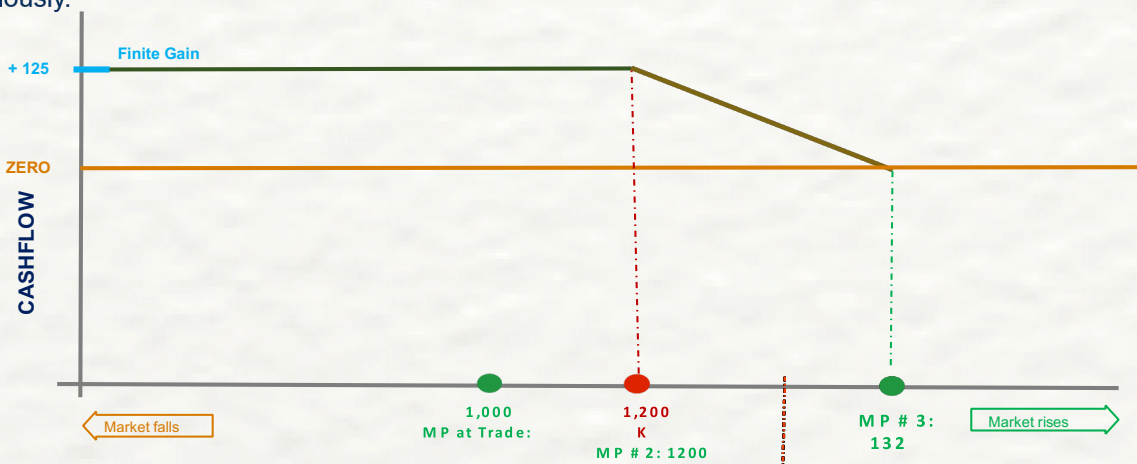
Calls to expire at '0'

WRITE CALLS

K1
↓



As markets rise, the Short Call starts to see losses that initially eat into the premium collected previously.

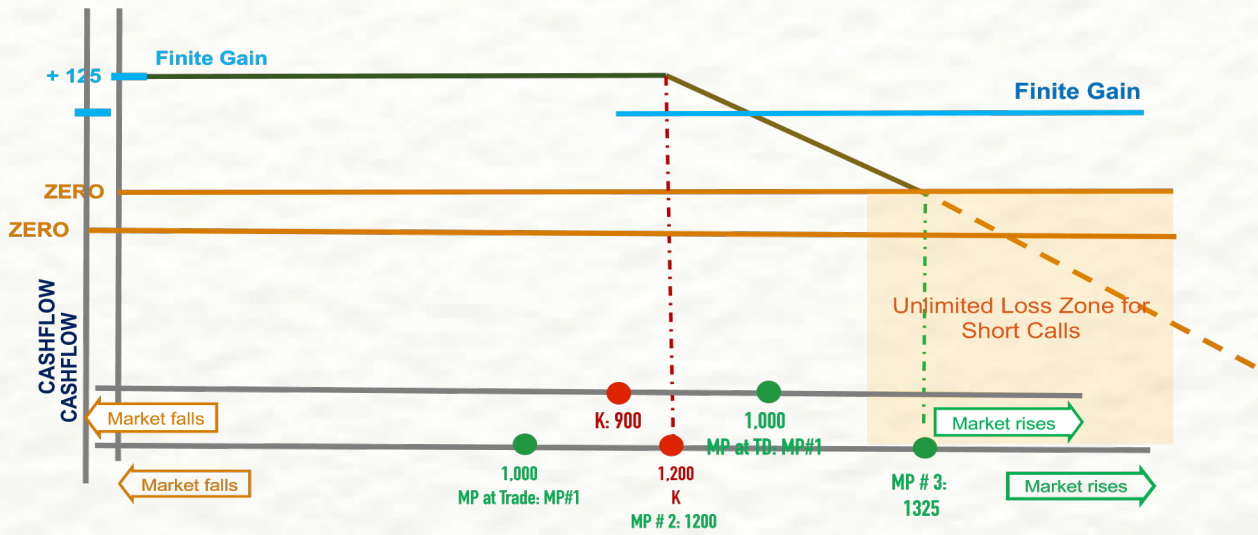


Beyond a point, the losses exceed the premium and the writer goes into the loss zone. Since Shorts run market risk, this loss is potentially unlimited for the Short Call.

The Short Put

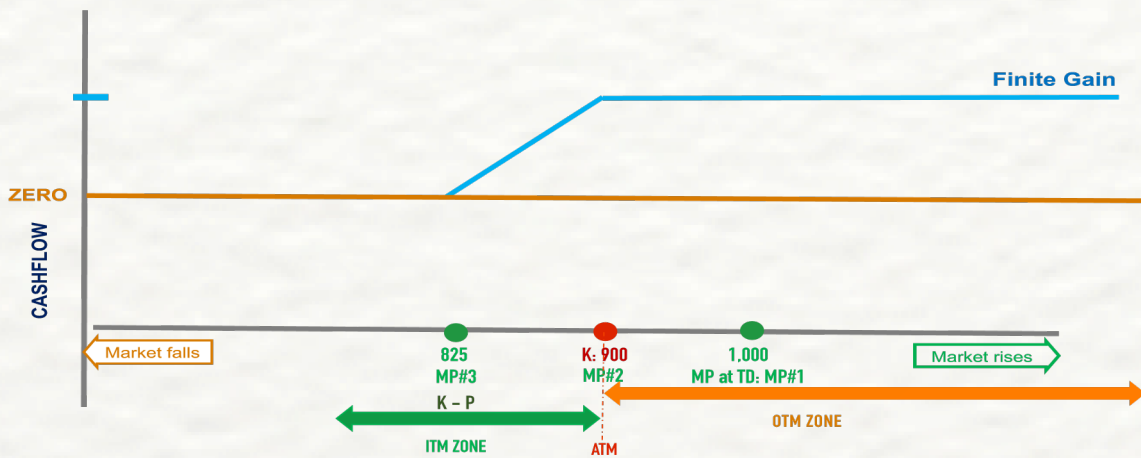
The short put is the counterparty to the Long Put. We will assume that the writer wrote that put option of K: 900 and collected 75 as premium.

75

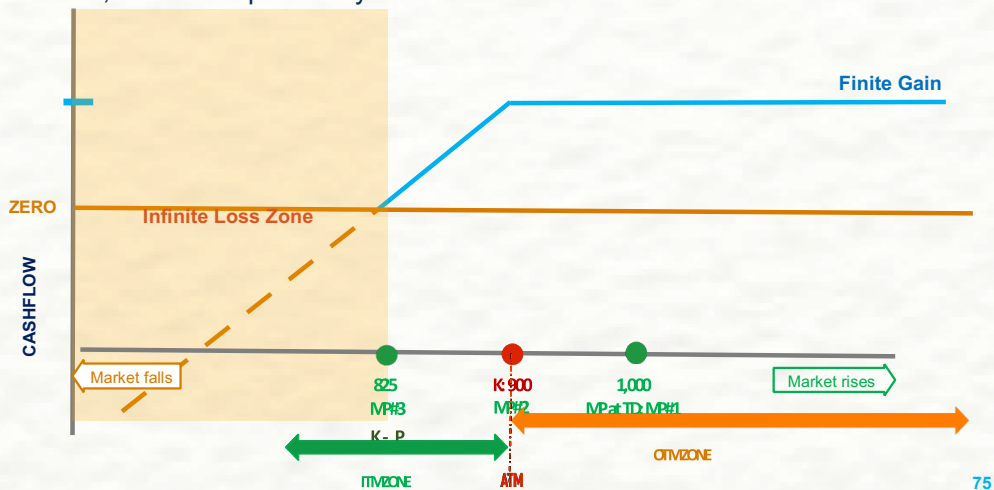


This is the income of the Short Put, the writer and is the maximum gain that the Short Put.

As markets rise, the Short Put starts to see losses that initially eat into the premium collected previously.



Beyond a point, the losses exceed the premium and the writer goes into the loss zone. Since Shorts run market risk, this loss is potentially unlimited for the Short Put.



These are the only four things we needed to understand. We now proceed to understand the simple but critical concept of Stop Loss.

Stop Loss

Traders enter markets with a view and to trade on their view with expectation that their views are exactly how markets will behave.

However, markets have a mind of their own and often go in a different, unexpected direction.

The Stop Loss is the escape hatch for a trader. It pulls the trader out of a losing situation before it loses its entire capital; and more. Traders who had been careless have been known to be driven to bankruptcy with the individuals involved sometimes taking their own lives.

Therefore, Stop Loss is important when it comes to trading. Its akin to having brakes in a car, if the intent is to drive fast.

The trader, before getting started, decides the appetite for loss if things were to go awry.

As soon as things go against and the loss limit is reached, the trigger is pulled limiting the loss. Executing this is critical because humans have a tendency to hope against hope when things are going against them and the outcome is almost always bad.

The idea is to pull the stop loss trigger a hundred times and get out with small losses, waiting for that one move which is in the trader's favor and enough gains are made to wipe out the accumulated losses from stop loss triggers and make still more to generate a return in the overall.

In options strategies, the Stop Loss can be installed as a trigger without requiring that the trader be present at the terminal or without needing to use an order management system feature that triggers a stop loss.

Those are interventions.

The options stop loss triggers the Stop Loss from the strategy itself. And yet, we use only the 4 basic option positions. For some of these strategies, different Strike Prices are used.

We now know that losses visit only the Shorts, so we focus our attention on stop loss strategies for Short Calls and Short Puts.

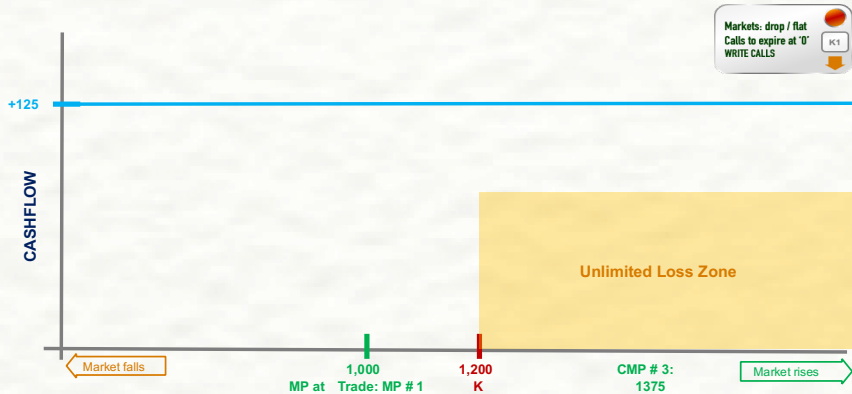
The Stop Loss for a Short Call

The trader who Shorts a Call expects the market to 'not go up'. This is strictly speaking not the same as going down because if there was a strong view that markets would go down the strategy with potentially unlimited gains would be to go Long Put.

This is just a view that the market is not likely to go up. By writing calls, the trader expects the option to expire worthless and the writer to be able to retain the full premium after expiry.

But markets have a mind of their own. If it decides to go up and that too, by a significant measure then the Short Call is in trouble.

The SHORT Call: how much loss to bear?

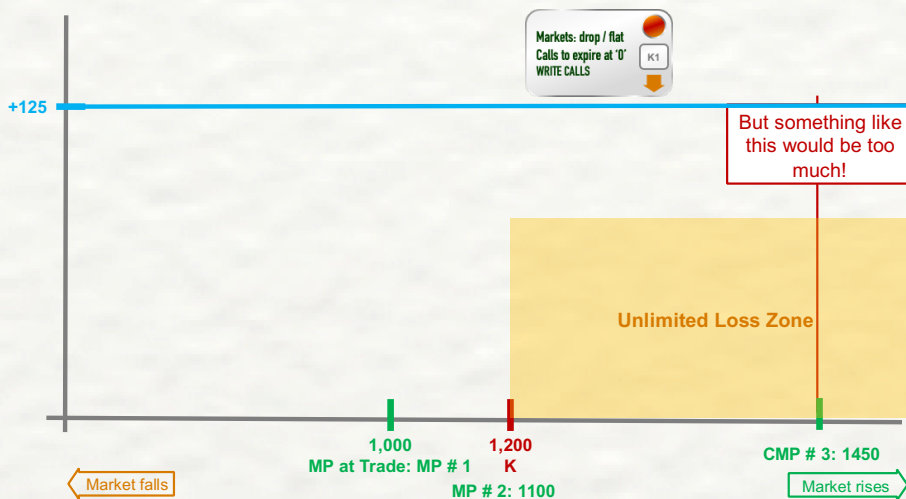


Let's proceed methodically to understand what will happen and how to construct a stop loss.

The Short Call is at K: 1200, P = 125; Market Price on this Trade Date is 1000.

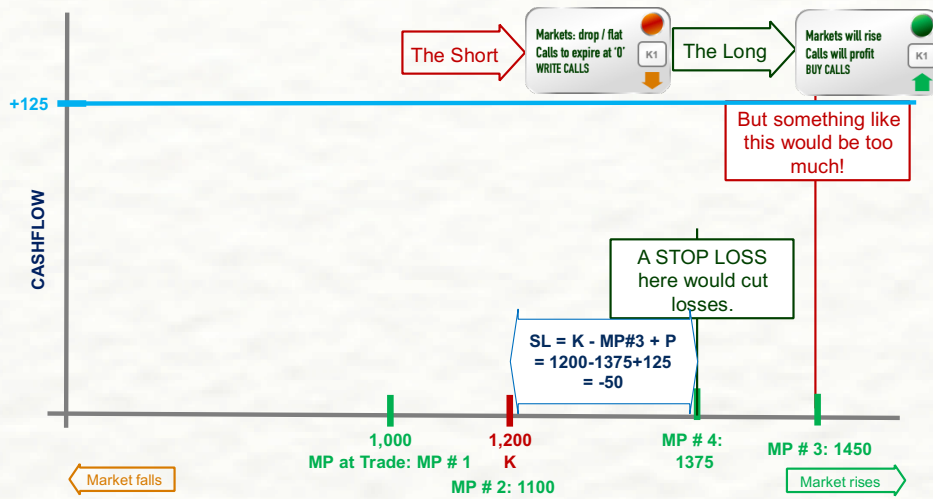
When the Long Call goes ITM the Short is in trouble. The Long Call will exercise and ask to be sold the asset at K:1000 when MP is 1350.

The Short will have to go into the market and buy the asset at 1450 and sell it for 1200 to Long Call, directly making a loss of 250!



The Stop Loss answer to this is: if the Short Call had a source from which to buy the asset for a guaranteed price which is fixed, then the Short would not face a situation of open ended loss.

How to determine guaranteed price that suits the Short? Let us say that the short, having received P of 125 is not willing to face a loss of more than 50. That means the market will move up (against the view of Short Call) by 125 beyond K, (wiping out P), and another 50 (the amount the Short trader is willing to lose; also known as Stop Loss). **[K - MP for StopLoss + P].**

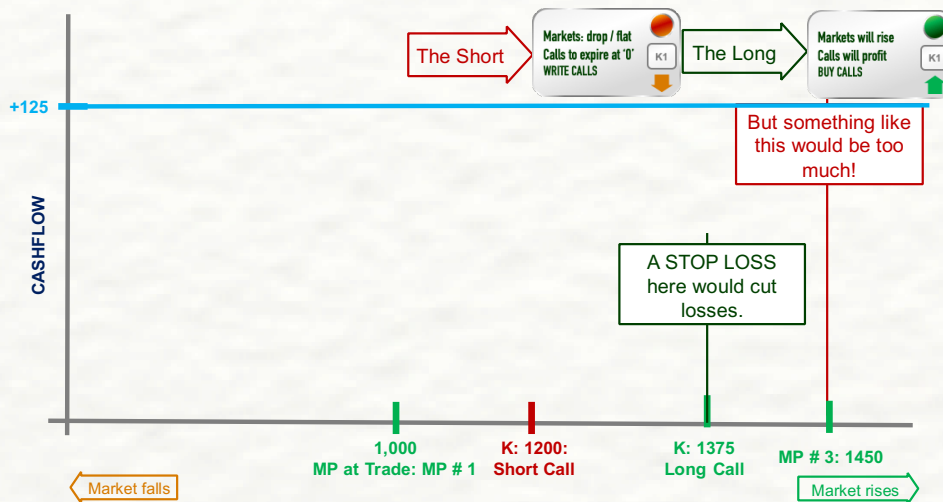


Therefore, a market level of 175 higher than the Market Price on the Trade Date when the trader goes Short Call is the point at which the trader wants to get out.

MP on TD is assumed by us as 1000. K is at At 1200; P: 125. The market needs to move beyond 1325 for the Call to be ITM. From there another 50 of loss is acceptable to the Short Call. At MP = 1375 he wants a guaranteed supply.

It will get supply at 1375, sell at K: 1200. Book a loss of 175. Subtract the P previously earned on writing and the Short Call is left with a loss of 50; which is the intended Stop Loss.

The source of the guaranteed supply is a Long Call K: 1375.



The Short Call losses will mount steeply if the markets go beyond 1375. However, this loss will be offset by the gain in the Long Call held by the same trader, so that beyond 1375, the loss is limited.

Unless a trader runs the possibility of a loss it cannot make a gain. However, it is not necessary to face limitless losses.

A Short Call at K can limit its loss with a Long Call at a higher K, K+.

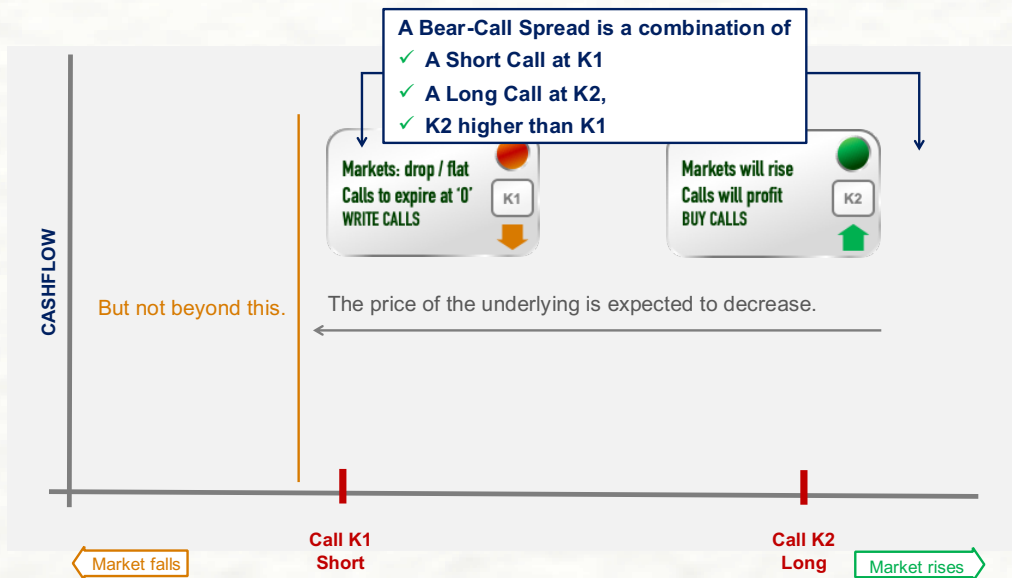
This is the strategy known as the **Bear Call Spread** and is explained in the classical format below.

The Bear Call Spread

The trader's view: the market will be moderately bearish and not go down significantly.

In line with this view the trader goes Short Call at K, hoping to book the P received as profits when the Call expires worthless.

Bear Call Spread



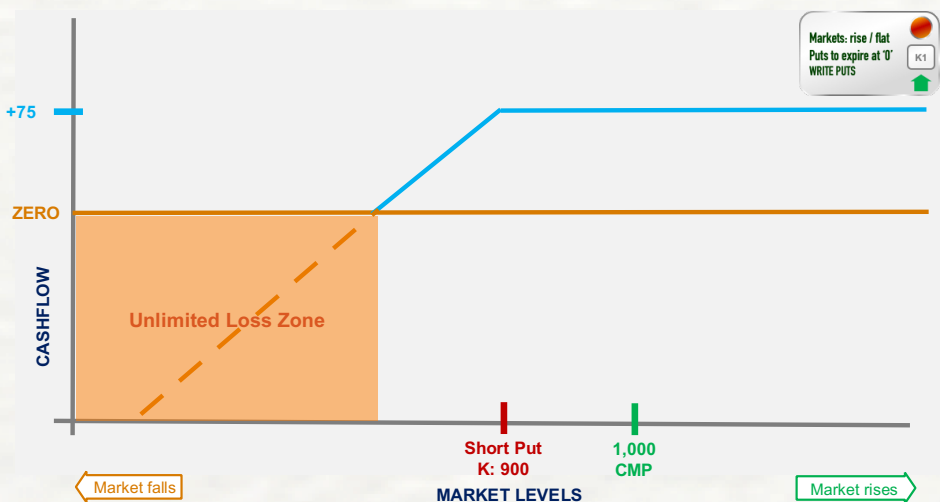
To cover the risk that the view does not materialise and that the market might go up significantly, it covers with a Long Call at a higher K, K+/

Combining a Short Call of a particular K with a Long Call of a still higher K is a Bear Call Spread. It works as described in the previous section.

Stop Losses for Short Puts

Similarly, a Short Put can limit its loss with Long Put with a lower K. Let's work through that, too.

The Short Put sold Put K: 900 and collected P: 75.

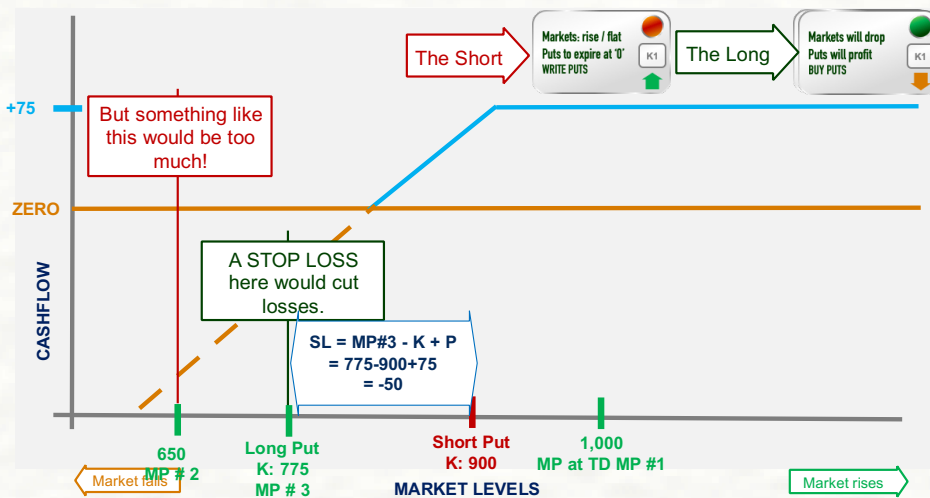


The market declines (against the trader's view that markets will 'not go down'). The Short is forced to buy the asset at a price of 900 which is trading in the market at perhaps, 800. It can limit its loss from this event if it is able to sell off what it buys from the Long Put at an acceptable price.

The Short Put wants to limit losses to 50. This loss of 50 will happen if the market declines initially by 75 beyond the K to wipe out P; and a further 50 which is the stop loss the Short Put is willing to bear.

So, $K - P - 50$ is the desired price at which the Short Put wants to be able to sell off what it is forced to buy at 900. $K - P - 50 = 775$.

A guaranteed price at which to sell is achieved by Long Put K: 775.



So the stop loss for Short Put K: 900 is Long Put at still lower K of 775; when the Market Price on Trade Date is 1000. And here is how that works:

The market goes down to 650. The Short Put must buy the asset at 900. Using the Long Put the trader sells it off at 775, booking a loss of 125. Consider the premium of 75 collected earlier, the net loss to the trader is 50 which is the stop loss it intended to implement.

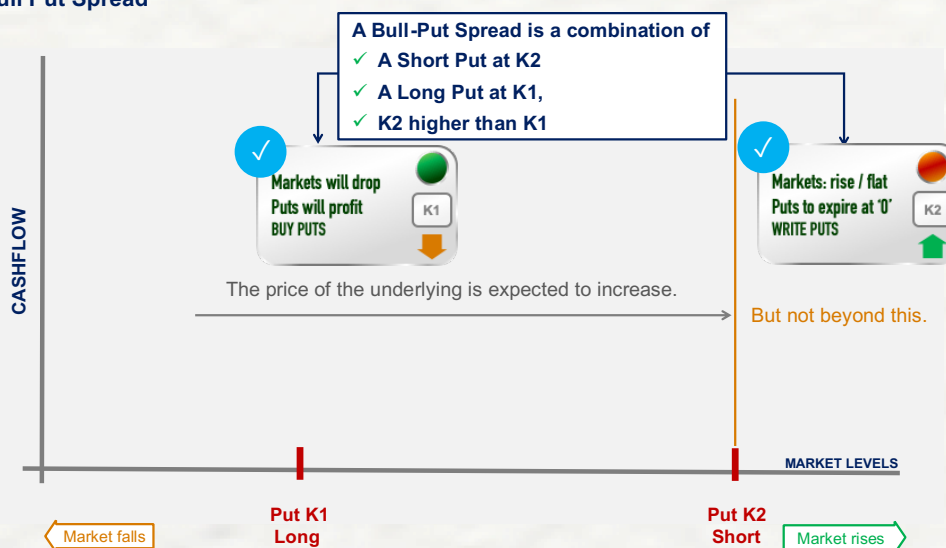
The advantage of a stop loss thus implemented is that the trader need not be watching the terminal. This is the strategy called the Bull Put Spread and is described classically in the following section.

A Bull Put Spread

The trader's view: the market will be moderately bullish and not go up significantly.

In line with this view the trader goes Short Put at K1, hoping to book the P received as profits when the Put expires worthless.

Bull Put Spread



To cover the risk that the view does not materialise and that the market might go down significantly, it covers with a Long Put at a low K, K-.

Combining a Short Put of a particular K with a Long Put of a still lowerer K is a Bear Call Spread. It works as described in the previous section.

Both of these strategies (Bear Call Spread; Bull Put Spread) are based on earning and keeping the premium through the option decaying; covered by a stop loss if the view does not pan out and the market goes in the other direction.



“The market is going nowhere!”

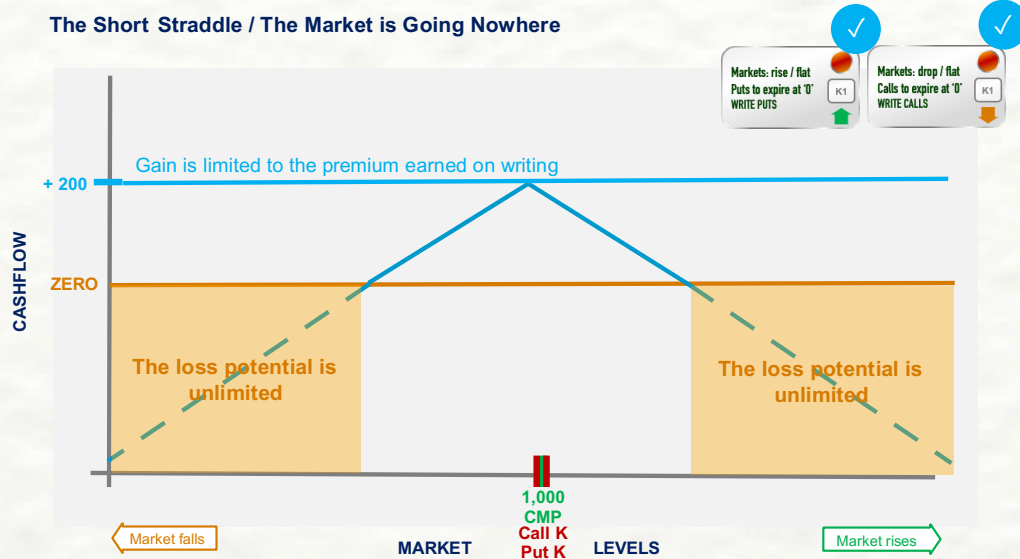
This section covers the Short Straddle and Short Strangle.

If that is the view of the trader then it might want to earn from the decay of options – the bet is all options the trader writes will expire worthless.

To execute this strategy, the trader executes a Short Call and a Short Put at the levels at which the market is on the trade date. Writing near and in and about the market levels ensures a high level of earning for the Short trader.

Thereafter, the Short trader waits for expiry, betting that ‘the market will go nowhere’. If that view holds out, then both Short Call and Short Put will expire worthless. All the premium collected can be retained and accounted as profit.

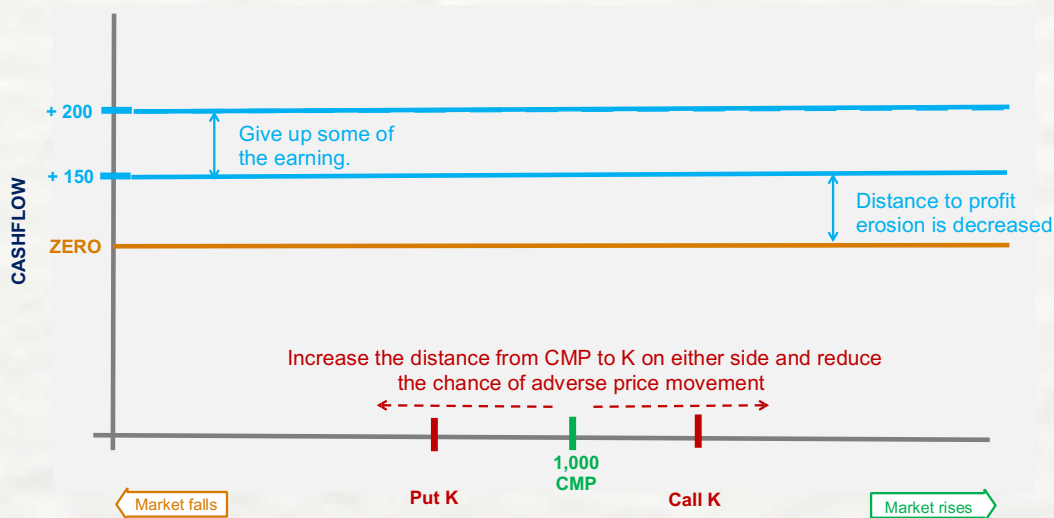
This strategy seen in the chart below is the Short Straddle.



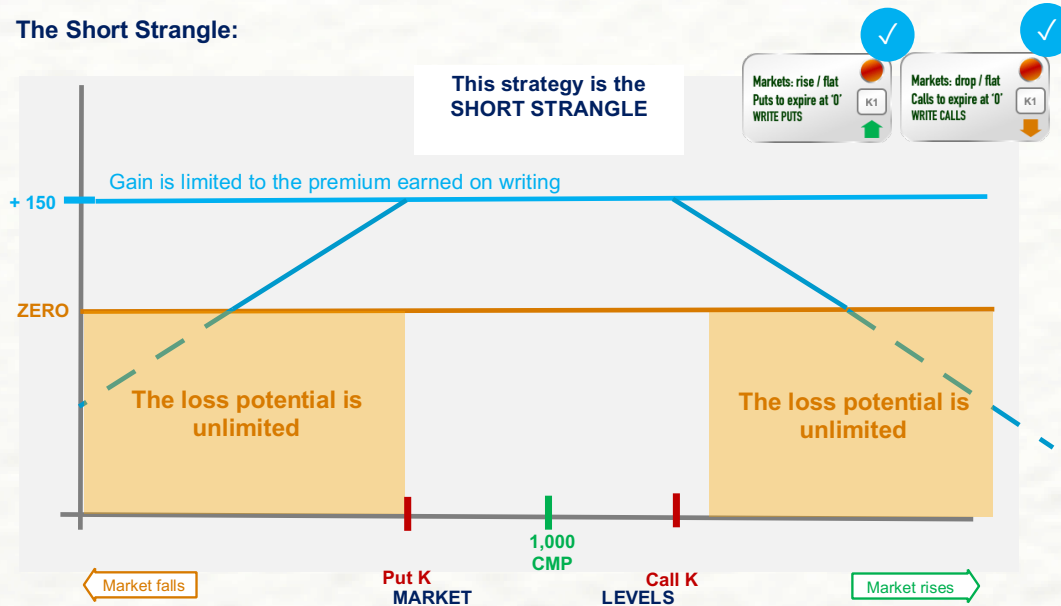
Shorts are never without risk; to be precise, open-ended market risk.

The moment a trader moves to reduce risk profits will shrink; and if the move is to eliminate risk earnings will be eliminated too.

One way to reduce risk is the move away K from current levels in both directions. That means losses will accrue from writing only beyond a certain movement in the market in either direction. **Reducing the Probability of Profit Erosion**



The Short Strangle:



This is the Short Strangle. The earning from P is lower but the risk of a loss is somewhat lower as well.

Combining Stop Loss strategies with the Short Straddle and the Short Strangle

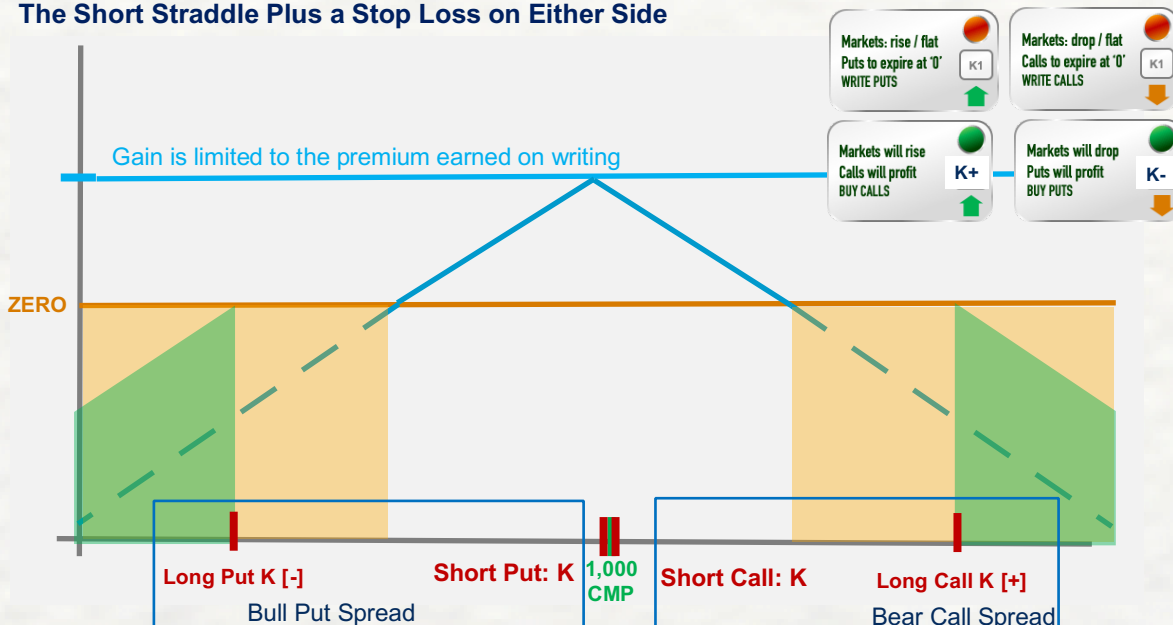
We are now quite familiar with stop losses using options. It is simple: if you are Short Call, then go long Call at a higher K; the Long Call K is at the point at which you want to exit the market. If you are Short Put, then go Long Put at a lower K; the Long Put K is at a point when you want to exit the market.

In a Short Straddle or Short Strangle you need a stop loss in both directions. Combine a Bear Call Spread and a Bull Put Spread in each direction and you are completely covered.

The Short Straddle with a Bear Call Spread and a Bull Put Spread is a Butterfly. See the chart below.

The Butterfly

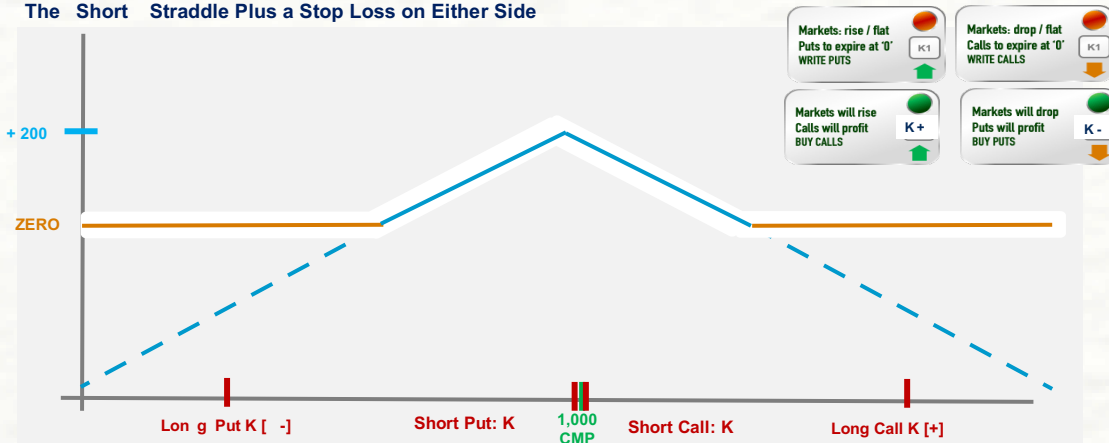
The Short Straddle Plus a Stop Loss on Either Side



If you do not see the butterfly in the above chart, look below:

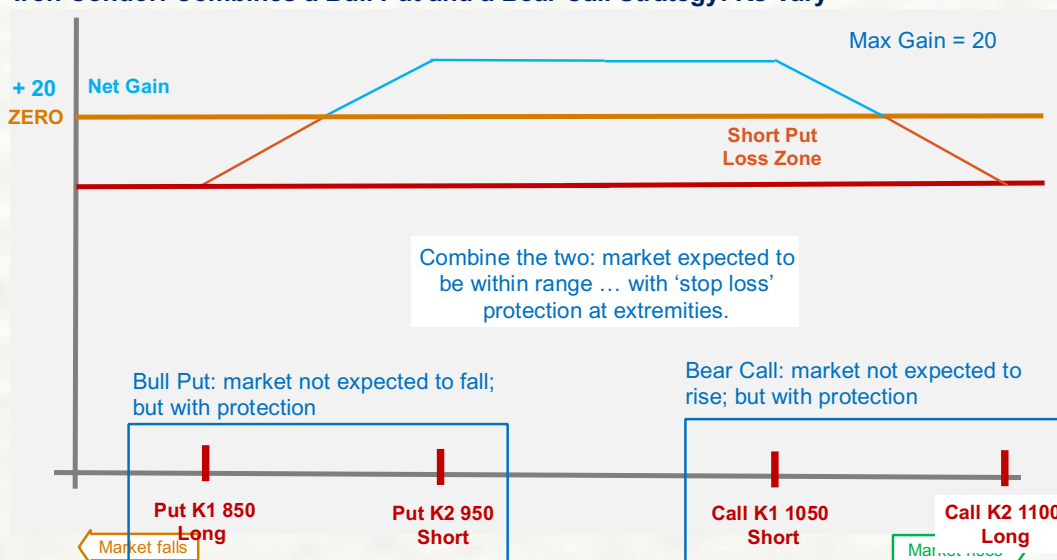
The Butterfly

The Short Straddle Plus a Stop Loss on Either Side



The Short Strangle with a Bear Call Spread and a Bull Put Spread is an Iron Condor. See the chart below:

Iron Condor: Combines a Bull Put and a Bear Call Strategy: Ks Vary



“The Market is going to breakout!”

This section covers the Long Straddle and Long Strangle.

This is the opposite view of the market stagnating. This view is that the market has been stagnating for too long and is set to breakout. In fact, that is one of the observations about markets: that the longer it does ‘nothing’ the greater the probability it will breakout dramatically. Further, veteran traders share tales of how the market did nothing as they stared at the screen for the longest stretch. And then in 3 trading sessions when a bored trader took a vacation it made a big leap in one direction or the other.

Trading markets can be a lot like fishing. You need patience and just when you lose patience and decide to take a break the largest trout might idly swim by.

So, after a length of quiet time some traders might take the view that something is set to happen; that volatility will break out.

It can be expensive as the trader is paying two premiums and hoping that the move in the market will cover the cost of two premiums and then some to yield an overall profit.

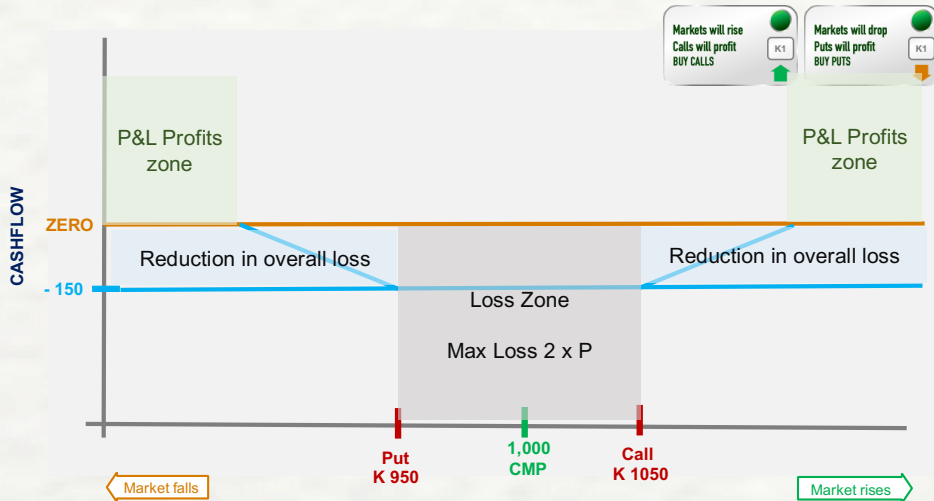
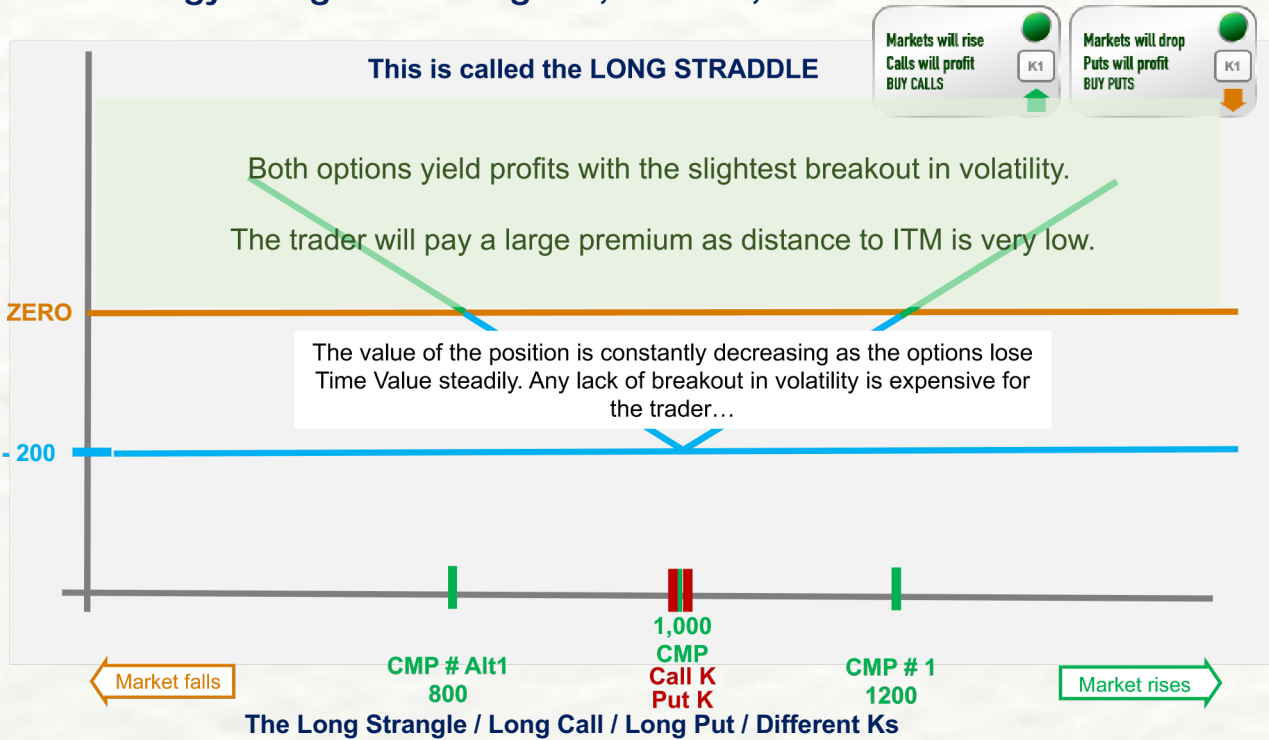
The trader can also reduce the premium cost by moving the K of the Call a bit higher and the K of the put a bit lower. That would then be the Long Strangle.

However, they might not have a view on exactly which side the market will break out: up or down. Nor might they particularly care.

The trader could simply combine a Long Call with a Long Put, both with Ks around the current market level. The moment the market moves in either direction the Call or the Put will start gaining money.

That is a Long Straddle.

The Strategy: Long Call + Long Put; Same K; K = CMP



Strategies Associated with Hedging

The strategies discussed so far are independent of what an entity might have in its core portfolio. The strategies could be used by speculators such as hedge funds.

However, there are a couple of strategies which those with an underlying exposure could use. This is called hedging.

A fund manager might hold assets and worry about a potential decline in prices. The same fund manager might think the market is really going nowhere in the short-run; why not make money with some option strategy? The risk is limited by just delivering the stock if things go against the market view and the market does in fact run up.

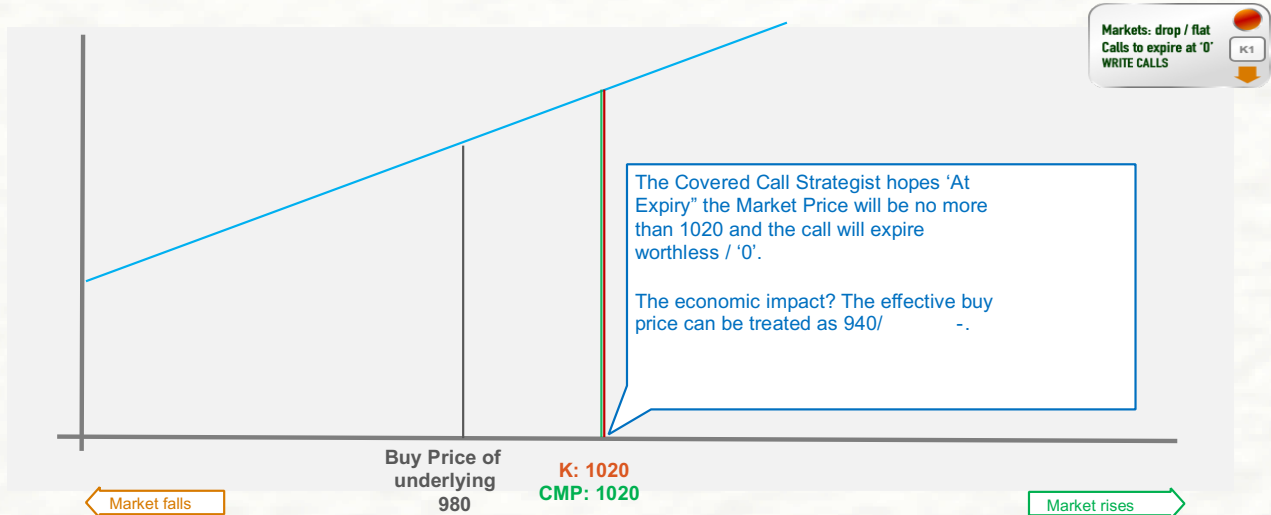
The Covered Call

The trader holds an asset and does not see the market going up in particular in the short run. This does not serve the strategy of holding an asset which is basically to see the value rise in the portfolio. The trader decides to go Short Call; with market not going up one might as well squeeze a few extra cents in profits to boost portfolio returns.

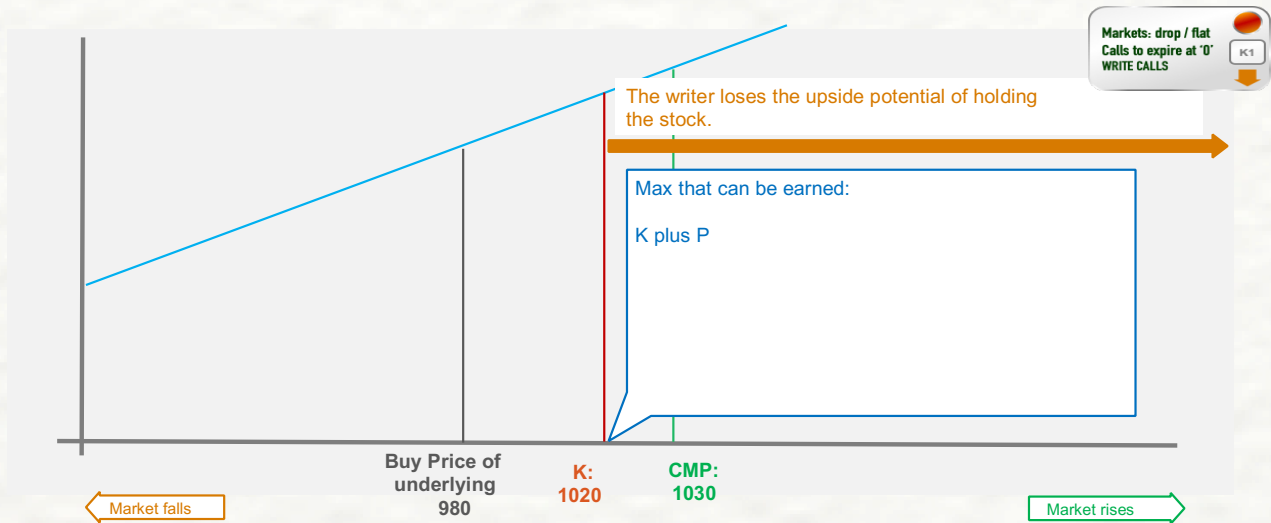
Should the market shoot up unexpectedly, instead of losing money the trader will merely deliver the asset. Its loss is the opportunity it lost from holding on to that asset. Part of that is offset by the premium it collected in going Short Call.

One can view the Covered Call as defining the maximum one can earn from holding an asset, owing to the nature of the strategy.

Covered Call Strategy: Best Case Scenario



Covered Call Strategy: What the Writer Gives Up

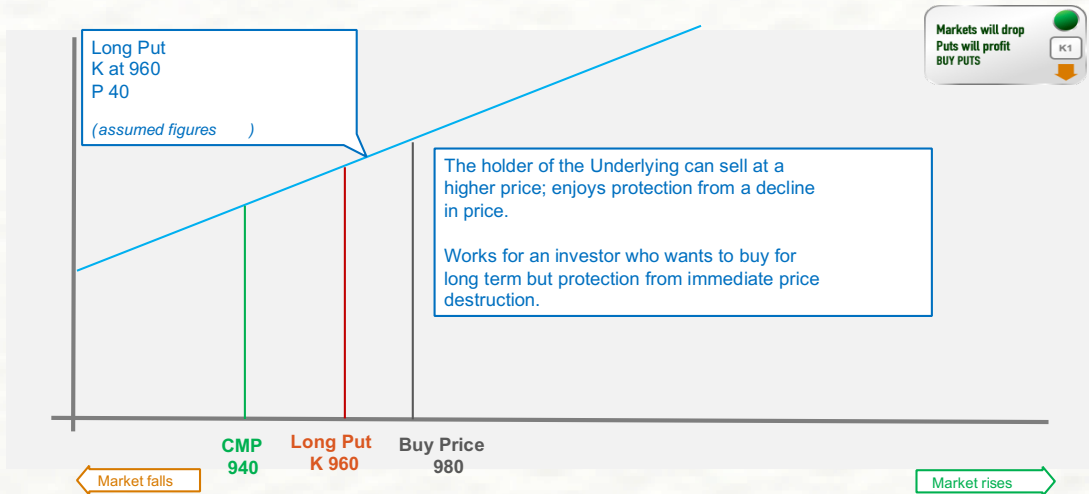


The Protective Put

The trader holds an asset and worries about a potential crash in the market. It goes Long Put and if the market does in fact crash, it has a right to sell at a suitably higher price (K). If the market does not crash the trader ignores the Long Put allowing the option to expire and treating P as the cost of covering the downside risk, i.e., the hedge.

The Protective Put may be viewed as delivering an assured minimum price for an asset held. If you feel that this is nothing but the Long Put you are correct. A position is a hedge (or not) based on other portfolios held by the trader! So if you do not know what else an entity holds you cannot conclude whether a trade is speculative or a hedge.

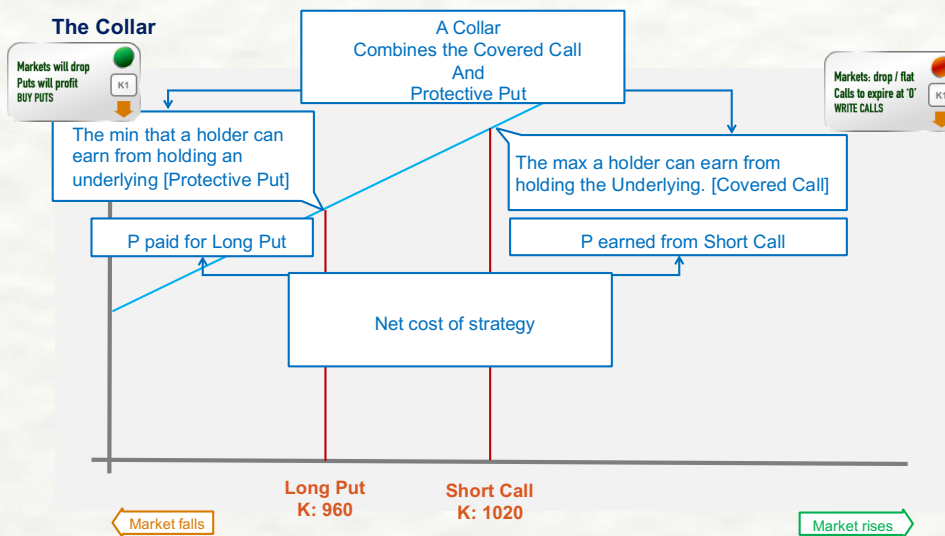
Protective Put Strategy: Protection from Downside



The Collar

For nervous fund managers who are unsure of what is going to happen next, they can secure themselves on the downside with a Protective Put and earn some extra money on the upside with a Covered Call protecting itself from unlimited losses by simply delivering the asset.

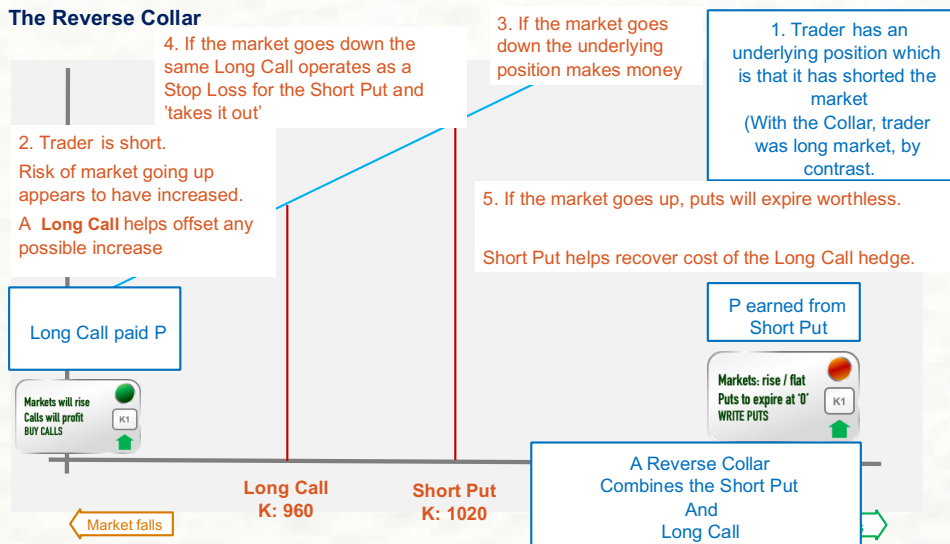
The value of the portfolio is 'not less than' as determined by the Long Put; and 'not more than' as determined by the Short Call + P from Short Call.



The Reverse Collar

Follow the numbers in the chart below:

The Reverse Collar



Other Hedges

Caps

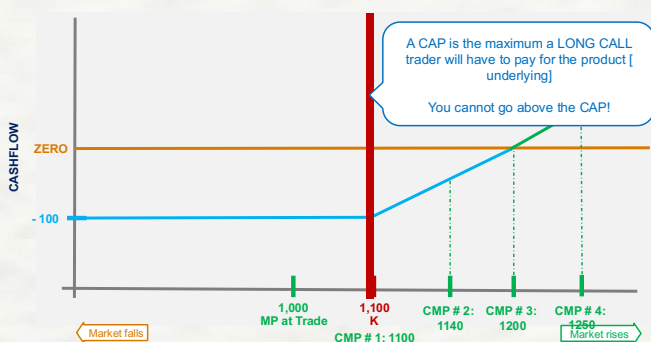
A Long Call serves as a Cap: the maximum that one might have to pay for an asset. The terminology is more apt for forex and interest rate markets as the following examples show:

Fx Cap: Go Long Call on USD, K: 0.9 GBP per USD; for an importer of goods it can limit the price paid for USD while importing goods. For instance: pay no more than GBP 90,000 to take delivery of USD 100,000. (If you can get GBP for \$ 85,000 allow the option to expire worthless and buy your GBP in the open market.)

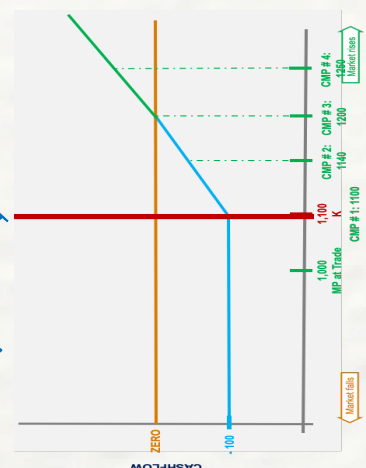
Interest Rate Cap: Go Long Call on USD 3 year interest rates at K 4.5%. Pay no more than 4.5% to borrow for 3 years in USD. (If the market rate of borrowing is 4.25%, allow the option to expire worthless and borrow in the market at 4.25%).

The chart on the left is the payoff chart for Long Calls. Rotate it by 90 degrees and view the thick red line as the maximum one might have to pay for an asset.

A CAP is simply a LONG CALL



A cap is the maximum a LONG CALL trader will have to pay.
 You cannot go beyond the CAP!
 The terminology is more associated with product groups:
 ✓ Forex
 ✓ Interest Rates
 The right to BUY USD for not more than INR 75/- for a dollar. [India importer]
 The right to BUY money (BORROW) for not more than interest rate 7.75%.



Floors

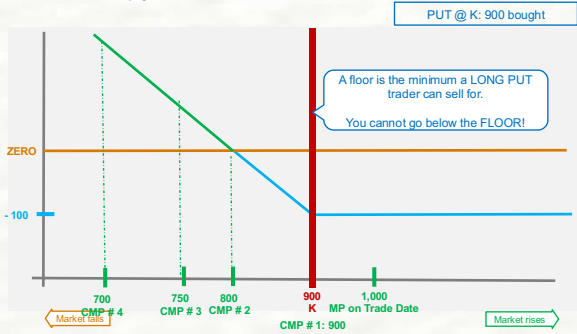
A Long Put serves as a Floor: the minimum one might receive for an asset. See the examples below:

Fx Floor: Go Long Put on USD, K: 1.02 GBP per USD; for an exporter of goods it can ensure the rate at which its USD are converted to GBP. For instance: receive no less than GBP 102,000 when giving delivery of USD 100,000. (If your USD fetches GBP 104,000 in the open allow the option to expire worthless and collect GBP 104,000 in the open market.)

Interest Rate Floor: Go Long Put on USD 3 year interest rates at K 5.25%. Receive no less than 5.25% to lend for 3 years in USD. (If the market rate of lending is 5.25%, allow the option to expire worthless and lend in the market at 5.25%).

The chart on the left is the payoff chart for Long Puts. Rotate it by 90 degrees and view the thick red line as the minimum one might get from selling an asset.

A FLOOR is simply a LONG PUT

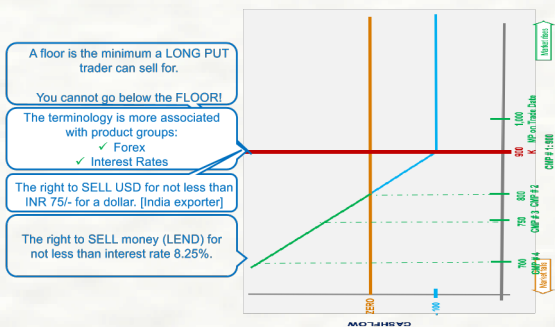


Calendar Spreads

So far all the discussions have revolved around options in the same expiry series or same expiry date.

Options are available in mature markets for a range of expiry dates, some as far out as 12 months. Characteristically, near months are highly liquid contracts and prices might be truer. Far month contracts can suffer a lack of liquidity. Generally, it is safer for traders to operate in liquid markets.

A FLOOR is simply a LONG PUT



← Near Month Highly liquid ————— It's a spectrum ————— Less liquid Far Month →

| Expiry Period 1 | Expiry Period 2 | Expiry Period 3 | Expiry Period n |
|---|---|---|---|
| <p>Markets will rise Calls will profit BUY CALLS</p> <p>Markets will drop Puts will profit BUY PUTS</p> <p>Markets: drop / flat Calls to expire at '0' WRITE CALLS</p> <p>Markets: rise / flat Puts to expire at '0' WRITE PUTS</p> | <p>Markets will rise Calls will profit BUY CALLS</p> <p>Markets will drop Puts will profit BUY PUTS</p> <p>Markets: drop / flat Calls to expire at '0' WRITE CALLS</p> <p>Markets: rise / flat Puts to expire at '0' WRITE PUTS</p> | <p>Markets will rise Calls will profit BUY CALLS</p> <p>Markets will drop Puts will profit BUY PUTS</p> <p>Markets: drop / flat Calls to expire at '0' WRITE CALLS</p> <p>Markets: rise / flat Puts to expire at '0' WRITE PUTS</p> | <p>Markets will rise Calls will profit BUY CALLS</p> <p>Markets will drop Puts will profit BUY PUTS</p> <p>Markets: drop / flat Calls to expire at '0' WRITE CALLS</p> <p>Markets: rise / flat Puts to expire at '0' WRITE PUTS</p> |

Calendar spreads execute the same strategies but with one of the options at an earlier expiry (shorter term / near month) and the later one at a later expiry (longer term / far month).

This section does not discuss calendar spreads in too great a detail. But it leaves you with a clear idea of how they are executed now that the basic building blocks are well and truly in place.

Long Calendar Spreads

The trader has a view that the market might go nowhere in the near term; but then it is expected to take a particular direction in a later period.

In such a case, the strategy would be to go Short Call or a Short Straddle or Short Strangle in the near term. In the short term, the options would expire worthless. Premiums would be earned by the trader.

Simultaneously, in the far month / contract the strategy would be to go Long Call or Put; or a Long Straddle or Long Strangle. For this leg of the strategy, premiums would be paid by the trader.

The net cost of the strategy is the premium earned minus the premium paid. It will be a net outgo because the longer the expiry of the contract, the greater will be the premium. The Shorts are in the near month and will not earn as much premium as the Longs will cost.

This is the Long Calendar Spread and will always have a net cost for this reason.

The Long Calendar Spread with a Call has a bullish view for the break out in the farther month. The Long Calendar Spread with a Put has a bearish view for the breakout in the farther month.

Short Calendar Spread

The near contract is Long and the far contract is Short.

The Shorts fetch higher premiums; the Long costs less so that the net is a positive.

The view is that the market will make a move in the near term and then, exhausted from the move, will stagnate in the longer contract so that the Shorts expire worthless, yielding a full profit.

The



Calendar Spread

The spread is the net of Short P earned and Long P paid.

One would expect longer Options to have higher Ps

The Spread

Reverse Calendar

Remember: the market has a mind of its own.

One generalise this works by placing different strategies in different periods as

Expiry Period 1

Markets will rise
Calls will profit
BUY CALLS

Market will rise now ...

Markets will drop
Puts will profit
BUY PUTS

Market will fall now ...

Earn from market moves

Expiry Period 3

Markets: drop / flat
Calls to expire at '0'
WRITE CALLS

... then stagnate.

Markets: rise / flat
Puts to expire at '0'
WRITE PUTS

... then stagnate.

Earn from Option Decay

The spread is the net of Short P earned and Long P paid.

One would expect longer Options to have higher Ps

Remember: the market has a mind of its own.

shown below:

| Expiry Period 1 | Expiry Period 3 |
|--|--|
| Long Straddle Expecting Volatility here | Short Straddle Expecting Decay here |
| Long Strangle Expecting Volatility here Reducing Costs by shifting Ks | Short Strangle Expecting Decay here Reducing Risks by shifting Ks |
| Long Strangle Expecting Volatility here Reducing Costs by shifting Ks | Short Strangle Expecting Decay here Reducing Risks by shifting Ks |
| Cap here | Floor here |

In conclusion:

Strategies, in order to be executable need viable prices, which shifts us from [CMP,K,P] to the Trading Screen. Liquidity in contracts is a significant consideration in strategies.

Swaps

Interest Rate Swap

Interest rate swap (IRS) is the most popular among all swaps. The basic structure, called the “vanilla IRS”, is described below, and many variations of the vanilla structure exist.

Vanilla IRS has exchange of two interest payments between the parties. One payment represents the interest at fixed rate and the other, at floating rate. Both amounts are computed on an amount called the **notional**, which represents the principal. It is called notional because the exchange of principal is only notional and not actual. The only actual exchanges in swap are the two interest payments computed on the notional principal.

Principal is not exchanged in IRS because each party is simultaneously a borrower and lender of the same amount. One party borrows an amount at fixed interest rate and simultaneously lends the same amount at floating interest rate; and the other party, lends at fixed rate and borrows at the floating rate. Since the same amount of principal is simultaneously lent and borrowed, the exchange of principal is unnecessary and hence dispensed with. The two interest amounts, however, are exchanged during the life of the swap.

The two interest amounts, fixed and floating, represent two sides (or legs or loans or bonds) inherent in the swap. The fixed-rate side is equivalent to a fixed-coupon bond and the floating-rate side, a floating rate note. Since each party pays one side and simultaneously receives the other, we may say that each party bought and sold two bonds (or borrowed and lent two loans) for the same face value (or loan amount). This simultaneous purchase-and-sale (or borrowing-and-lending) obviates the need for exchanging the principal.

Between the two sides, the fixed-rate side is considered the more important because the interest rate for this side is known. The interest rate for floating-rate side varies over time and is not known in advance. Accordingly, the swap “price” (also called “rate” or “coupon”) quoted in the market is the interest rate on the fixed-rate side of swap. And the party receiving the fixed-rate interest amount is simply called the **receiver** in swap. He is also said to be **buyer** of swap (or **long** on swap) in the sense that he purchased the fixed-coupon bond. Similarly, the party paying the fixed-rate interest in swap is the **payer**, and is the **seller** of swap (or **short** on swap) in the sense that is issued the fixed-coupon bond.

It should be noted that swap is an exchange of fixed interest amount against floating interest amount. The “payer” in the swap pays the fixed-rate amount and also receives the floating-rate amount, just as the “receiver” in the swap receives the fixed-rate amount and pays the floating-rate amount. The following summarizes the profile of two parties in the swap contract.

| Swap PAYER | Swap RECEIVER |
|---|---|
| Pays fixed interest amount | Receives fixed interest amount |
| Seller of the swap (or short on swap) | Buyer of the swap (or long on it) |
| Issuer of notional fixed-rate bond | Investor in notional fixed-rate bond |
| Receives floating interest amount | Pays floating interest amount |
| Investor in notional floating rate note | Issuer of notional floating rate note |
| Lender at floating interest rate | Borrower at floating interest rate |
| Borrower at fixed interest rate | Lender at fixed interest rate |

To avoid the confusion in terminology, it has become the standard in front office to use only “payer” and “receiver” for vanilla IRS, and both terms are always with respect to the fixed-rate side of the swap.

Non-generic Swaps

Non-generic swaps are swaps with modifications in one or more of the features of swap contract. Let us, therefore, list the features of standard swap contract.

- Swap starts within two business days (i.e. Effective Date is not later than two business days from Trade Date)
- Notional is constant throughout swap term
- One leg has fixed interest rate and the other has floating interest rate
- Interest payments are periodically exchanged during swap term
- Interest rate in Fixed-rate leg is constant through swap term
- Interest rate in Floating-rate leg is without in spread (i.e. it is “flat”)

The modified standard swaps are called **non-generic** or **exotic** swaps; and to distinguish them from ordinary swaps, the latter are given the retronym **vanilla** swaps, *a la* the “watch” has become “analogue watch” after the advent of digital watch. We may say that the essence of vanilla swap is the exchange of certainty (i.e. fixed-rate payments) with uncertainty (i.e. floating-rate payments).

There are a wide variety of non-generic swaps with descriptive and even colorful names. More non-generic swaps are added to list every year. The drivers for the growth of non-generic swaps are customized hedging requirements from end-users, management of swap book by market-makers and arbitrage.

Most non-generic swaps are simply bundled structures of vanilla swaps. The structuring of non-generic products from vanilla products has become a distinct domain called **financial engineering**.