A is for Average Rate Options

Sometimes referred to as "avros" or "Asian" options. They have traditionally been popular in FX and commodity markets.

A plain vanilla option pays out the difference between a predetermined strike price and a spot value of the underlying at the time of expiry.

An Average Rate Option pays to the buyer a cash flow based on the average value of the underling. The average can be calculated in a number of different ways (e.g. arithmetic or weighted) from the spot rate on a pre-determined series of dates.

In general using an average rate option to hedge an exposure incurs a lower premium than a portfolio of vanilla options. This is because the averaging process offsets high values with low ones and so reduces the volatility and the premium. Some people refer to this as a 'cheaper' form of optionality, but this is somewhat misleading as this term generally refers to a mis-valued instrument.

It is also possible to have average strike options. Here the strike rate is not fixed until exposure when again it is set with respect to an average value but settled against the prevailing spot price.

B is for basis risk

This is a phrase whose usage will depend on the context. In the futures market it describes the risk that the future and the underlying asset may not move in line with the underlying exposure. If you held a bond position against a bond futures position, then you have exposure to the slope of the yield curve. A change in short term rates would impact the repo cost built into the future's price. A change in long term rates impacts the underlying bond price.

More generally, basis risk is the risk that some form of hedge may not move in line with the price of the hedged position. For example, hedging swap positions with bonds incurs basis risk as the position is exposed to movements in the swap spread.

Basis risk increase the more the instrument to be hedged and underlying are imperfect substitutes.

C is for Cliquet option

Also sometimes known as a ratchet or reset option. This type of option allows the buyer to lock in gains in the underlying asset during certain intervals over the lifetime of the option.

The option's strike price is effectively reset on predetermined dates, locking in any gains. So if an index rises from 100 to 110 in year one the buyer would lock in a gain of 10 points and strike would be reset to 110. If the underlying price were to fall to 97, there would be no profits to lock in but the strike would be reset to the lower level.

This is referred to as a path-dependent instrument as the payout is a function of how the price moves prior to expiry. Recall that with a regular vanilla option the payout is only a function of the expiry value of the asset price.

D is for Debt to Equity swap

Not your traditional fixed for floating interest rate or currency swap. Here we are referring to a one-off transaction that involves the exchange of physical instruments rather than an exchange of future cashflows.

It would typically involve substituting equity for debt, either bonds or loans, usually when the debt becomes unserviceable. Typically used by heavily indebted companies.

E is for an exchange option

This is an option that gives the buyer the right to exchange one asset for another.

This might be useful if there isn't a cross market between two assets - for example, a barrel of oil priced in EUR. The buyer of this option exchanges a certain amount of EUR for a certain number of barrels of oil.

Another example is a convertible bond. These are often described as a bond that has an embedded equity call option. But if you think about it, when the holder converts, they deliver the bond and receive a fixed number of shares in return. Admittedly one of the challenges is figuring out the correlation between the two underlying assets, which is an integral part of the option's valuation.

F is for forward starting option

This is an option (call or put) which becomes effective at some future date. The strike price is not fixed at the trade date but rather at the point that the option is activated. When the option is first traded the buyer will agree the strike to be set at a certain fixed percentage relative to the prevailing spot price when the option becomes effective.

Suppose an investor buys a 12 month option on BMW that will become effective in 1 months' time. They agree with the seller that the strike will be 100% so if the spot share price at the end of the month is (say) €75 this will be the strike.

This should not be confused with a regular option where the strike is fixed at an explicit level but does not become effective until future date. Stock options would fall into such a category.

G is for Garman / Kohlhagen

One of the major breakthroughs of option valuation was the original Black Scholes formula, which was designed to value European-style options on non-dividend paying stocks. Following hot on its heels was the 1973 Merton model that allowed for the possibility of dividends. Arguably, the G-K model for European options on spot FX adapted these principles and replaced the dividend component with a 'foreign' interest rate.

But what I always found somewhat ambiguous is how this 'foreign' interest rate rate (and by default, the domestic rate) were defined. In some web resources, the domestic rate is simply defined as the USD interest rate. But suppose you have two FX quotes where for one the USD is the base and other it is the quoted currency. Which is the foreign interest rate now? For example:
USDCHF ($1 = CHF 0.98)
GBPUSD (£1 = $1.19)

Take the USDCHF quote. CHF 0.98 is the price of 1 USD, paid for in CHF. So, CHF is the domestic currency and USD is the foreign currency. It would be the other way around for the GBPUSD quote.

So relating it back to the B-S-M models the dividend yield is the base currency interest rate, and the borrowing cost is the quoted currency rate.

H is for Historic Rate Rollover

An HRR allows an existing forward position to be extended ('rolled over') with generating any intermediate cash flows. The position is rolled using the original rate rather than the prevailing rate.

Effectively the position is reinstated for a new settlement date using a new off-market forward rate based on the original, historic rate.

Suppose a UK exporter has sold $100,000 1 month forward against GBP at a rate of £1 = $1.40. The GBP equivalent is £71,428. When the contract is due to settle, the USD has not arrived and so the exporter seeks to delay settlement for another month. However, the current 1m rate is now £1 = $1.35, which means that to settle the contract without the receipt of funds from the US client would mean the UK corporate would have to buy $100k in the spot market which would cost them £74k. They would only receive back £71k from the bank under the terms of the forward resulting in a loss of £3k. So, the exporter asks for the contract to be extended at the original historic rate.

Suppose that this continues for a few more months until it becomes clear that the US entity will not pay. The bank decides to force settlement of the contract at the next due date where for arguments sake the spot rate is now £1 = $1.20. The bank demands that the exporter pays the original amount of $100k, which requires the corporate to buy the dollars in the spot market at a cost of £83k. They would receive back £71k and so would incur an overall loss in the region of

£12k.

Although the figures presented here are somewhat stylized, the HRR could present the bank with an unacceptable credit risk if the FX rate moves against the client.

I is for interest rate corridor

This is a position that combines the purchase and sale of an interest rate cap. The 'buyer' of a corridor buys a low strike cap and sells a higher strike cap. The premium earned on the sold cap can be used to reduce the overall cost of the position.

The buyer of the corridor is then protected from rates rising above the first cap's strike but are exposed again if they rise past the second cap's strike.

J is for Japanese Crude Cocktail

This has been traditionally used as a reference price index used to price long term Liquified Natural Gas (LNG) contracts in Asian countries such as Japan and South Korea. Was published monthly and took its value from the average crude oil import price into Japan.

A more common index value is the Japan Korea Marker (JKM), which is published by S&P Global Platts and reflects the market value of LNG cargoes delivered into Japan, South Korea, China, and Taiwan.

This is a good example of how pricing for natural gas has evolved over time. Where there was no active market for trading natural gas, a common practice was to use an alternative energy source such as crude oil. However, as markets developed, contracts can now be valued based on traded natural gas prices.

K is for Kurtosis

In simple terms this a measure of how fast the tails or wings of a probability distribution approach zero when evaluated with respect to a normal distribution.

The tails can be described as "fat-tailed" (leptokurtic) or "thin-tailed" (platykurtic). Markets are generally considered to be leptokurtic. SO the fatter the tails the greater the chance a variable will reach an extreme value. This is often referred to when discussing traditional option pricing models such as Black Scholes Merton, which do not reflect this feature. As a result, there will be pricing biases for deeply in or out of the money options.

L is for Leverage

This is one phrase that can have a multitude of different meanings depending on the context.

Here we will define it as the ability to control large amounts of underlying exposure for a small

initial investment.

Futures are a nice example. Let us suppose that a trader buys 1 FTSE 100 index future at a price of 7,300 points. In order to monetize the contract the exchange decides to assign an arbitrary monetary value to each index point of £10. As a result the contract behaves as if the trader has bought a portfolio of UK stocks with a monetary value of £73,000.

Both buyer and seller will deposit some initial margin which acts as collateral. Although these levels will vary over time, a simple rule of thumb suggests this will be in region of 5% of the value of the exposure - in our case £3,650.

The trader is leveraged by a factor of 20. If the index rises by 50 points the trader will make a profit of £500. Relative to the futures contract's exposure this is a profit of 0.6849% (£500 / £73,000) but relative to the initial margin it is 13.69% (£500 / £3,650) which is 20 times larger.

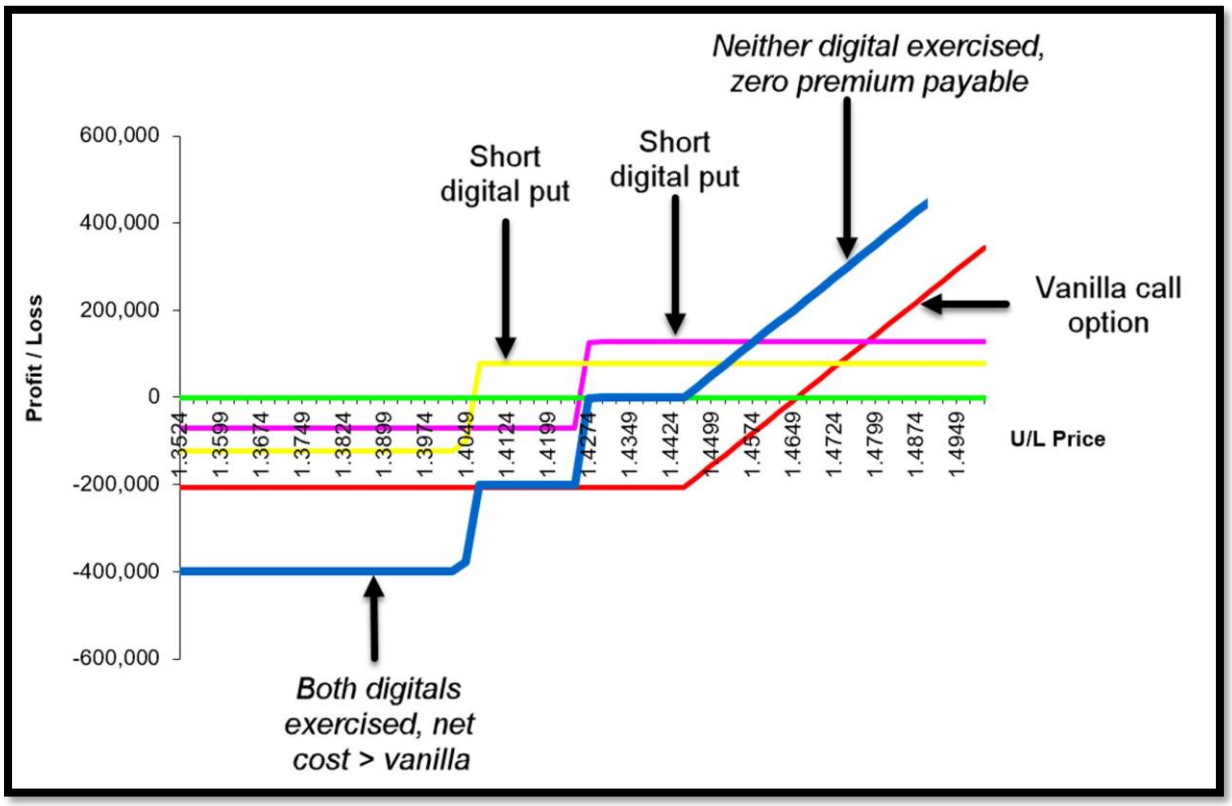
M is for mini-premium option

The purchase of a mini-premium option (aka a "step-payment option") pays no initial premium. Instead a fixed premium becomes payable if the spot rate subsequently trades through a series of pre-determined trigger levels.

Although the structure offers hedgers protection at zero cost, the total premium paid if all of the triggers are activated will be greater than the premium for the equivalent vanilla option.

Take a look at the attached diagram. Suppose a hedger buys a vanilla call option which will incur an upfront premium (red line). We will presume that the hedger is seeking protection against a rise in the price of some underlying asset. This cost can be deferred by the sale of two digital put options (pink and yellow lines). Each digital put has a lower strike than the call option. The premium received from the two digital puts finances the cost of the vanilla call option.

If the underlying price rises, the call is exercised but not the digitals. The hedger achieves the desired protection at zero cost (blue line). If the price falls, both digitals are exercised incurring a cost to the hedger greater than the cost of an equivalent European call. Note though that it is now less expensive to buy the underlying asset.



N is for natural hedge

A natural hedge is the reduction in financial risk that can arise from an institution's normal operating procedures.

For example, a company which has a significant portion of its sales in one country will have a natural hedge to at least part of its currency risk if it has operations in that country generating operating expenses in the country.

Examples could be a UK company issuing USD debt and financing the currency cash flows by selling products in USD.

A more risky example would be a mining company selling metal in USD and relying on movements in the USD to hedge the exposure. The argument goes that there is (generally) an inverse relationship between the price of the commodities and the strength of the dollar. Price of metal declines you receive fewer USD but if this is associated with a strengthening of the USD vs. your domestic currency you give up fewer USD to receive the same amount of domestic currency.

O is for Outperformance option

Sometimes also referred to as a Magrabe option (after its "inventor"). This option gives the purchase the right to the return from a single asset from a basket of two or more components, either as a cash settlement or by physical delivery.

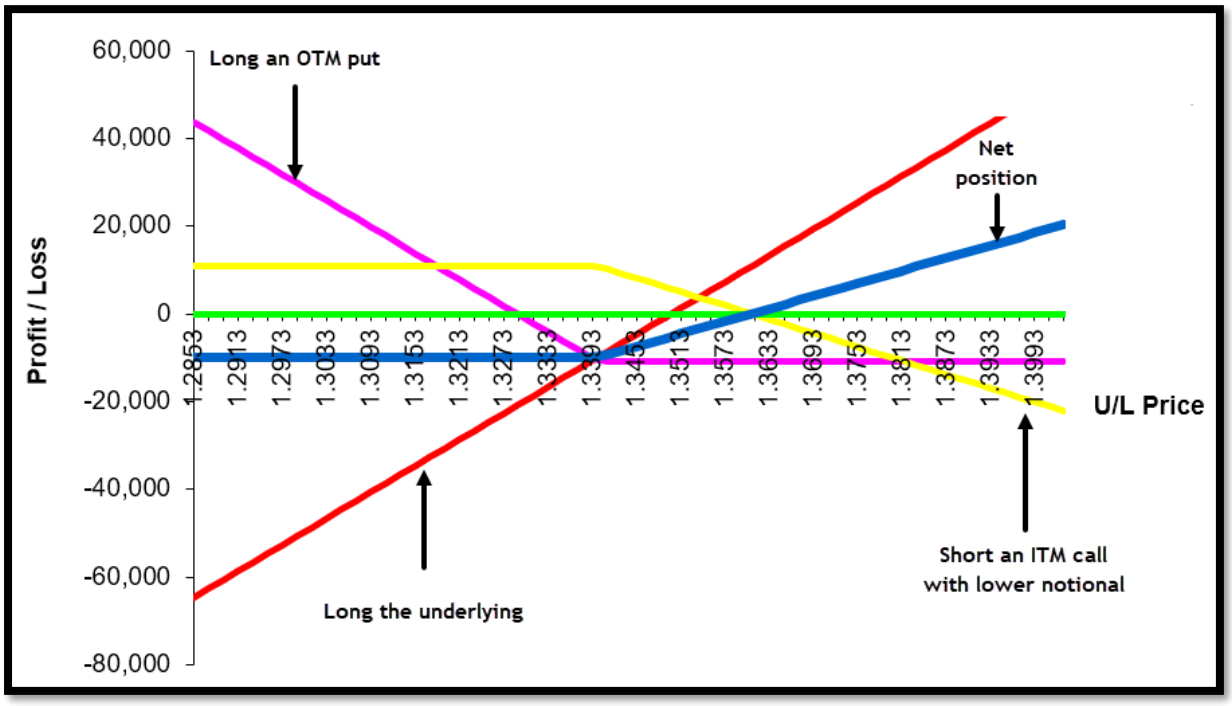
This could be the best performing of "X" assets, where X is the number of assets in the basket (a "best of" of option) or the worst performing (a "worst of X assets" option).

For example, a buyer could hold an option to buy either Tesla or GM depending on which increased most in percentage terms.

The value of these options is influenced by the correlation that exists between the underlying assets in the basket.

P is for participating forward

This is an option strategy that is designed to be zero premium in nature. Consider the following diagram



The investor is long the underlying asset (which here is £1m GBP at a rate of £1 = $1.35). The pink line shows the purchase of an OTM put struck just below the current price at £1 = $1.34. This put option provides downside protection but at a cost. The yellow line shows the sale of a ITM call where the strike is set equal to that of the put. For this to be zero premium the notional of the call is lower; in this example it is about half the size. This means that if the underlying price rises, the sold call option is exercised, and the investor is faced with an increased payout but on a lower notional amount. The balance of their underlying position is not hedged and so they are able to partially benefit from the price movement as shown by the blue line.

Q is for Quanto

This concept describes a situation where an asset or liability is denominated in a currency other than that in which it is usually traded.

One classic example can be seen in the index futures world. The CME group have long offered a USD denominated index future that references the the Nikkei index. This contract takes the nominal price of the yen-denominated index and applies it to a USD notional amount.

So as I write, the September 2022 contract is trading at 27,850 (yen) index points. An investor buying one of these contracts will therefore have an exposure of USD 139,250 as the quote is multiplied by $5. This so-called "index multiplier" is set by the exchange and is the same for all participants.

R is for repo

A repurchase agreement is a form of secured borrowing. The classic way of understanding the product is consider how a market participant finances the purchase of a bond.

In simple terms they must borrow money and as such will most likely be required to deposit some form of collateral. It is this collateral that is the focus of repo. In this context, the bond buyer will borrow cash and sell a bond to the lender for an agreed period of time. At the end of the agreement, the cash loan is repaid with interest and the bond that was used as collateral is repurchased.

Some key points to note:
- under the terms of the repo, the sold bond is repurchased at the same price.
- under the terms of the Global Master Repo Agreement the bond is sold and repurchased rather than being pledged so ownership is transferred.
- In our example, the bond buyer ('repo seller') retains all economic exposure. Principally, this is the market risk on the bond and the possibility that the collateral may default. In the latter case the cash loan is repaid and a defaulted bond is returned.

There are lots of other quirks to the market and I may return to the topic if there is interest.....

S is for Spread Option

A spread option pays off based on the price differential between two assets or the same asset at different times or places.

Some examples:
Fixed income: An option that references two different points on the yield curve (e.g. 2 yr and 10yr). The option could be structured to pay out if the curve steepens or flattens.
Commodities: These are based on the price of the same commodity at two different locations

Commodities (again): quality spreads are based on the differential between different grades of the same commodity. For example, crude oil that might have different sulphur content.

If you believed that the spread was going to increase a simple option would be to purchase a call. The payoff would be:

MAX (price of asset 1 - price of asset 2 - strike, 0)

A fall in the spread could be captured using a put option:

Max (Strike - price of asset 1 + price of asset 2, 0)

The correlation between the two assets will impact the value of the option.

T is for total rate of return swaps

A total rate of return swap is a fixed for floating swap in which cash flows are exchanged but the floating rate on one side is based on the total rate of rate of return that would have been earned by the underlying asset or index including elements such as dividends and compounded yields. The other leg would normally reference some form of floating rate.

Couple of examples. Suppose a US or European hedge fund wished to take exposure to China Telecom. It may be difficult for this type of entity to access this specific market and so they could enter into an equity swap where they receive the increase in the price of the share against paying a floating rate plus a funding spread. If the share price rises, they will make money from the swap and if it is total return in nature, they will be paid any dividend. If the share price falls, they will pay any depreciation across to their counterparty.

The offsetting leg can be thought of as a kind of funding cost. If they had bought the share outright, they would have to pay a borrowing cost. If the spread to the chosen floating benchmark on the swap is less than their normal cost of borrowing, then the deal will be advantageous.

The deal can be structured in any currency (e.g. USD) not just that of the share's own country (CNY).

Another application is when the deal references an asset class that is difficult to trade physically. Commodities are a classic example of this. An investor could receive the rate of return of a commodity index such as the S&P GSCI in return for an offsetting cash flow such as a Treasury bond yield. These structures are a little more complex and are worthy of a separate post. In the meantime, for those that cannot wait, I do document this in my commodity derivatives book (chapter 14).

Cue shameless plug: https://www.amazon.co.uk/Commodity-Derivatives-Markets-Applications-Finance/dp/1119349109/ref=tmm_hrd_swatch_0?_encoding=UTF8&qid=1661160178&sr=8-2

U is for Ultra Large Crude Carrier

Over the last week, I have been really enjoying "40 classic crude oil trades" by Owain Johnson. Some of the examples reminded me of an old case study which I still think is interesting.

In December 2008, a newspaper report suggested that BP had decided to take a view on higher crude oil prices in 2009 by booking super tankers to store oil at sea. BP booked the *Eagle Vienna* a vessel that can store two million barrels of oil, which at the time was about 10% of America's daily demand. It was filled with Brent and transported for storage in the Gulf of Mexico for release to the US market at a later date. At the time other market participants such as Royal Dutch Shell and Koch (a petrochemical company) had done the same leading to suggestions that about ten million barrels of oil were being stored in a similar fashion.

Why had they done this? In December 2008 the 'prompt' price for Brent crude was quoted as $47 / barrel while the 12 month forward price was $60 / barrel. To use the lingo of the commodities market the forward curve was experiencing a steep contango. Prices for shorter-dated delivery are lower than those for longer-dated delivery.

Although it was never confirmed, we could perhaps do a quick back of an envelope calculation to speculate as to the profitability.

- BP buys 2m barrels @ $47 / BBL
- They simultaneously sell the 2m barrels for forward delivery @ $60 / BBL
- This would give them a gross profit of $26m.

From this profit they would have to subtract their associated 'carry' costs. These would include:

- Cost of hiring the carrier for 12 months.
- Interest rate cost associated with borrowing money to finance the purchase of the physical crude and the cost of hiring the freight.

This strategy most likely proved very profitable because after the financial crisis freight costs and interest rates fell substantially. As a result their carry costs were most likely well below the gross profit made from the purchase and sale prices.

These types of arbitrage are more likely to occur in physical commodity markets as they are not as efficient as financial markets.

https://www.amazon.co.uk/Commodity-Derivatives-Markets-Applications-Finance/dp/1119349109/ref=tmm_hrd_swatch_0?_encoding=UTF8&qid=1661160178&sr=8-2

V is for value at risk

Put somewhat formally this is the probabilistic bound of market losses over some period of time (known as the holding period) expressed in terms of a specified degree of certainty (known as the confidence interval).

In simpler terms the value at risk (VAR) is the worst – case loss expected over the holding period within the probability set out by the confidence interval.

Larger losses are possible but with a lower probability. For instance a portfolio whose VAR is $20m over a one day holding period, with a 95% confidence interval would only have a 5% chance of suffering an overnight loss greater than $20m. Alternatively, we are 95% confident that over the next 24 hours we will not lose more than $20m.

Calculation of VAR entails modelling the possible market moves over the holding period, incorporating correlations among market factors, calculating the impact of such potential market moves on portfolio positions and combining the results to examine risk at different levels of aggregation.

Popular techniques used to calculate VAR include historical simulation and Monte Carlo approaches.

W is for warrant

Perhaps most often associated with the world of equities, a warrant gives the buyer the right but not the obligation to buy shares in a company at a specific price for a given period of time. One type is issued by a company that attaches the warrants to a bond and so lowers the coupon payable. This is because the is in effect long an equity call option and 'pays' for this right by accepting a lower rate of interest on the bond.

They differ from a convertible bond in that the investor is not required to give up the bond when exercising the warrant; the investor can take delivery of the shares and still retain the bond. With a convertible, once the option is exercised, the bond is irrevocably delivered back to the issuer in exchange for the agreed number of shares.

X is for XVA

XVA is a collection of valuation adjustments that are applied to the price of derivative contracts. For example, a Credit Valuation Adjustment adjusts the price of a derivative contract to reflect the counterparty credit risk. Other measures include adjustments for funding costs, margin costs, and capital costs.

Y is for Yield curve option

This is an option that allows investors to take a view on the shape of a yield curve without talking a view on the market's direction. It is normally structured as the yield of a longer dated maturity minus the yield of a short one. They may be variously described as caps / calls or floors / puts.

Suppose an investor had a view that the 2s10s spread on the swaps curve (calculated as the 10 year swap rate minus the 2 year swap rate) was likely to increase; that is the curve is expected to steepen. The investor could buy a cap to express this view.

The option's payoff would be:

MAX ((10 year swap rate – 2 year swap rate) – strike, 0)

Suppose that the agreed ATM strike is 2% based on a 10 year rate of 5% and a 2 year rate of 3%. The notional amount is 100m.

If 10 year moved to 5.5% and the 2 year to 2.5% then the expiry payoff would be:

MAX ((5.5% - 2.5%) – 2%, 0) = 1%

Which based on a notional of 100m would return a payoff of 1m. Premiums are ignored in this example.

Z is for Zero premium option

This is an option strategy that involves financing the purchase of a long position by the simultaneous sale of another option that has equal monetary value. One classic strategy used in many different asset classes is the purchase of an out of the money (OTM) put with a strike place below the current market level. This is financed by the sale of an OTM call whose strike is placed above the market but at such a level that the two premiums net to zero. The strike of the OTM put sets the minimum sale price of the underlying asset, while the short call establishes the maximum sale price. This gives rise to the name used by our commodity friends – the 'min-max'.

Couple of additional points:

- It is sometimes referred to as a zero cost strategy but arguably there is an opportunity cost to the position. In the above example, if underlying price rises above the call strike the investor will not be able to benefit.
- Zero premium does not mean good value. You must believe that the option you are selling is overvalued and / or the purchased option is undervalued.