

## Product Briefing - Exotic Options

Somewhat unhelpfully an exotic option is an option whose pay off profile does not conform to the traditional 'hockey stick' shape. (These are illustrated in the options product briefing available to download for free from this website.)

There is a larger family of options that are designated as being exotic. The two most common exotic options are barriers and binaries.

### Barrier options

A barrier option is an option that has an additional price performance feature, sometimes referred to as a trigger, which if hit by a movement in the spot price will result in an option position being either activated ('knocked in') or deactivated ('knocked out').

Although not universally adopted language it is useful to classify barrier options as to the position of the barrier in relation to the spot price. A standard barrier option is one where the barrier is placed in the out-of-the-money region. A reverse barrier option represents an instance where the barrier is placed in the in-the-money region.

Within either of these two categories it is possible to categorise the structure as to whether they are knocked in or knocked out and then as to whether they are calls or puts. This results in 16 different permutations which are shown below in table 1. It is possible to extend the number to 32 by distinguishing between buyers and sellers but we will restrict our analysis to the 16 key positions.

	Standard Knock-Ins	Standard Knock Outs	Reverse Knock Ins	Reverse Knock Outs
Calls	Down and in Barrier below spot	Down and out Barrier below spot	Up and in Barrier above spot	Up and out Barrier above spot
Puts	Up and in Barrier above spot	Up and out Barrier above spot	Down and in Barrier below spot	Down and out Barrier below spot

Table 1 Taxonomy of barrier option positions

It is market convention to refer to these barrier options using terms such as 'down and out'. Take for example a standard knock out call option. Suppose an option has a strike rate of 100 and a barrier at 90. Unless the spot rate trades at 90 prior

to maturity the option is for all intents and purposes a European - style barrier option. As soon as 90 trades the option position is terminated and no further rights or obligations accrue. Hence the name, if the spot rate goes down, the option position gets knocked out.

Arguably the main motivation for executing a barrier option is one of cost. Since there is a possibility that the option will either survive or be terminated the price of a barrier option will always be cheaper than that of an equivalent European-style contract.

## Binary options

A binary option is also sometimes referred to as a 'digital', 'all or nothing' or 'bet' option. If exercised the structure will pay out a fixed sum irrespective of how deeply the option is in-the-money.

There are some variations on this basic description. An '*at expiry*' binary option is a European-style option that pays out a fixed amount only if the option is ITM at expiry. Since the payout at maturity is limited to a fixed amount they will be cheaper than an equivalent non-binary option. A '*one touch*' option is an American-style digital option, which pays out a fixed amount at the point that the strike is hit, which could be anytime prior to expiry. A '*no touch*' option is a digital option that pays out a fixed sum at expiry if the underlying price does not touch the strike.

Depending on their style, digital options may or may not be path dependent. Path dependent means that the magnitude of the option's payout is affected by the movement of the underlying price prior to expiry. One touch and no touch options are path dependent and will cost more than the European digital. As a rule of thumb, American-style digitals will cost twice as much as a European digital due to the increased probability of exercise.

Since the option has a fixed payout and a fixed premium cost there is no need to have a principal amount. The premium is often quoted as a percentage of a 100% payout. So if the trader wished to have a payout of USD 1m the premium might be quoted as 10% (USD 100,000). Somewhat confusingly, the strike rate on a binary option may be referred to as a 'barrier' and the words call and put may be replaced by 'up' and 'down'. Reference is also made to 'knock ins' and 'knock outs' for touch and no touch structures respectively.