LOOKING FOR A CHEAPER OPTION

BANDED OPTIONS – A FLEXIBLE ALTERNATIVE

By BILL TAYLOR and CON MICHALAKIS

An explanation of a truncated option that has some significant benefits for over-the-counter option-market participants.

A banded or truncated option is a contract bestowing on the holder the rights of a long specified option contract valid over a specified band or range of values of the underlying security: the intrinsic and expiration values of the specified option contract for underlying security values beyond the specified range are zero. The counterparty (seller) of the banded option contract is also the seller of the specified option and has the contingent liability associated with it should the option expire in the money (the specified range) for the buyer.

In short, a banded option is no more than an option contract valid over a specific range of security values. For example, on XYZ Corp. shares currently selling at $3.10, a 420Mar.3.15 call would represent a call option on the stock, expiring in March with an exercise price of $3.15 but of worthless value should the share price at expiration exceed $4.20. The holder of the call no longer has the "theoretical infinite" profit value of the corresponding non-banded call; nor does the seller have the "infinite loss potential" associated with his contingent liability.

Such a call is cheaper to the buyer, who forgoes the higher (if rare) call values normally encountered for expiration share prices beyond $4.20, and is of less value to the seller, who is compensated by the reduced risk of high losses for deep in-the-money calls at expiration.

In other words, why pay for rarely attainable "blue sky" values? Why should the seller risk the "rain and pain" of deep in-the-money exercised options for a few cents extra on option price? A 295XYZMar.3.10 put would similarly represent an XYZ at the put option expiring in March, but of no value should the share price at expiration be lower than the cut-off value of $2.95. It should be noted that such a banded option differs markedly from the "cap" and "floor" instruments already in use in many markets, such as the bull/bear spreads in equity markets and "collars" in debt markets. In these cases, an upper/lower limit to the options is provided; for banded options, however, option values beyond the cut-off are not limited but worthless: it is indeed a truncation.

Pricing the banded option

Appealing or otherwise, the banded option and its variations present some important considerations other than its use as an over-the-counter option instrument. First, there is the evaluation of the opportunity cost relative to the comparable ETO and the location of the cut-off share price. Since a

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banded option cannot be synthesised from standard puts and calls, there is also the question of its pricing methodology and its time-decay characteristics. Finally, an examination of the banded option as a pricing tool used in more advanced combination instruments sold as a package may be advantageous. A closer look at the hedge ratios and other sensitivities of banded options is not presented. It will suffice to outline briefly through an example the comparison of this instrument with the more traditional option using the Black-Scholes formula. This comparison reveals some important differences and advantages of the banded option.

Application of the Black-Scholes theory to the call option, with the provision that the expected value of the stock and strike price difference at expiration be considered only over the acceptable range of price outcomes within the in-the-money region, shows that:

- the truncated call value may be regarded as a modified bull spread using calls; and
- the time-decay follows the bull spread features but dies away for the share values beyond the cut-off value.

Diagram 1 illustrates the basic features of the banded call with strike price K and cut-off value A. The dotted line shows the time-decay of the corresponding bull spread; the continuous line indicates the modified spread which is the banded call. The price of the banded call is given by Expression 1.

With decreasing time to expiration the peak of the decay curve rises to the value A-K. The decay curve above A moves closer to the vertical while the decay below A aligns closer to the option expiration value.

Diagram 2 illustrates the corresponding banded put option viewed as a modified bear spread using puts.

EXPRESSION 1

long call(K) + short call(A) - (A-K)*N(x)*exp(-rT)
where x = [log(S/A) + (r-1/2V)T]/sq.root(VT)
and S = current share price
V = share price volatility squared
T = time to expiration
A = cut-off share price
r = annual riskless rate
N(x) = cumulative standard Normal function
K = strike price
exp() = exponential function

EXPRESSION 2

long put(K) + short put(B) - (K-B)*N(-y)*exp(-rT)
where y = [log(S/B) + (r - 1/2V)T]/sq.root(VT)
B = cut-off share price
sq.root = square root

The option (banded put) is shown in Expression 2.

For both puts and calls the banded option price is thus the price of the corresponding spread less the expected value of the spread "cap" for share prices beyond the band. Diagrams 3 and 4 illustrate short banded options with strike price K and cut-offs A and B respectively. It is noteworthy that the time-decay of banded options differs markedly from the decay characteristics of the ET options, approaching the values from below rather than above. Banded options increase in price approaching expiration; ET options, on the other hand, decrease over the period.

Diagrams 5 and 6 show the two-tailed truncated calls and puts, each with strike price K and banded over the regions A-B. This configuration results from the buying of one banded option and the simultaneous selling of a corresponding banded option with a lower cut-off value.

Banded option vs ETO.

An example of the opportunity cost of a banded option, relative to its ETO counterpart, is provided by the analysis of the option market report (The Australian Financial Review, August 20, 1990) on BTR Nylex shares shown in Table 1. Black-Scholes evaluation of the last sale price provides an implicit estimate of share volatility; it enables estimation of the banded option price for cut-off values corresponding to probability levels of the expiration share price occurring out-of-the money behind the banded region. The table shows the cut-off share price for probability levels of 10 per cent, 5 per cent, and 2 per cent. Thus a BTR Nylex Sep250 call option with last sale of $0.40 may be replaced, in theory, by an equivalent banded call truncated at $3.50 worth $0.27 with a one-in-ten chance that the call will expire out-of-the-money for a share price greater than cut-off.

Why bother?

The question arises: does the replacement of ET options by their truncated counterparts make any financial sense? The answer depends on the preference of the investor, who is doing no more than trading off the risks against the reward of the position.

Pricing formulae are based on the expected value of the underlying stock price at the option expiration date. This is obtained by the sum of each possible price at expiration multiplied by the chance of occurrence. Hence a deep in-the-money exchange-traded option will be worth at least its intrinsic value. However a corresponding banded option will have significantly lower value if the

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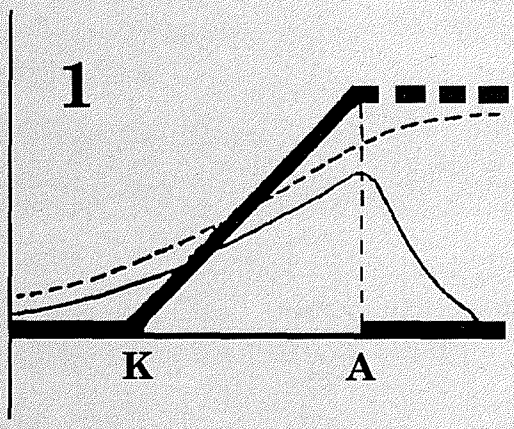
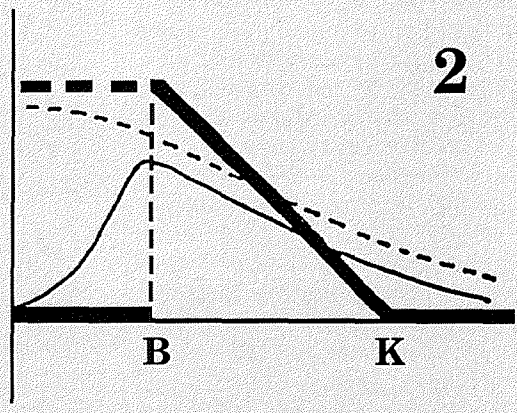
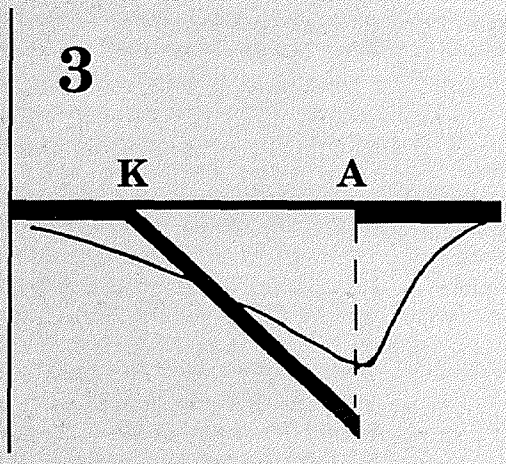
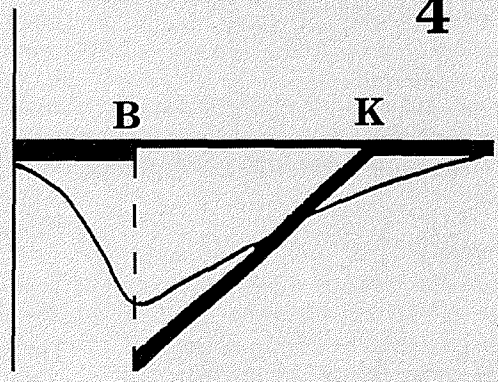
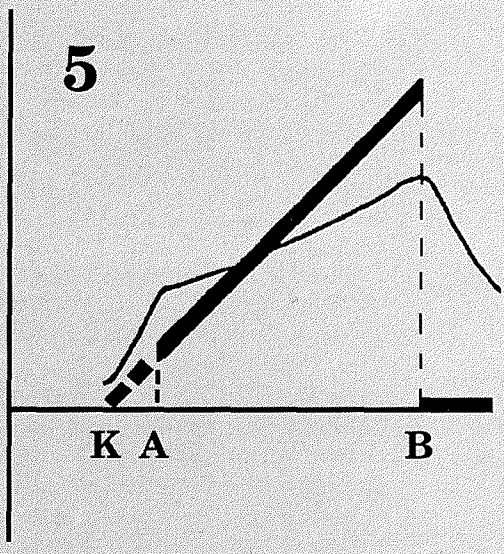
TRUNCATED OPTION DIAGRAMS

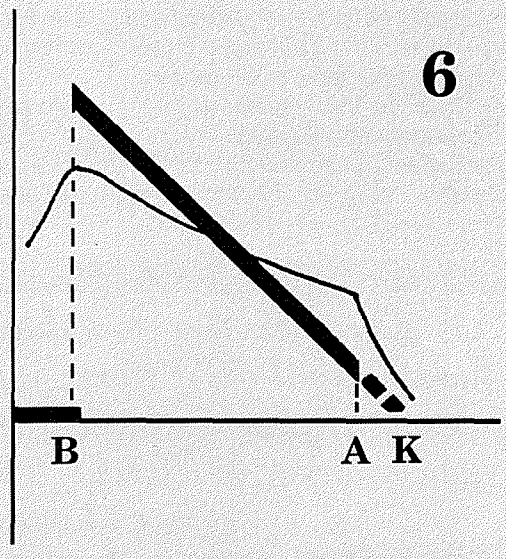












bands do not cover such prices.

From this aspect, a cheaper option may be attractive to the buyer but not to the seller, whose profit lies solely in the sale cost; however, Diagrams 3 and 4 reveal the other side of the coin, since the seller, for once—at the expense of a slightly cheaper sale—can claim downside protection.

Time value of banded options

Besides the "advantages" of cheaper costs to the buyer and down-side protection to the seller, the prices of banded options exhibit a completely different time-decay structure from standard options. ET options are wasting assets, not only in the wider sense of being time-limited contracts lapsing at the expiration date, but also because their time-decay changes have higher values over the longer term and reduce as the lifetime of the options shortens.

Although attractive to the risk-taker who may exploit this factor using time-spread strategies, the buyer (investor) of the longer-term protective features of options could perhaps benefit from the flexible alternative of banded options. This is because they are cheaper initially, closer to expiration value over their life and generally increase in value with time.

The doubly truncated options in Diagrams 5 and 6 introduce a more actuarial approach, since they can be regarded in a sense as reflecting a "no-claim" bonus. Holding such options is tantamount to an implied agreement not to exercise about-the-money; in doing so, the holder reaps the benefit of cheaper overall cost.

BTR NYLEX Call options

share price	*$2.80*		prob	10%	prob	5%	prob	2%
Expn. Date	strike price	last sale	cut-off price	option price	cut-off price	option price	cut-off price	option price
Sep.	2.50	0.40	3.50	0.27	3.73	0.33	4.00	0.36
Sep.	2.75	0.18	3.28	0.11	3.42	0.14	3.59	0.16
Sep.	3.00	0.06	3.22	0.02	3.37	0.03	3.52	0.05
Dec.	2.50	0.45	3.55	0.32	3.76	0.38	4.01	0.42
Dec.	2.75	0.35	3.85	0.20	4.19	0.26	4.61	0.31
Dec.	3.00	0.17	3.62	0.08	3.86	0.11	4.15	0.14

BTR NYLEX Put options

share price	*$2.80*		prob	10%	prob	5%	prob	2%
Expn. Date	strike price	last sale	cut-off price	option price	cut-off price	option price	cut-off price	option price
Sep.	2.50	0.05	2.29	0.01	2.16	0.03	2.02	0.04
Sep.	2.75	0.10	2.39	0.05	2.28	0.07	2.16	0.09
Sep.	3.00	0.21	2.48	0.15	2.39	0.17	2.29	0.19
Dec.	2.50	0.09	2.11	0.03	1.92	0.06	1.76	0.07
Dec.	2.75	0.18	2.10	0.10	1.92	0.13	1.74	0.16
Dec.	3.00	0.32	2.05	0.21	1.86	0.26	1.68	0.29

Conclusion

Ultimately, we get what we pay for, and banded options reflect another structured option alternative that exchanges cost and price for a different measure of risk.

The important point to consider is that it is an OTC option; hence it will have the inherent advantages and disadvantages that all OTC instruments have. But its main benefit is its limited risk over a subset of security values and its undeniably lower price than an ETO counterpart. □

References

Jarrow, R. and A. Rudd, *Option Pricing*, 1983, pp. 84-95.

Black, F. and L. M. Scholes, "The Pricing of Options and Corporate Liabilities", *Journal Of Political Economy*, May-June 1973.

Cox and Rubinstein, *Option Markets*, 1980, pp. 16-19, 200-215.

TAX AND DIVIDENDS

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dend rebates (s.46). Until July 1, 1987, the amount of the dividend rebate was calculated on net dividends, ie, gross dividends, included in assessable income, less deductions allowable against such income. Since the introduction of the dividend imputation system of company taxation from July 1, 1987, the rebate is calculated on the full amount of dividends without offsetting any allowable deductions.

The combination of the s.46 rebate with the principle that a company can take a deduction for interest expenses incurred in acquiring shares (since the interest is incurred in deriving assessable income) has resulted in numerous arrangements to reduce tax, Marks says. Abuses of the s.46 rebate include preference-share funding and dividend stripping.

The final part of Marks's book explains and discusses the imputation system which has operated since July 1, 1987. A dividend declared and paid by a resident company as a franked dividend is subject to income tax in the shareholder's hands. The effective amount of the franked dividend which is included in an individual shareholder's assessable income, is the dividend grossed up by the company tax paid. At the same time, the individual shareholder receives an imputation rebate against his personal income tax.

An Australian resident company which receives a franked dividend from another resident company will include that franked dividend as a net amount in its assessable income and be entitled to a s.46 rebate of tax. The franked dividend is then added to the receiving company's franking account balance. If the dividend received was unfranked it would be included in its assessable income (subject to s.46 rebate); however, it would not be added to the receiving company's franking account.

In today's ever-changing corporate world, the issue of taxation is of vital importance. Bernard Marks's book provides a comprehensive and thorough reference on recent rulings and legislation. □