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March 4, 2008

Mr. David Stawick
Office of the Secretariat
Commodity Futures Trading Commission
Three Lafayette Centre
1155 21ˢᵗ Street, NW
Washington, DC 20581

> RE: **Revisions to the Interpretation to CME Rule 584 –
> CME GLOBEX OPTIONS VOLATILITY QUOTE TRADING
> CME Submission 08-52**

Dear Mr. Stawick:

Chicago Mercantile Exchange Inc. ("CME") hereby notifies the Commission that it is adopting revisions to four formulas contained in the Whaley Option Pricing Model for American-Style Options as provided in the Interpretation to new CME Rule 584. On February 8, 2008, CME, in CME Submission 08-28, notified the Commission of the adoption of rule amendments to allow for volatility quoting and trading in selected foreign exchange ("FX") options products.

Please note that there are no changes to CME Rule 584 or the first part of the Interpretation. Appendix 1 presents the proposed rules changes with the deletions bracketed and overstruck, and additions underlined. For ease of review, these deletions and additions are highlighted in yellow. Appendix 2 is a clean copy of the relevant portion of the Interpretation incorporating the changes.

If you require any additional information, please do not hesitate to contact Mr. Steven Youngren at 312-930-4583 or via e-mail at Steve.Youngren@cmegroup.com or me. Please reference our CME Group Submission 08-52 on all future correspondence regarding this notification.

Sincerely,

Stephen M. Szarmack
Director and Associate General Counsel

Attachments

Appendix 1.

New Rule 584 – CME GLOBEX OPTIONS VOLATILITY QUOTE TRADING and Its Interpretation to Allow for Volatility Quoting and Trading in Selected CME Group Options on Futures Products Traded on CME Globex. The rule amendments follow with additions underlined and deletions bracketed and overstruck.

[Text of CME Rule 584 does not change.]

INTERPRETATIONS & SPECIAL NOTICES RELATING TO CHAPTER 5

INTERPRETATION OF RULE 584.—CME GLOBEX OPTIONS VOLATILITY QUOTE TRADING

[Beginning of CME Rule 584 does not change.]

Whaley Option Pricing Model for American-Style Options

The following model is based on the Barone-Adesi-Whaley model as described in the Journal of Finance, Vol. 42 No.2, pages 301-320. The model uses analytic approximation techniques to solve for the price of the American-style option. The model estimates a value for S* which is the underlying price above which the option should be exercised. The value of S* is then used to determine the value of the option. For call options, the model estimates S* by satisfying the following equation:

(LHS – RHS / K < 0.00001   (Please see notes 1-4 at the end of this section.)

Where

$LHS = S^* - K$

[RHS = e^{(b-r)T}[S * N(d_1) - KN(d_2)] + [(1 - e^{(b-r)T} N(d_1)) * (S * /q_2)]]

$\underline{RHS = c(S, T) + [(1 - e^{(b-r)T} N(d_1)) * (S * /q_2)]}$

$d_1 = [ln(S * /K) + (b + \text{б}^2/2)T] / \text{б} \sqrt{T}$

$d_2 = d_1 - \text{б} \sqrt{T}$

$q_2 = [-(N - 1) + \sqrt{(N-1)^2 + 4M/k} / 2$

$M = 2 * r / \text{б}^2$

$N = 2 * b / \text{б}^2$

$k = 1 - e^{-rT}$

N(.) is the cumulative univariate normal distribution.

n(.) is the univariate normal density function.

б = volatility (e.g. 10% per annum = 0.10)

T = time until expiration in years (e.g. 90 days = 0.247)

r = interest rate (e.g. 8% per annum = 0.08)

b = cost of carry, assumed to be zero for the purposes of this calculation

K = strike price

S = underlying price

After each iteration, the estimate of S^* is adjusted by:

$$S^*_{i+1} = [\,K + RHS - b_i\,S^*_i\,]\,/\,(1 - b_i)$$
where

$$b_i = e^{(b-r)T}\,N[d_1(\,S^*_i\,)](1 - 1/q_2) + [1 - e^{(b-r)T}n[d_1(\,S^*_i\,)]\,/\,6\,\sqrt{T}\,]\,/\,q_2$$

Once the correct value of S^* is found, the value of the call and the call's delta are found by solving:

$$C(S,T) = C(S,T) + A_2\,(S\,/\,S^*)^{q_2}$$
Where

$$A_2 = (S^*\,/\,q_2)\,(1 - e^{(b-r)T}N[d_1(S^*)])$$

$$\Delta = \Delta_e + A_2 * q_2 * (S\,/\,S^*)^{q_2}\,/\,S$$

$c(S,T)$ = the price of a European style call option.

Δ_e = the delta of the European style call option.

For put options, the model estimates S^* by satisfying:

$$(LHS - RHS)\,/\,K < 0.00001$$

where

$$LHS = K - S^*$$

~~$[RHS = e^{(b-r)T}[KN(d_2) - S^* N(d_1)] - [(1 - e^{(b-r)T} N(d_1)) * (S * /q_1)]]$~~

$$\underline{RHS = p(S,T) - [(1 - e^{(b-r)T} - N(d_1)) * (S * /q_1)]}$$

$$d_1 = [ln(S * /K) + (b + 6^2/2)T]\,/\,6\,\sqrt{T}$$

$$d_2 = d_1 + 6\,\sqrt{T}$$

$$q_1 = [-(N-1) - \sqrt{(N-1)^2 + 4M/k}\,/\,2$$

$$M = 2 * r/6^2$$

$$N = 2 * b/6^2$$

$$k = 1 - e^{-rT}$$

$N(.)$ is the cumulative univariate normal distribution.

$n(.)$ is the univariate normal density function.

6 = volatility (e.g. 10% per annum = 0.10)

T = time until expiration in years (e.g. 90 days = 0.247)

r = interest rate (e.g. 8% per annum = 0.08)

b = cost of carry, assumed to be zero for the purposes of this calculation

K = strike price

S = underlying price

After each iteration, the estimate of S* is adjusted by:

$$\cancel{[S_{i+1}^* = [K + RHS - b_i S_i^*]/(1 - b_i)]}$$

$$S_{i+1}^* = [K - RHS + b_i S_i^*]/(1 + b_i)$$

where

$$\cancel{[b_i = e^{(b-r)T} N[d_1(S_i^*)](1 - 1/q_1) + [1 - e^{(b-r)T} n[d_1(S_i^*)]/6 \sqrt{T}]/q_1]}$$

$$b_i = -e^{(b-r)T} \cdot N[d_1(S_i^*)](1 - 1/q_1) - [1 + e^{(b-r)T} n[d_1(S_i^*)]/6 \sqrt{T}]/q_1$$

Once the correct value of S* is found, the value of the put and the put's delta are found by solving:

$$P(S,T) = p(S,T) + A_1 (S / S^*)^{q_1}$$

where

$$A_1 = -(S^* / q_1)(1 - e^{(b-r)T} N[d_1(S^*)])$$

$$\Delta = \Delta_e + A_1 * q_1 * (S / S^*)^{q_1} / S$$

$p(S,T)$ = the price of a European style put option.

Δ_e = the delta of the European style put option.

Note 1.   CME Group's Falcon engine goes slightly further in its precision to 0.000001 (one more decimal place).

Note 2.   CME Group's Falcon engine also has a maximum number of iterations that it will perform on the equation discussed in Note 1 to fall within the tolerance level. If after 10,000 iterations the Falcon engine calculation is not within a tolerance of 0.000001, it will fall back to the European model instead.

Note 3.   CME Group's Falcon engine does not implement any notion of a carrying-cost or foreign interest rate. The b variable is always equal to zero in the equations. If for some reason the Falcon engine does start to use b, it is worth noting that if b is ever greater than or equal to the interest rate r, the Falcon engine automatically falls back to the European model.

Note 4.   CME Group's Falcon engine uses the Black Option Pricing Model (see Appendix A) in place of the Merton Model referred to in the abstract of Giovanni Barone-Adesi and Robert E. Whaley's article in the June 1987 Journal of Finance (Volume XLII, No. 2).

End of Interpretation to Rule 584.

Appendix 2.

Clean Copy of the Section Containing Amendments

New Rule 584 – CME GLOBEX OPTIONS VOLATILITY QUOTE TRADING and Its Interpretation to Allow for Volatility Quoting and Trading in Selected CME Group Options on Futures Products Traded on CME Globex.

[Text of CME Rule 584 does not change.]

INTERPRETATIONS & SPECIAL NOTICES RELATING TO CHAPTER 5

INTERPRETATION OF RULE 584.—CME GLOBEX OPTIONS VOLATILITY QUOTE TRADING

[Beginning of CME Rule 584 does not change.]

Whaley Option Pricing Model for American-Style Options

The following model is based on the Barone-Adesi-Whaley model as described in the Journal of Finance, Vol. 42 No.2, pages 301-320. The model uses analytic approximation techniques to solve for the price of the American-style option. The model estimates a value for S* which is the underlying price above which the option should be exercised. The value of S* is then used to determine the value of the option. For call options, the model estimates S* by satisfying the following equation:

$(LHS - RHS / K < 0.00001$ (Please see notes 1-4 at the end of this section.)

Where

$LHS = S^* - K$

$RHS = c(S, T) + [(1 - e^{(b-r)T} N(d_1)) * (S * /q_2)]$

$d_1 = [ln(S * /K) + (b + \textit{6}^2/2)T] / \textit{6} \sqrt{T}$

$d_2 = d_1 - \textit{6} \sqrt{T}$

$q_2 = [-(N - 1) + \sqrt{(N-1)^2 + 4M / k} / 2$

$M = 2 * r / \textit{6}^2$

$N = 2 * b / \textit{6}^2$

$k = 1 - e^{-rT}$

N(.) is the cumulative univariate normal distribution.

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T = time until expiration in years (e.g. 90 days = 0.247)

r = interest rate (e.g. 8% per annum = 0.08)

b = cost of carry, assumed to be zero for the purposes of this calculation

K = strike price

S = underlying price

After each iteration, the estimate of S* is adjusted by:

$$S^*_{i+1} = [K + RHS - b_i S^*_i] / (1 - b_i)$$
where

$$b_i = e^{(b-r)T} N[d_1(S^*_i)](1 - 1/q_2) + [1 - e^{(b-r)T} n[d_1(S^*_i)]/6 \sqrt{T}]/q_2$$

Once the correct value of S* is found, the value of the call and the call's delta are found by solving:

$$C(S,T) = C(S,T) + A_2 (S/S^*)^{q_2}$$
Where

$$A_2 = (S^*/q_2)(1 - e^{b-r)T} N[d_1(S^*)])$$

$$\Delta = \Delta_e + A_2 * q_2 * (S/S^*)^{q_2} / S$$

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For put options, the model estimates S* by satisfying:

$$(LHS - RHS)/K < 0.00001$$

where

$$LHS = K - S^*$$

$$RHS = p(S, T) - [(1 - e^{(b-r)T} - N(d_1)) * (S * /q_1)]$$

$$d_1 = [ln(S * /K) + (b + 6^2/2)T] / 6 \sqrt{T}$$

$$d_2 = d_1 + 6 \sqrt{T}$$

$$q_1 = [-(N-1) - \sqrt{(N-1)^2 + 4M/k} / 2$$

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6 = volatility (e.g. 10% per annum = 0.10)

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r = interest rate (e.g. 8% per annum = 0.08)

b = cost of carry, assumed to be zero for the purposes of this calculation

K = strike price

S = underlying price

After each iteration, the estimate of S* is adjusted by:

$$S^*_{i+1} = [K - RHS + b_i S^*_i] / (1 + b_i)$$

where

$$b_i = -e^{(b-r)T} - N[d_1(S^*_i)](1 - 1/q_1) - [1 + e^{(b-r)T} n[d_1(S^*_i)] / 6 \sqrt{T}] / q_1$$

Once the correct value of S* is found, the value of the put and the put's delta are found by solving:

$$P(S,T) = p(S,T) + A_1 (S / S^*)^{q_1}$$

where

$$A_1 = -(S^* / q_1)(1 - e^{(b-r)T} N[d_1(S^*)])$$

$$\Delta = \Delta_e + A_1 * q_1 * (S / S^*)^{q_1} / S$$

$p(S,T)$ = the price of a European style put option.

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End of Interpretation to Rule 584.