Blogs

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The Derivatives Exposure Equation

Our <u>last post</u> provided a big picture summary of the steps required to calculate a Fund's "derivatives exposure" for purposes of new <u>Rule 18f-4</u>. The post may have left an impression that this process should not be that difficult. To provide additional perspective, we offer the following equation for calculating derivatives exposure. If interest rate and currency hedges satisfy the following condition:

NHI + δN_{OHI} + δN_{OHEX} + $N_{HEX} \le 1.1 \times (P_H + P_{MX} + P_{EX} + M_{VEX})$ Then a Fund will be a limited derivatives user when: $1 \times NA \ge M_{VSS} + (\delta N_O - \delta N_{OFE} - \delta N_{OHI} - \delta N_{OHEX}) + 10Y_{N_I} + (N_D - N_{OFE} - N_{HEX})$ Where:

δNofe =	Delta adjusted gross notional amount of options offsetting δΝο	
N/ =	Gross notional amount of interest rate derivatives transactions other than options	
NIOFF =	Gross notional amount of interest rate derivative transactions other than options offsetting N_{ℓ}	
N _D =	Gross notional amounts of all other derivatives transactions (i.e., derivatives transactions other than MVss, δ No, δ Nofe, Ni, Niger, Nofe, NHL δ Nofe, δ Nofe, and Nifex)	
Nofe =	Gross notional amounts of derivatives transactions offsetting N_{D}	
P _H =	Principal amount of specific fixed-income investments and Fund borrowings subject to interest rate hedges	
PMX =	Market value of specific equity investments subject to interest rate hedges	
NHI =	Gross notional amount of interest rate derivatives other than options hedging $P_{\textit{H}}$ and $P_{\textit{MV}}$	
<u>бNоні</u> =	Delta adjusted gross notional amount of interest rate options hedging $P_{\textit{H}}$ and $P_{\textit{MV}}$	
10YN/=	10-year bond equivalent of N _I – N _{IQEE} – N _{HI}	
Pex =	Principal amount of specific fixed-income investments and Fund borrowings subject to currency hedges	
MV _{EX} =	Market value of specific equity investments subject to currency hedges	
δNohex =	Delta adjusted gross notional amount of currency options hedging Pex and MVEX	
NHEX =	Gross notional amounts of currency derivatives transactions hedging $\underbrace{\text{P}_{\text{EX}}}$ and $\underbrace{\text{MV}_{\text{EX}}}$	This formula

tries to resolve ambiguities to produce a smaller derivatives exposure. Admittedly, there is nothing hard about the math in this equation, although this would change if we included the formula for calculating an option's delta.

$$\delta = N(d1)$$

where :
$$d1 = \frac{ln\left(rac{S}{K}
ight) + \left(r + rac{\sigma^2}{2}
ight)t}{\sigma\sqrt{t}}$$

Legend

K Option strike price

N Standard normal cumulative distribution function

r | Risk-free interest rate

σ | Volatility of the underlying

S Price of the underlying

t Time to option's expiry

For us, and we suspect many compliance

officers, the most significant aspect of the equation is the sheer number of variables and the need to use different values (unadjusted and adjusted notional amounts, principal amounts, market values) for different variables. Creating a daily compliance report for derivatives exposure will require some careful data entry and programming.

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