institution's proprietary options pricing model, subject to oversight by the appropriate supervisor.

Delta-weighted positions of options based on debt securities or interest rates would be slotted into the debt securities time-bands, as set out above for debt instruments, under the following procedure. A two-legged approach would be used as for other derivatives, requiring one entry at the time the underlying contract takes effect and a second at the time the underlying contract matures. For instance, a bought call option on a June three-month interest-rate future will in April be considered, on the basis of its ''delta'' equivalent value, to be a long position with a maturity of five months and a short position with a maturity of two months. The written option would be similarly slotted as a long position with a maturity of two months and a short position with a maturity of five months. Floating rate instruments with caps or floors would be treated as a combination of floating rate securities and a series of European-style options. For example, the holder of a three-year floating rate bond indexed to six month LIBOR with a cap of 15 percent would treat the instrument as: (1) A debt security that reprices in six months; and (2) a series of five written call options on a floating rate asset (FRA) with a basis of 15 percent, each with a negative sign at the time the underlying FRA takes effect and a positive sign at the time the underlying FRA matures.

In addition to the above capital charges arising from delta risk, the proposal requires capital for gamma and vega risks. Institutions using this method would be required to calculate the gamma and vega for each option position. The results would be slotted into separate maturity ladders by currency. For options such as caps and floors whose underlying instrument is an interest rate, the delta and gamma would be expressed in terms of a hypothetical underlying security. Subsequently:

(1) For gamma risk, for each time-band, net gammas which are negative would be multiplied by the risk weights set out in the proposed regulatory language (OCC—Table 5, Board—Table IV, FDIC—Table 4) and by the square of the market value of the underlyings (net gammas which are positive would be disregarded);

(2) For volatility risk, institutions would be required to calculate the capital charges for vegas in each time-band assuming a proportional shift in volatility of 25 percent;

(3) The capital charge would be the absolute value of the sum of the individual capital charges for net negative gammas plus the absolute value of the sum of the individual capital charges for vega risk for each time-band.

The capital charge for options on equities would also be based on the delta weighted positions of the options by incorporating those weighted positions into the market risk measure for equities described above. For purposes of this calculation individual equity issues and indices are to be treated as separate underlyings. In addition to the capital charge for delta risk, institutions would apply a further capital charge for gamma and vega risk:

(1) For gamma risk, the net negative gammas for each underlying instrument would be multiplied by 0.72 percent when that instrument is an individual equity and by 0.32 percent when it is an index.[20] That product would then be multiplied by the square of the market value of the underlying;

(2) For volatility risk, institutions would be required to calculate the capital charges for vegas for each underlying instrument assuming a proportional shift in volatility of plus or minus 25 percent;

(3) The capital charge would be the absolute value of the sum of the individual capital charges for net negative gammas plus the absolute value of the sum of the individual capital charges for vega risk.

The capital charge for options on foreign exchange and gold positions would be based on the shorthand method set out earlier. For delta risk, the net delta (or delta-based) equivalent of the total book of foreign currency and gold options would be incorporated into the measurement of the exposure in a single currency position. The gamma and vega risks would be measured as follows:

(1) For gamma risk, for each underlying exchange rate net gammas which are negative would be multiplied by 0.32 percent and by the square of the market value of the position;[21]

(2) For volatility risk, institutions would be required to calculate the capital charges for vegas for each currency pair and gold assuming a proportional shift in volatility of plus or minus 25 percent;

(3) The capital charge would be the absolute value of the sum of the individual capital charges for net negative gammas plus the absolute value of the sum of the individual capital charges for vega risk.

The capital charge for options on commodities would be based on the same approach set out above for commodities. The delta weighted positions would be incorporated into one of the two measures described in that section. In addition to the capital charge for delta risk, institutions would incur a further capital charge for gamma and vega risk:

(1) For gamma risk, net negative gammas for each underlying would be multiplied by 1.125 percent and by the square of the market value of the commodity;[22]

(2) For volatility risk, institutions would be required to calculate the capital charges for vegas for each commodity as defined above in the section dealing with commodities, assuming a proportional shift in volatility of plus or minus 25 percent;

(3) The capital charge would be the absolute value of the sum of the individual capital charges for net negative gammas plus the absolute value of the sum of the individual capital charges for vega risk.

A worked example of the delta-plus method for commodities is set out in Attachment IV of the Board's and the FDIC's proposed regulatory language. In the case of options based on debt securities or interest rates and with the approval of the appropriate supervisor, institutions that are significant traders in options could be allowed to net positive and negative gammas and vegas across time-bands to a limited extent. However, such netting would be permitted only if it is based on prudent and conservative assumptions and the institution materially satisfies the qualitative standards outlined under the internal models approach.

In addition, instead of applying a uniform relative change in volatility to measure vega risk, institutions may base the calculation on a volatility ladder in which the implied change in volatility varies with the maturity of the option. When using such a volatility ladder the assumed proportional shift in volatility should be at least 25 percent at the short end of the maturity spectrum. The proportional shift in volatility for longer maturities should be at least as stringent in statistical terms as the 25 percent shift at the short end. Use of this alternative would be subject to validation by the supervisor, and to the qualitative standards listed in the internal models section that are relevant to this aspect of the institution's

[20] Using the Taylor expansion, the risk weights are calculated as follows: Risk weight for gamma =0.5× (assumed price change of underlying)^2 For an individual equity, $0.5 \times 0.12^2 = 0.72\%$. In the case of an index as the underlying, the assumed price change of the underlying equals 8.0 percent.

[21] The assumed price change is 8.0 percent.

[22] The assumed price change is 15 percent.