

each option portfolio. The measure for market risk for the portfolio is the largest loss in value from among the scenario revaluations. The total measure for market risk for all option portfolios is the sum of the individual option portfolio measures.

e. The FDIC will review the application of the scenario approach, particularly regarding the precise way the analysis is constructed. A bank using the scenario approach should meet the appropriate qualitative criteria set forth in section III.B. of this appendix C.

5. Under the delta-plus method, a bank that writes options may include delta-weighted options positions within each measurement framework as set forth in sections IV.A. through IV.D. of this appendix C.

a. Options positions should be measured as a position equal to the market value of the underlying instrument multiplied by the delta. In addition, a bank must measure the sensitivities of the option's gamma (the change of the delta for a given change in the

price of the underlying) and vega (the sensitivity of the option price with respect to a change in volatility) to calculate the measure for market risk. These sensitivities may be calculated according to an exchange model approved by the FDIC or to the bank's own options pricing model, subject to review by the FDIC.

b. For options with debt instruments or interest rates as the underlying instrument, delta-weighted options positions should be allocated into the debt instrument time bands in section IV.A. of this appendix C using a two-legged approach (as is used for other derivatives), requiring one entry at the time the underlying contract takes effect and one at the time the underlying contract matures.⁴⁵ Floating rate instruments with caps or floors should be treated as a combination of floating rate securities and a series of European-style options.⁴⁶ A bank must also calculate the gamma and vega for each such option position (including hedge positions). The

results should be allocated into separate maturity ladders by currency. For interest rate options such as caps and floors, the delta and gamma should be expressed in terms of a hypothetical underlying security. Subsequently:

i. For gamma risk, for each time band, net gammas on short positions are multiplied by the risk weights set out in table 5 and by the square of the market value of the underlying instrument (net gammas on long positions may be disregarded);

ii. For volatility risk, a bank calculates the risk measure for vega in each time band assuming a proportional shift in volatility of ± 25.0 percent;

iii. The measure for market risk is the absolute value of the sum of the individual measures for net gammas on short positions plus the absolute value of the sum of the individual measures for vega risk for each time band; and

iv. The delta plus method risk weights are:

TABLE 5.—DELTA PLUS METHOD RISK WEIGHTS

Time-band	Modified duration (average assumed for time band)	Assumed interest rate change (%)	Risk-weight for gamma ¹
Under 1 month	0.00	1.00	0.00000
1 up to 3 months	0.20	1.00	0.00020
3 up to 6 months	0.40	1.00	0.00080
6 up to 12 months	0.70	1.00	0.00245
1 up to 2 years	1.40	0.90	0.00794
2 up to 3 years	2.20	0.80	0.01549
3 up to 4 years	3.00	0.75	0.02531
4 up to 5 years	3.65	0.75	0.03747
5 up to 7 years	4.65	0.70	0.05298
7 up to 10 years	5.80	0.65	0.07106
10 up to 15 years	7.50	0.60	0.10125
15 up to 20 years	8.75	0.60	0.13781
Over 20 years	10.00	0.60	0.18000

¹ According to the Taylor expansion, the risk weights are calculated as $\frac{1}{2}$ (modified duration x assumed interest rate change) ≈ 100 .

c. For options with equities as the underlying, delta-weighted option positions should be incorporated in the measure of market risk set forth in section IV.B. of this appendix C. Individual equity issues and indices should be treated as separate underlyings. In addition to the measure for delta risk, a bank should apply a further charge for gamma and vega risk:

i. For gamma risk, the net gammas on short positions for each underlying are multiplied by 0.72 percent (in the case of an individual equity) or 0.32 percent (in the case of an index as the underlying) and by the square of the market value of the underlying;

ii. For volatility risk, a bank calculates the risk measure for vega for each underlying, assuming a proportional shift in volatility of ± 25.0 percent; and

iii. The measure for market risk is the absolute value of the sum of the individual

measures for net gammas on short positions plus the absolute value of the individual measures for vega risk.

d. For options on foreign exchange and gold positions, the net delta (or delta-based) equivalent of the total book of foreign currency and gold options is incorporated into the measurement of the exposure in a net open position in each currency as set forth in section IV.C. of this appendix C. The gamma and vega risks should be measured as follows:

i. For gamma risk, for each underlying exchange rate, net gammas on short positions are multiplied by 0.32 percent and by the square of the market value of the positions;

ii. For volatility risk, a bank calculates the risk measure for vega for each currency pair and gold assuming a proportional shift in volatility of ± 25.0 percent; and

iii. The measure for market risk is the absolute value of the sum of the individual measures for net gammas on short positions plus the absolute value of the sum of the individual measures for vega risk.

e. For options on commodities, the delta-weighted positions are incorporated in one of the measures described in section IV.D. of this appendix C. In addition, a bank must apply a capital requirement for gamma and vega risk:

i. For gamma risk, net gammas on short positions for each underlying are multiplied by 1.125 percent and by the square of the market value of the commodity;

ii. For volatility risk, a bank calculates the risk measures for vega for each commodity assuming a proportional shift in volatility of ± 25.0 percent; and

iii. The measure for market risk is the absolute value of the sum of the individual

⁴⁵ For example, in April a purchased call option on a June three-month interest-rate future would be considered on the basis of its delta-equivalent value to a long position with a maturity of five months and a short position with a maturity of two months. The written option would be allocated as a long

position with a maturity of two months and a short position with a maturity of five months.

⁴⁶ 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 bond as a debt

security that repurchases in six months, and a series of five written call options on a FRA with a strike rate of 15 percent, each allocated as a short position at the expiration date of the option and as a long position at the time the FRA matures.