have a remaining maturity from 1 year up to 4 years, and zone 3 instruments have a remaining maturity of 4 years or more.) These options and the associated hedging positions should be evaluated under the assumption that the relevant interest rates move simultaneously. For options based on equities, separate grids are constructed for each individual equity issue and index. For options based on exchange rates, separate grids are constructed for individual exchange rates. For options based on commodities, separate grids are constructed for each category of commodity (as defined in sections I.B.3. and IV.D. of this appendix E).

c. For option portfolios with options based on equities, exchange rates, and commodities, the first dimension of the grid consists of rate or price changes within a specified range above and below the current market value of the underlying; for equities, the range is ± 12.0 percent (or in the case of an index ± 8.0 percent), for exchange rates the range is ± 8.0 percent, and for commodities the range is ± 15.0 percent. For option portfolios with options based on interest rates, the range for the first dimension of the grid depends on the remaining maturity zone. The range for zone 1 is ± 100 basis points, the range for zone 2 is ± 90 basis points, and the range for zone 3 is ± 75 basis points. For all option portfolios, the range is divided into at least ten equally spaced intervals. The second dimension of each grid is a shift in the volatility of the underlying rate or price equal to ± 25.0 percent of the current volatility.[50]

d. For each assumed volatility and rate or price change (a scenario), the banking

organization revalues each option portfolio. The market risk capital requirement for the portfolio is the largest loss in value from among the scenario revaluations. The total market risk capital requirement for all option portfolios is the sum of the individual option portfolio capital requirements.

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

5. Under the delta-plus method, a banking organization 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 E.

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 banking organization 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 total capital requirement. These sensitivities may be calculated according to an exchange model approved by the Federal Reserve or to the banking organization's own options pricing model, subject to review by the Federal Reserve.

b. For options with debt instruments or interest rates as the underlying instrument, delta-weighted options positions should be

slotted into the debt instrument time-bands in section IV.A. of this appendix E 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.[51] Floating rate instruments with caps or floors should be treated as a combination of floating rate securities and a series of European-style options.[52] A banking organization must also calculate the gamma and vega for each such option position (including hedge positions). The results should 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 should be expressed in terms of a hypothetical underlying security. Subsequently:

i. For gamma risk, for each time-band, net gammas that are negative are multiplied by the risk weights set out in Table IV in section IV.E.5.b.iv. of this appendix E and by the square of the market value of the underlying instrument (net positive gammas may be disregarded);

ii. For volatility risk, a banking organization calculates the capital requirements for vega in each time-band assuming a proportional shift in volatility of ± 25.0 percent;

iii. The capital requirement is the absolute value of the sum of the individual capital requirements for net negative gammas plus the absolute value of the sum of the individual capital requirements for vega risk for each time-band; and

iv. The delta plus method risk weights are:

TABLE IV.—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 ½ (modified duration × assumed interest rate change)^2 100.

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 E. Individual equity issues and indices should be treated as separate

underlyings. In addition to the capital requirement for delta risk, a banking

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[50] For example, if the underlying in an equity instrument with a current market value of $100 and a volatility of 20 percent, the first dimension of the grid would range from $88 to $112, divided into ten intervals of $2.40 and the second dimension would assume volatilities of 15 percent, 20 percent, and 25 percent.

[51] 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 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 slotted as a long position with a maturity of two months and a short position with a maturity of five months.

[52] 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 reprices in six months, and a series of five written call options on a FRA with a strike rate of 15 percent, each slotted as a short position at the expiration date of the option and as a long position at the time the FRA matures.