positions plus the amount of the matched long position is multiplied by a spread rate of 1.5 percent.

c. The unmatched net position from shorter-term time bands must be carried forward to offset exposures in longer-term time bands. A charge of 0.6 percent of the net position carried forward is added for each time band that the net position is carried forward.[37] The total measure for commodities risk is the sum of the 15.0 percent base measurement for each net commodity position and the additional charges for matched positions and for unmatched positions carried forward. An example of this calculation is in attachment IV to this appendix C.

5. Commodity derivatives and other off-balance-sheet positions that are affected by changes in commodity prices are included in the measurement system under this section IV.D. (except for options and the associated underlying, which are included in the measurement system under the treatment discussed in section IV.E. of this appendix C). Commodity derivatives are converted into notional commodity positions. Under the maturity method, the positions are allocated in maturity time bands as follows:

a. Futures and forward contracts relating to individual commodities are incorporated in the measurement system as notional amounts (of, for example, barrels or kilos) that are converted to U.S. currency at current spot rates and are assigned a maturity according to expiration date;

b. Commodity swaps in which one side of the contract is a fixed price and the other side is the current market price are incorporated as a series of positions equal to the notional amount of the contract at current spot rates, with one position corresponding to each payment on the swap and allocated in the maturity ladder accordingly. The positions are long positions if the bank is paying a fixed price and receiving a floating price, and short positions if the bank is receiving a fixed price and paying a floating price; [38] and

c. Commodity swaps in which the sides of the transaction are in different commodities are included in the relevant reporting ladder. No offsetting is allowed unless the commodities are in the same sub-category.

E. Options

1. Three alternatives are available for a bank to use in measuring its market risk for options activities under the standardized approach. A bank that only has purchased options may use the simplified method set forth in paragraph E.2 of this section. A bank that also writes options may use the scenario method described in section IV.E.3., or the delta-plus method set forth in paragraph E.4. of this section.[39] These methods may only be used by banks which, in relative terms, have limited options activities. Banks with more significant options business are expected to adopt an internal measurement system conforming to the criteria in section III of this appendix C. Regardless of the method used, specific risk related to the issuer of an instrument still applies to options positions for equities, equity indices and corporate debt securities as set forth in sections IV.A. and IV.B. of this appendix C. Options remain an element of risk-weighted assets under section II of appendix A of this part.

2. Under the simplified and scenario methods, the positions for the options and the associated underlying, cash or forward, are not included in the measurement framework for debt securities, equities, foreign exchange or commodities risk as set forth in sections IV.A. through IV.D. of this appendix C. Rather, they are subject to the measure of market risk as calculated in this section. The risk measures calculated under this section should then be added to the risk measures for debt securities, equities, foreign exchange and commodities risk as appropriate. Under the delta-plus method, the delta equivalent position [40] for each option is included in the measurement frameworks set forth in sections IV.A. through IV.D. of this appendix C.

3. A bank that has only a limited amount and range of purchased options may use the following simplified approach to measure its market risk exposure.

a. For a bank with a long cash position and a long put or with a short cash position and a long call, the measure for market risk is the market value of the underlying instrument multiplied by the sum of the specific and general market risk requirements for the underlying (that is, the specific and general market risk requirements that would have applied to the underlying directly under sections IV.A. through IV.D. of this appendix C [41]), less the amount the option is in the money (if any) bounded at zero.[42]

b. For a bank with a long call or a long put, the measure for market risk is the lesser of:

i. The market value of the underlying security multiplied by the sum of specific and general market risk requirements for the underlying (that is, the specific and general market risk requirements that would have applied to the underlying directly under sections IV.A. through IV.D. of this appendix C) [43]; or

ii. The market value of the option.

4. Under the scenario approach, a bank revalues its options and related hedging positions by changing the underlying rate or price over a specified range and by assuming different levels of volatility for that rate or price.

a. For each of its option portfolios, a bank constructs a grid based on a fixed range of changes in the portfolio's risk factors and calculates changes in the value of the option portfolio at each point within the grid. For this purpose, an option portfolio consists of an option and any related hedging positions or multiple options and related hedging positions that are grouped together according to their remaining maturity or the type of underlying.

b. Options based on interest rates and debt instruments are grouped into portfolios according to the maturity zones that are set forth in section IV.A. of this appendix C. (Zone 1 instruments have a remaining maturity of up to 1 year, zone 2 instruments 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 section IV.D. of this appendix C).

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.[44]

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

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[37] For example, if $200 short is carried forward from the 3–6 month time band to the 1–2 year time band, the capital charge would be $200×.006×2=$2.40.

[38] If one of the sides of the transaction involves receiving/paying a fixed or floating interest rate, that exposure should be allocated into the appropriate repricing maturity band in section IV.A. of this appendix C.

[39] Unless all their written option positions are hedged by perfectly matched long positions in exactly the same options, in which case there is no measure for market risk.

[40] The delta equivalent of an option is the option's delta value multiplied by its principal or notional value. The delta value of an option represents the expected change in the option's price as a proportion of a small change in the price of the underlying instrument. For example, an option whose price changes $1 for every $2 dollar change in the price of the underlying instrument has a delta of 0.50.

[41] Because some underlying instruments are not subject to a specific risk charge under sections IV.A through IV.D of this appendix C, such instruments will only be multiplied by the general market risk charge in making this calculation.

[42] For example, if a holder of 100 shares currently valued at $10 each has an equivalent put option with a strike price of $11, the risk measure would be: $1,000×16.0 percent (e.g., 8.0 percent specific plus 8.0 percent general market risk)=$160, less the amount the option is in the money ($11–$10)×100=$100, i.e., the measure for market risk would be $60. A similar methodology applies for options for which the underlying is a foreign currency, a debt security or a commodity.

[43] See footnote 41 in section IV.E.3.a. of this appendix C.

[44] 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.