valuing gross positions in commodity derivatives for this purpose, a banking organization should use the current spot price. The total capital requirement for commodities risk is the sum of the 15.0 percent base charges for each net commodity position and the 3.0 percent requirements on the gross commodity positions.

4. *Maturity method*. a. Under this method, a banking organization must slot each long and short commodity position (converted into U.S. currency at current spot rates) into a maturity ladder. The time-bands for the maturity ladder are; from zero to one month, one up to three months, three up to six months, six up to twelve months, one up to two years, two up to three years, and over three years. A separate maturity ladder is used for each category of commodity. Physical commodities are allocated to the first time-band.

b. In order to capture forward gap and interest rate risk within a time-band (together sometimes referred to as curvature/spread risk), offsetting long and short positions in each time-band are subject to an additional capital requirement. Beginning with the shortest-term time-band and continuing with subsequent time-bands, the amount of the matched short 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 capital requirement of 0.6 percent of the net position carried forward is added for each time-band that the net position is carried forward.[43] The total capital requirement for commodities risk is the sum of the 15.0 percent base capital requirement for each net commodity position and the additional requirements for matched positions and for unmatched positions carried forward. An example of this calculation is in Attachment IV to this appendix E.

5. *Commodity derivatives*. Commodity derivatives and other off-balance-sheet positions that are affected by changes in commodity prices are included in the measurement system under section IV.D. of this appendix E (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 E). Commodity derivatives are converted into notional commodity positions. Under the maturity method, the positions are slotted into 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. dollars at current spot rates and are assigned a maturity according to expiration date;

b. Commodity swaps where 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 slotted in the maturity ladder accordingly. The positions are long positions if the banking organization is paying a fixed price and receiving a floating price, and short positions if the banking organization is receiving a fixed price and paying a floating price;[44] and

c. Commodity swaps where 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 banking organization to use in measuring its market risk for options activities. A banking organization that only has purchased options may use the simplified method set forth in section IV.E.2. of this appendix E. A banking organization that also writes options may use the scenario method described in section IV.E.3. of this appendix E or the delta-plus method set forth in section IV.E.4. of this appendix E.[45] These methods may only be used by banking organizations which, in relative terms, have limited options activities. Banking organizations with more significant options business are expected to adopt an internal measurement system conforming to the criteria in section III. of this appendix E. 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 E. There remains a separate capital requirement for counterparty credit risk as set forth in appendix A to 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 E. Rather, they are subject to capital requirements as calculated in this section. The capital requirements calculated under this section IV.E. should then be added to the capital requirements for debt securities, equities, foreign exchange and commodities risk as appropriate. Under the delta-plus method, the delta equivalent position[46] for each option is included in the measurement frameworks set forth in sections IV.A. through IV.D. of this appendix E.

3. A banking organization 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 banking organization with a long cash position and a long put or with a short cash position and a long call, the capital requirement 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 E.[47]), less the amount the option is in the money (if any) bounded at zero.[48]

b. For a banking organization with a long call or a long put, the capital charge 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 E[49]); or

ii. The market value of the option.

c. Under this measure, the capital requirement for currency options is 8.0 percent of the market value of the underlying and for commodity options is 15.0 percent of the market value of the underlying.

4. Under the scenario approach, a banking organization 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 banking organization 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 E. (Zone 1 instruments have a remaining maturity of up to 1 year, zone 2 instruments

[43] 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.

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

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

[46] 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.

[47] Some options (e.g., where the underlying is an interest rate, a currency, or a commodity) bear no specific risk but specific risk will be present in the case of options on corporate debt securities and for options on equities and equity indices.

[48] 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 capital charge 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 capital charge would be $60. A similar methodology applies for options whose underlying is a foreign currency, a debt security or a commodity.

[49] See footnote 47 in section IV.E.3.a of this appendix E.