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APPENDIX E TO PART 208—CAPITAL ADEQUACY GUIDELINES FOR STATE MEMBER BANKS; MARKET RISK MEASURE

Section 1. Purpose, Applicability, Scope, and Effective Date

(a) *Purpose.* The purpose of this appendix is to ensure that banks with significant exposure to market risk maintain adequate capital to support that exposure.[1] This appendix supplements and adjusts the risk-based capital ratio calculations under appendix A of this part with respect to those banks.

(b) *Applicability.* (1) This appendix applies to any insured state member bank whose trading activity[2] (on a worldwide consolidated basis) equals:

(i) 10 percent or more of total assets;[3] or

(ii) $1 billion or more.

(2) The Federal Reserve may additionally apply this appendix to any insured state member bank if the Federal Reserve deems it necessary or appropriate for safe and sound banking practices.

(3) The Federal Reserve may exclude an insured state member bank otherwise meeting the criteria of paragraph (b)(1) of this section from coverage under this appendix if it determines the bank meets such criteria as a consequence of accounting, operational, or similar considerations, and the Federal Reserve deems it consistent with safe and sound banking practices.

(c) *Scope.* The capital requirements of this appendix support market risk associated with a bank's covered positions.

(d) *Effective date.* This appendix is effective as of January 1, 1997. Compliance is not mandatory until January 1, 1998. Subject to supervisory approval, a bank may opt to comply with this appendix as early as January 1, 1997.[4]

[1] This appendix is based on a framework developed jointly by supervisory authorities from the countries represented on the Basle Committee on Banking Supervision and endorsed by the Group of Ten Central Bank Governors. The framework is described in a Basle Committee paper entitled ''Amendment to the Capital Accord to Incorporate Market Risks,'' January 1996. Also see modifications issued in September 1997.

[2] Trading activity means the gross sum of trading assets and liabilities as reported in the bank's most recent quarterly Consolidated Report of Condition and Income (Call Report).

[3] Total assets means quarter-end total assets as reported in the bank's most recent Call Report.

[4] A bank that voluntarily complies with the final rule prior to January 1, 1998, must comply with all of its provisions.

Section 2. Definitions

For purposes of this appendix, the following definitions apply:

(a) *Covered positions* means all positions in a bank's trading account, and all foreign exchange[5] and commodity positions, whether or not in the trading account.[6] Positions include on-balance-sheet assets and liabilities and off-balance-sheet items. Securities subject to repurchase and lending agreements are included as if they are still owned by the lender.

(b) *Market risk* means the risk of loss resulting from movements in market prices. Market risk consists of general market risk and specific risk components.

(1) *General market risk* means changes in the market value of covered positions resulting from broad market movements, such as changes in the general level of interest rates, equity prices, foreign exchange rates, or commodity prices.

(2) *Specific risk* means changes in the market value of specific positions due to factors other than broad market movements and includes event and default risk as well as idiosyncratic variations.

(c) *Tier 1* and *Tier 2 capital* are defined in appendix A of this part.

(d) *Tier 3 capital* is subordinated debt that is unsecured; is fully paid up; has an original maturity of at least two years; is not redeemable before maturity without prior approval by the Federal Reserve; includes a lock-in clause precluding payment of either interest or principal (even at maturity) if the payment would cause the issuing bank's risk-based capital ratio to fall or remain below the minimum required under appendix A of this part; and does not contain and is not covered by any covenants, terms, or restrictions that are inconsistent with safe and sound banking practices.

(e) *Value-at-risk (VAR)* means the estimate of the maximum amount that the value of covered positions could decline during a fixed holding period within a stated confidence level, measured in accordance with section 4 of this appendix.

Section 3. Adjustments to the Risk-Based Capital Ratio Calculations

(a) *Risk-based capital ratio denominator.* A bank subject to this appendix shall calculate its risk-based capital ratio denominator as follows:

(1) *Adjusted risk-weighted assets.* Calcuate adjusted risk-weighted assets, which equals

[5] Subject to supervisory review, a bank may exclude structural positions in foreign currencies from its covered positions.

[6] The term trading account is defined in the instructions to the Call Report.

risk-weighted assets (as determined in accordance with appendix A of this part), excluding the risk-weighted amounts of all covered positions (except foreign exchange positions outside the trading account and over-the counter derivative positions)[7] and receivables arising from the posting of cash collateral that is associated with securities borrowing transactions to the extent the receivables are collateralized by the market value of the borrowed securities, provided that the following conditions are met:

(i) The transaction is based on securities includable in the trading book that are liquid and readily marketable,

(ii) The transaction is marked to market daily,

(iii) The transaction is subject to daily margin maintenance requirements,

(iv) The transaction is a securities contract for the purposes of section 555 of the Bankruptcy Code (11 U.S.C. 555), a qualified financial contract for the purposes of section 11(e)(8) of the Federal Deposit Insurance Act (12 U.S.C. 1821(e)(8)), or a netting contract between or among financial institutions for the purposes of sections 401–407 of the Federal Deposit Insurance Corporation Improvement Act of 1991 (12 U.S.C. 4401–4407), or the Board's Regulation EE (12 CFR part 231).

(2) *Measure for market risk.* Calculate the measure for market risk, which equals the sum of the VAR-based capital charge, the specific risk add-on (if any), and the capital charge for de minimis exposures (if any).

(i) *VAR-based capital charge.* The VAR-based capital charge equals the higher of:

(A) The previous day's VAR measure; or

(B) The average of the daily VAR measures for each of the preceding 60 business days multiplied by three, except as provided in section 4(e) of this appendix;

(ii) *Specific risk add-on.* The specific risk add-on is calculated in accordance with section 5 of this appendix; and

(iii) *Capital charge for de minimis exposure.* The capital charge for de minimis exposure is calculated in accordance with section 4(a) of this appendix.

(3) *Market risk equivalent assets.* Calculate market risk equivalent assets by multiplying the measure for market risk (as calculated in paragraph (a)(2) of this section) by 12.5.

(4) *Denominator calculation.* Add market risk equivalent assets (as calculated in paragraph (a)(3) of this section) to adjusted risk-weighted assets (as calculated in paragraph (a)(1) of this section). The resulting sum is the bank's risk-based capital ratio denominator.

(b) *Risk-based capital ratio numerator.* A bank subject to this appendix shall calculate its risk-based capital ratio numerator by allocating capital as follows:

(1) *Credit risk allocation.* Allocate Tier 1 and Tier 2 capital equal to 8.0 percent of adjusted risk-weighted assets (as calculated in paragraph (a)(1) of this section).[8]

(2) *Market risk allocation.* Allocate Tier 1, Tier 2, and Tier 3 capital equal to the measure for market risk as calculated in paragraph (a)(2) of this section. The sum of Tier 2 and Tier 3 capital allocated for market risk must not exceed 250 percent of Tier 1 capital allocated for market risk. (This requirement means that Tier 1 capital allocated in this paragraph (b)(2) must equal at least 28.6 percent of the measure for market risk.)

(3) *Restrictions.* (i) The sum of Tier 2 capital (both allocated and excess) and Tier 3 capital (allocated in paragraph (b)(2) of this section) may not exceed 100 percent of Tier 1 capital (both allocated and excess).[9]

(ii) Term subordinated debt (and intermediate-term preferred stock and related surplus) included in Tier 2 capital (both allocated and excess) may not exceed 50 percent of Tier 1 capital (both allocated and excess).

(4) *Numerator calculation.* Add Tier 1 capital (both allocated and excess), Tier 2 capital (both allocated and excess), and Tier 3 capital (allocated under paragraph (b)(2) of this section). The resulting sum is the bank's risk-based capital ratio numerator.

Section 4. Internal Models.

(a) *General.* For risk-based capital purposes, a bank subject to this appendix must use its internal model to measure its daily VAR, in accordance with the requirements of this section.[10] The Federal Reserve may permit a bank to use alternative techniques to

[7] Foreign exchange positions outside the trading account and all over-the-counter derivative positions, whether or not in the trading account, must be included in the adjusted risk weighted assets asdetermined in appendix A of this part.

[8] A bank may not allocate Tier 3 capital to support credit risk (as calculated under appendix A of this part).

[9] Excess Tier 1 capital means Tier 1 capital that has not been allocated in paragraphs (b)(1) and (b)(2) of this section. Excess Tier 2 capital means Tier 2 capital that has not been allocated in paragraph (b)(1) and (b)(2) of this section, subject to the restrictions in paragraph (b)(3) of this section.

[10] A bank's internal model may use any generally accepted measurement techniques, such as variance-covariance models, historical simulations, or Monte Carlo simulations. However, the level of sophistication and accuracy of a bank's internal model must be commensurate with the nature and size of its covered positions. A bank that modifies its existing modeling procedures to

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measure the market risk of de minimis exposures so long as the techniques adequately measure associated market risk.

(b) *Qualitative requirements.* A bank subject to this appendix must have a risk management system that meets the following minimum qualitative requirements:

(1) The bank must have a risk control unit that reports directly to senior management and is independent from business trading units.

(2) The bank's internal risk measurement model must be integrated into the daily management process.

(3) The bank's policies and procedures must identify, and the bank must conduct, appropriate stress tests and backtests.[11] The bank's policies and procedures must identify the procedures to follow in response to the results of such tests.

(4) The bank must conduct independent reviews of its risk measurement and risk management systems at least annually.

(c) *Market risk factors.* The bank's internal model must use risk factors sufficient to measure the market risk inherent in all covered positions. The risk factors must address interest rate risk,[12] equity price risk, foreign exchange rate risk, and commodity price risk.

(d) *Quantitative requirements.* For regulatory capital purposes, VAR measures must meet the following quantitative requirements:

(1) The VAR measures must be calculated on a daily basis using a 99 percent, one-tailed confidence level with a price shock equivalent to a ten-business day movement in rates and prices. In order to calculate VAR measures based on a ten-day price shock, the bank may either calculate ten-day figures directly or convert VAR figures based on holding periods other than ten days to the equivalent of a ten-day holding period (for instance, by multiplying a one-day VAR measure by the square root of ten).

(2) The VAR measures must be based on an historical observation period (or effective observation period for a bank using a weighting scheme or other similar method) of at least one year. The bank must update data sets at least once every three months or more frequently as market conditions warrant.

(3) The VAR measures must include the risks arising from the non-linear price characteristics of options positions and the sensitivity of the market value of the positions to changes in the volatility of the underlying rates or prices. A bank with a large or complex options portfolio must measure the volatility of options positions by different maturities.

(4) The VAR measures may incorporate empirical correlations within and across risk categories, provided that the bank's process for measuring correlations is sound. In the event that the VAR measures do not incorporate empirical correlations across risk categories, then the bank must add the separate VAR measures for the four major risk categories to determine its aggregate VAR measure.

(e) *Backtesting.* (1) Beginning one year after a bank starts to comply with this appendix, a bank must conduct backtesting by comparing each of its most recent 250 business days' actual net trading profit or loss[13] with the corresponding daily VAR measures generated for internal risk measurement purposes and calibrated to a one-day holding period and a 99 percent, one-tailed confidence level.

(2) Once each quarter, the bank must identify the number of exceptions, that is, the number of business days for which the magnitude of the actual daily net trading loss, if any, exceeds the corresponding daily VAR measure.

(3) A bank must use the multiplication factor indicated in Table 1 of this appendix in determining its capital charge for market risk under section 3(a)(2)(i)(B) of this appendix until it obtains the next quarter's backtesting results, unless the Federal Reserve determines that a different adjustment or other action is appropriate.

TABLE 1—MULTIPLICATION FACTOR BASED ON RESULTS OF BACKTESTING

Number of exceptions	Multiplication factor
4 or fewer	3.00
5	3.40
6	3.50

comply with the requirements of this appendix for risk-based capital purposes should, nonetheless, continue to use the internal model it considers most appropriate in evaluating risks for other purposes.

[11] Stress tests provide information about the impact of adverse market events on a bank's covered positions. Backtests provide information about the accuracy of an internal model by comparing a bank's daily VAR measures to its corresponding daily trading profits and losses.

[12] For material exposures in the major currencies and markets, modeling techniques must capture spread risk and must incorporate enough segments of the yield curve—at least six—to capture differences in volatility and less than perfect correlation of rates along the yield curve.

[13] Actual net trading profits and losses typically include such things as realized and unrealized gains and losses on portfolio positions as well as fee income and commissions associated with trading activities.

TABLE 1—MULTIPLICATION FACTOR BASED ON RESULTS OF BACKTESTING—Continued

Number of exceptions	Multiplication factor
7	3.65
8	3.75
9	3.85
10 or more	4.00

Section 5. Specific Risk

(a) *Modeled specific risk.* A bank may use its internal model to measure specific risk. If the bank has demonstrated to the Federal Reserve that its internal model measures the specific risk, including event and default risk as well as idiosyncratic variation, of covered debt and equity positions and includes the specific risk measures in the VAR-based capital charge in section 3(a)(2)(i) of this appendix, then the bank has no specific risk add-on for purposes of section 3(a)(2)(ii) of this appendix. The model should explain the historical price variation in the trading portfolio and capture concentration, both magnitude and changes in composition. The model should also be robust to an adverse environment and have been validated through backtesting which assesses whether specific risk is being accurately captured.

(b) *Partially modeled specific risk.* (1) A bank that incorporates specific risk in its internal model but fails to demonstrate to the Federal Reserve that its internal model adequately measures all aspects of specific risk for covered debt and equity positions, including event and default risk, as provided by section 5(a), of this appendix must calculate its specific risk add-on in accordance with one of the following methods:

(i) If the model is susceptible to valid separation of the VAR measure into a specific risk portion and a general market risk portion, then the specific risk add-on is equal to the previous day's specific risk portion.

(ii) If the model does not separate the VAR measure into a specific risk portion and a general market risk portion, then the specific risk add-on is the sum of the previous day's VAR measures for subportfolios of covered debt and equity positions that contain specific risk.

(2) If a bank models the specific risk of covered debt positions but not covered equity positions (or vice versa), then the bank may determine its specific risk charge for the included positions under section 5(a) or 5(b)(1) of this appendix, as appropriate. The specific risk charge for the positions not included equals the standard specific risk capital charge under paragraph (c) of this section.

(c) *Specific risk not modeled.* If a bank does not model specific risk in accordance with section 5(a) or 5(b) of this appendix, then the bank's specific risk capital charge shall equal the standard specific risk capital charge, calculated as follows:

(1) *Covered debt positions.* (i) For purposes of this section 5, covered debt positions means fixed-rate or floating-rate debt instruments located in the trading account and instruments located in the trading account with values that react primarily to changes in interest rates, including certain non-convertible preferred stock, convertible bonds, and instruments subject to repurchase and lending agreements. Also included are derivatives (including written and purchased options) for which the underlying instrument is a covered debt instrument that is subject to a non-zero specific risk capital charge.

(A) For covered debt positions that are derivatives, a bank must risk-weight (as described in paragraph (c)(1)(iii) of this section) the market value of the effective notional amount of the underlying debt instrument or index portfolio. Swaps must be included as the notional position in the underlying debt instrument or index portfolio, with a receiving side treated as a long position and a paying side treated as a short position; and

(B) For covered debt positions that are options, whether long or short, a bank must risk-weight (as described in paragraph (c)(1)(iii) of this section) the market value of the effective notional amount of the underlying debt instrument or index multiplied by the option's delta.

(ii) A bank may net long and short covered debt positions (including derivatives) in identical debt issues or indices.

(iii) A bank must multiply the absolute value of the current market value of each net long or short covered debt position by the appropriate specific risk weighting factor indicated in Table 2 of this appendix. The specific risk capital charge component for covered debt positions is the sum of the weighted values.

TABLE 2—SPECIFIC RISK WEIGHTING FACTORS FOR COVERED DEBT POSITIONS

Category	Remaining maturity (contractual)	Weighting factor (in percent)
Government	N/A	0.00
Qualifying	6 months or less	0.25
	Over 6 months to 24 months.	1.00
	Over 24 months	1.60
Other	N/A	8.00

(A) The *government* category includes all debt instruments of central governments of OECD-based countries[14] including bonds,

[14] Organization for Economic Cooperation and Development (OECD)-based countries is defined in appendix A of this part.

Treasury bills, and other short-term instruments, as well as local currency instruments of non-OECD central governments to the extent the bank has liabilities booked in that currency.

(B) The *qualifying* category includes debt instruments of U.S. government-sponsored agencies, general obligation debt instruments issued by states and other political subdivisions of OECD-based countries, multilateral development banks, and debt instruments issued by U.S. depository institutions or OECD-banks that do not qualify as capital of the issuing institution.[15] This category also includes other debt instruments, including corporate debt and revenue instruments issued by states and other political subdivisions of OECD countries, that are:

(*1*) Rated investment-grade by at least two nationally recognized credit rating services;

(*2*) Rated investment-grade by one nationally recognized credit rating agency and not rated less than investment-grade by any other credit rating agency; or

(*3*) Unrated, but deemed to be of comparable investment quality by the reporting bank and the issuer has instruments listed on a recognized stock exchange, subject to review by the Federal Reserve.

(C) The *other* category includes debt instruments that are not included in the government or qualifying categories.

(2) *Covered equity positions.* (i) For purposes of this section 5, covered equity positions means equity instruments located in the trading account and instruments located in the trading account with values that react primarily to changes in equity prices, including voting or non-voting common stock, certain convertible bonds, and commitments to buy or sell equity instruments. Also included are derivatives (including written and purchased options) for which the underlying is a covered equity position.

(A) For covered equity positions that are derivatives, a bank must risk weight (as described in paragraph (c)(2)(iii) of this section) the market value of the effective notional amount of the underlying equity instrument or equity portfolio. Swaps must be included as the notional position in the underlying equity instrument or index portfolio, with a receiving side treated as a long position and a paying side treated as a short position; and

(B) For covered equity positions that are options, whether long or short, a bank must risk weight (as described in paragraph (c)(2)(iii) of this section) the market value of the effective notional amount of the underlying equity instrument or index multiplied by the option's delta.

[15] U.S. government-sponsored agencies, multilateral development banks, and OECD banks are defined in appendix A of this part.

(ii) A bank may net long and short covered equity positions (including derivatives) in identical equity issues or equity indices in the same market.[16]

(iii)(A) A bank must multiply the absolute value of the current market value of each net long or short covered equity position by a risk weighting factor of 8.0 percent, or by 4.0 percent if the equity is held in a portfolio that is both liquid and well-diversified.[17] For covered equity positions that are index contracts comprising a well-diversified portfolio of equity instruments, the net long or short position is multiplied by a risk weighting factor of 2.0 percent.

(B) For covered equity positions from the following futures-related arbitrage strategies, a bank may apply a 2.0 percent risk weighting factor to one side (long or short) of each position with the opposite side exempt from charge, subject to review by the Federal Reserve:

(*1*) Long and short positions in exactly the same index at different dates or in different market centers; or

(*2*) Long and short positions in index contracts at the same date in different but similar indices.

(C) For futures contracts on broadly-based indices that are matched by offsetting positions in a basket of stocks comprising the index, a bank may apply a 2.0 percent risk weighting factor to the futures and stock basket positions (long and short), provided that such trades are deliberately entered into and separately controlled, and that the basket of stocks comprises at least 90 percent of the capitalization of the index.

(iv) The specific risk capital charge component for covered equity positions is the sum of the weighted values.

[Reg. H, 61 FR 47370, Sept. 6, 1996, as amended at 62 FR 68067, Dec. 30, 1997; 64 FR 19037, 19038, Apr. 19, 1999; 65 FR 75858, Dec. 5, 2000]

[16] A bank may also net positions in depository receipts against an opposite position in the underlying equity or identical equity in different markets, provided that the bank includes the costs of conversion.

[17] A portfolio is liquid and well-diversified if: (1) It is characterized by a limited sensitivity to price changes of any single equity issue or closely related group of equity issues held in the portfolio; (2) the volatility of the portfolio's value is not dominated by the volatility of any individual equity issue or by equity issues from any single industry or economic sector; (3) it contains a large number of individual equity positions, with no single position representing a substantial portion of the portfolio's total market value; and (4) it consists mainly of issues traded on organized exchanges or in well-established over-the-counter markets.