must determine the ratio of value change (RVC). The RVC is the ratio of the cumulative sum of the periodic changes in value of one equity exposure to the cumulative sum of the periodic changes in the value of the other equity exposure. If RVC is positive, the hedge is not effective and E equals zero. If RVC is negative and greater than or equal to –1 (that is, between zero and –1), then E equals the absolute value of RVC. If RVC is negative and less than –1, then E equals 2 plus RVC.

(ii) Under the variability-reduction method of measuring effectiveness:

$$E = 1 - \frac{\sum_{t=1}^{T} \left(X_t - X_{t-1} \right)^2}{\sum_{t=1}^{T} \left(A_t - A_{t-1} \right)^2}, \text{ where}$$

(A) $X_t = A_t - B_t$;

(B) $A_t =$ the value at time t of one exposure in a hedge pair; and

(C) $B_t =$ the value at time t of the other exposure in a hedge pair.

(iii) Under the regression method of measuring effectiveness, E equals the coefficient of determination of a regression in which the change in value of one exposure in a hedge pair is the dependent variable and the change in value of the other exposure in a hedge pair is the independent variable. However, if the estimated regression coefficient is positive, then the value of E is zero.

(3) The effective portion of a hedge pair is E multiplied by the greater of the adjusted carrying values of the equity exposures forming a hedge pair.

(4) The ineffective portion of a hedge pair is (1–E) multiplied by the greater of the adjusted carrying values of the equity exposures forming a hedge pair.

§ 3.153 Internal models approach (IMA).

(a) *General*. A national bank or Federal savings association may calculate its risk-weighted asset amount for equity exposures using the IMA by modeling publicly traded and non-publicly traded equity exposures (in accordance with paragraph (c) of this section) or by modeling only publicly traded equity exposures (in accordance with paragraphs (c) and (d) of this section).

(b) *Qualifying criteria*. To qualify to use the IMA to calculate risk-weighted assets for equity exposures, a national bank or Federal savings association must receive prior written approval from the OCC. To receive such approval, the national bank or Federal savings association must demonstrate to the OCC's satisfaction that the national bank or Federal savings association meets the following criteria:

(1) The national bank or Federal savings association must have one or more models that:

(i) Assess the potential decline in value of its modeled equity exposures;

(ii) Are commensurate with the size, complexity, and composition of the national bank's or Federal savings association's modeled equity exposures; and

(iii) Adequately capture both general market risk and idiosyncratic risk.

(2) The national bank's or Federal savings association's model must produce an estimate of potential losses

for its modeled equity exposures that is no less than the estimate of potential losses produced by a VaR methodology employing a 99th percentile one-tailed confidence interval of the distribution of quarterly returns for a benchmark portfolio of equity exposures comparable to the national bank's or Federal savings association's modeled equity exposures using a long-term sample period.

(3) The number of risk factors and exposures in the sample and the data period used for quantification in the national bank's or Federal savings association's model and benchmarking exercise must be sufficient to provide confidence in the accuracy and robustness of the national bank's or Federal savings association's estimates.

(4) The national bank's or Federal savings association's model and benchmarking process must incorporate data that are relevant in representing the risk profile of the national bank's or Federal savings association's modeled equity exposures, and must include data from at least one equity market cycle containing adverse market movements relevant to the risk profile of the national bank's or Federal savings association's modeled equity exposures. In addition, the national bank's or Federal savings association's benchmarking exercise must be based on daily market prices for the benchmark portfolio. If the national bank's or Federal savings association's model uses a scenario methodology, the national bank or Federal savings association must demonstrate that the model produces a conservative estimate of potential losses on the national bank's or Federal savings association's modeled equity exposures over a relevant long-term market cycle. If the national bank or Federal savings association employs risk factor models, the national bank or Federal savings association must demonstrate through empirical analysis the appropriateness of the risk factors used.

(5) The national bank or Federal savings association must be able to demonstrate, using theoretical arguments and empirical evidence, that any proxies used in the modeling process are comparable to the national bank's or Federal savings association's modeled equity exposures and that the national bank or Federal savings association has made appropriate adjustments for differences. The national bank or Federal savings association must derive any proxies for its modeled equity exposures and benchmark portfolio using historical market data that are relevant to the national bank's or Federal savings association's modeled equity exposures and benchmark portfolio (or, where not, must use appropriately adjusted data), and such proxies must be robust estimates of the risk of the national bank's or Federal savings association's modeled equity exposures.

(c) *Risk-weighted assets calculation for a national bank or Federal savings association using the IMA for publicly traded and non-publicly traded equity exposures.* If a national bank or Federal savings association models publicly traded and non-publicly traded equity exposures, the national bank's or Federal savings association's aggregate risk-weighted asset amount for its equity exposures is equal to the sum of:

(1) The risk-weighted asset amount of each equity exposure that qualifies for a 0 percent, 20 percent, or 100 percent risk weight under § 3.152(b)(1) through (b)(3)(i) (as determined under § 3.152) and each equity exposure to an investment fund (as determined under § 3.154); and

(2) The greater of:

(i) The estimate of potential losses on the national bank's or Federal savings association's equity exposures (other than equity exposures referenced in paragraph (c)(1) of this section) generated by the national bank's or Federal savings association's internal equity exposure model multiplied by 12.5; or

(ii) The sum of:

(A) 200 percent multiplied by the aggregate adjusted carrying value of the national bank's or Federal savings association's publicly traded equity exposures that do not belong to a hedge pair, do not qualify for a 0 percent, 20 percent, or 100 percent risk weight under § 3.152(b)(1) through (b)(3)(i), and are not equity exposures to an investment fund;

(B) 200 percent multiplied by the aggregate ineffective portion of all hedge pairs; and

(C) 300 percent multiplied by the aggregate adjusted carrying value of the national bank's or Federal savings association's equity exposures that are not publicly traded, do not qualify for a 0 percent, 20 percent, or 100 percent risk weight under §3.152(b)(1) through (b)(3)(i), and are not equity exposures to an investment fund.

(d) *Risk-weighted assets calculation for a national bank or Federal savings association using the IMA only for publicly traded equity exposures.* If a national bank or Federal savings association models only publicly traded equity exposures, the national bank's or Federal savings association's aggregate risk-weighted asset amount for its equity exposures is equal to the sum of:

(1) The risk-weighted asset amount of each equity exposure that qualifies for a 0 percent, 20 percent, or 100 percent risk weight under §§3.152(b)(1) through (b)(3)(i) (as determined under §3.152), each equity exposure that qualifies for a 400 percent risk weight under §3.152(b)(5) or a 600 percent risk weight under §3.152(b)(6) (as determined under §3.152), and each equity exposure to an investment fund (as determined under §3.154); and

(2) The greater of:

(i) The estimate of potential losses on the national bank's or Federal savings association's equity exposures (other than equity exposures referenced in paragraph (d)(1) of this section) generated by the national bank's or Federal savings association's internal equity exposure model multiplied by 12.5; or

(ii) The sum of:

(A) 200 percent multiplied by the aggregate adjusted carrying value of the national bank's or Federal savings association's publicly traded equity exposures that do not belong to a hedge pair, do not qualify for a 0 percent, 20 percent, or 100 percent risk weight under §3.152(b)(1) through (b)(3)(i), and are not equity exposures to an investment fund; and

(B) 200 percent multiplied by the aggregate ineffective portion of all hedge pairs.

§3.154 Equity exposures to investment funds.

(a) *Available approaches.* (1) Unless the exposure meets the requirements for a community development equity exposure in §3.152(b)(3)(i), a national bank or Federal savings association must determine the risk-weighted asset amount of an equity exposure to an investment fund under the full look-through approach in paragraph (b) of this section, the simple modified look-through approach in paragraph (c) of this section, or the alternative modified look-through approach in paragraph (d) of this section.

(2) The risk-weighted asset amount of an equity exposure to an investment fund that meets the requirements for a community development equity exposure in §3.152(b)(3)(i) is its adjusted carrying value.

(3) If an equity exposure to an investment fund is part of a hedge pair and the national bank or Federal savings association does not use the full look-through approach, the national bank or Federal savings association may use the ineffective portion of the hedge pair as determined under §3.152(c) as the adjusted carrying value for the equity exposure to the investment fund. The risk-weighted asset amount of the effective portion of the hedge pair is equal to its adjusted carrying value.

(b) *Full look-through approach.* A national bank or Federal savings association that is able to calculate a risk-weighted asset amount for its proportional ownership share of each exposure held by the investment fund (as calculated under this subpart E of this part as if the proportional ownership share of each exposure were held directly by the national bank or Federal savings association) may either:

(1) Set the risk-weighted asset amount of the national bank's or Federal savings association's exposure to the fund equal to the product of:

(i) The aggregate risk-weighted asset amounts of the exposures held by the fund as if they were held directly by the national bank or Federal savings association; and

(ii) The national bank's or Federal savings association's proportional ownership share of the fund; or