PROCEDURES TO BE OBSERVED BY UNIVERSAL AND COMMERCIAL BANKS APPLYING FOR BANGKO SENTRAL RECOGNITION OF THEIR OWN INTERNAL MODELS FOR CALCULATING MARKET RISK CAPITAL
(Appendix to Sec. 125 on Market risk capital requirement)

A. Bank's own self-assessment

A bank intending to use its own internal Value-at-Risk (VaR) models, in lieu of the standardized approach, for calculating market risk capital charge should conduct a self-assessment of its compliance with the requirements for the use of such models as prescribed in *Appendix 42*, using the attached questionnaire in Annex A.

B. Offsite assessment by Bangko Sentral

If a bank believes that it is in compliance with the abovementioned requirements for the use of internal models, it should submit a written application to the appropriate supervising department of the Bangko Sentral, together with the following:

1. Accomplished questionnaire;

2. A listing of the products to be included in the risk models;

3. Details as of end of the preceding quarter, by each product listed above, of:
    a. The size of positions in terms of market value; and
    b. The currencies in which it is traded,

4. Organizational structure and personnel;

The bank should submit latest organizational chart showing the names, reporting lines, and responsibilities of key personnel in-charge of trading, and of functions supporting the trading operations such as risk control, back office, internal audit, etc., and those at board level to whom they report. For those responsible for trading, the bank should provide details of their relevant qualifications and experience in the area of trading. For those responsible for risk control, the bank should provide details of their relevant qualifications and experience, particularly on the use of bank's models.

The bank should also provide information on the number of staff within the risk control unit[1], their internal reporting structure, responsibilities, qualifications and experience.

5. Full technical description of the model, indicating, among others, the following:

    a. the type of VaR model used (e.g., variance-covariance matrix, historical simulation or Monte Carlo simulation);

    b. the parameters which are integral to the VaR calculations, including assumptions regarding:

        (1) confidence interval;
        (2) holding period;
        (3) length of historical data used to calculate volatility parameters;
        (4) scaling factors applied to VaR numbers to convert shorter holding periods to longer holding periods;
        (5) weighting scheme applied to historical data (e.g., giving recent observations more weight than less recent observations);
        (6) probability distribution functions of input variables to the Monte Carlo simulation model;
        (7) the frequency of input data updates (e.g., how often are historical data series updated, when are variance- covariance matrices revised, etc.);
        (8) the other models which are used as inputs to the VaR model (e.g., option pricing models, interest rate sensitivity models, etc.) and how they interface with the model; and
        (9) the frequency of VaR calculation;

    c. an outline of the VaR risk measurement calculation and processes, including, where necessary, mathematical formulae. This should also include:

        (1) the manner in which non-linear products, like options, are incorporated in the model;
        (2) the extent to which correlation is allowed both within and across risk categories (i.e., interest rates, equity prices, exchange rates); and
        (3) the means by which specific risk is addressed within the VaR framework, if appropriate, and the explanation of the techniques by which this is achieved.

6. Policies and procedures for backtesting;

    The bank should describe the methods of backtesting employed, including the treatment of intra-day trading profits and loss and fee income within the daily profit and loss figures. While the formal implementation of the Bangko Sentral prescribed backtesting program should begin on the quarter following the date of Bangko Sentral's recognition of the bank's internal model and thus implies that the formal accounting of exceptions under the Bangko Sentral prescribed backtesting program would be a year later, the bank should, at initial assessment, submit at least the latest backtesting result based on its own backtesting program, including the confidence level used in calculating the VaR numbers. The confidence level used shall dictate

the number of daily observations on which the backtesting will be applied (e.g., 250 number of observations for a ninety-nine percent (99%) confidence level, and a higher number of observations for a confidence level higher than ninety-nine percent (99%), subject to a minimum of 250 observations.

7. Policies and procedures for stress testing;

8. Internal validation reports which should include the following:

   a. the latest review of the overall risk management process by the applicant bank's internal auditors; and
   b. the latest validation of the formulae used in the calculation process, as well as for the pricing of options and other complex instruments by a qualified unit which is independent from the trading area; and

9. Validation reports of external auditor.

   The bank should stand ready to make a presentation to the Bangko Sentral on its compliance with the abovementioned requirements for the use of internal models.

C. On-site assessment by Bangko Sentral

The Bangko Sentral shall conduct an on-site assessment of the models to review both the technical details of the models and the risk management practices that govern their use.

During the on-site assessment, the bank should give a brief demonstration of how its models work. The demonstration should cover the following:

1. how model inputs are fed into the system including extent of manual inputs;
2. how VaR numbers are calculated;
3. how results are generated and interpreted;
4. accuracy in terms of back testing results;
5. stress testing capability;
6. use of model outputs in risk management; and
7. limitations of the model.

The onsite assessment shall also include interview with the concerned officers and personnel of the bank.

D. Assessment on an ongoing basis by the Bangko Sentral.

After initial recognition of the models by the Bangko Sentral, the bank should inform the Bangko Sentral of any material change to the models, including change in the methodology or scope to cover new products and instruments. The Bangko Sentral shall determine whether the models remain acceptable for calculating the market risk capital charge.

The Bangko Sentral shall likewise conduct a periodic assessment of the models and the controls surrounding the models at least annually to ensure that they remain compliant with the minimum qualitative and quantitative requirements prescribed under *Appendix 42* on an ongoing basis. Non-compliance with the minimum requirements shall be ground for disallowing the use of such models.

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Annex A

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(Name of Bank)

COMPLIANCE WITH THE REQUIREMENTS FOR THE USE OF INTERNAL MODELS

Criteria	Yes	No	Bank's Explanations[2]
I. General Criteria			
1. Is the bank's risk management system conceptually sound and implemented with integrity?			
2. Does the bank have sufficient number of staff skilled in the use of sophisticated models not only in the trading area but also in the risk control, audit, and if necessary, back office area?			
3. Do the bank's models have a proven track record of reasonable accuracy in measuring risk?			
4. Does the bank conduct stress tests along the lines discussed in Item V below?			
II. Qualitative Standards			
1. Does the bank have an independent risk control unit that is responsible for the design and implementation of the bank's risk management system?			

– Does the unit produce and analyze daily reports on the output of the bank's risk measurement model, including an evaluation of the relationship between measures of risk exposure and trading limits?			(Cite examples of reports produced by the unit and indicate what time of day these reports are calculated.)
– Is the unit independent from business trading units?			
• Does the unit report directly to senior management of the bank?			
2. Does the risk control unit conduct a regular backtesting program, i.e., an expost comparison of the risk measure generated by the model against actual daily changes in portfolio value over longer periods of time, as well as hypothetical changes based on static positions?			
3. Does the risk control unit conduct a regular backtesting program, i.e., an expost comparison of the risk measure generated by the model against actual daily changes in portfolio value over longer periods of time, as well as hypothetical changes based on static positions?			
4. Are the board of directors (or equivalent management committee in the case of Philippine branches of foreign banks) and senior management actively involved in the risk control process?			
5. Are the board of directors (or equivalent management committee in the case of Philippine branches of foreign banks) and senior management actively involved in the risk control process?			
• Do the board of directors (or equivalent management committee in the case of Philippine branches of foreign banks) and senior management regard risk control as an essential aspect of the business to which significant resources need to be devoted?			
• Are daily reports prepared by the independent risk control unit reviewed by a level of management with sufficient seniority and authority to enforce both reductions of positions taken by individual traders and reductions in the bank's overall risk exposure?			

6. Is the bank's internal risk measurement model closely integrated into the day-to-day risk management process of the bank?			
– Is the output of the internal risk measurement model accordingly an integral part of the process of planning, monitoring and controlling the bank's market risk profile?			
7. Is the risk measurement system used in conjunction with internal trading and exposure limits?			
– Are trading limits related to the bank's risk measurement model in a manner that is consistent over time and that is well-understood by both traders and senior management?			
8. Is a routine and rigorous program of stress testing in place as a supplement to the risk analysis based on day-to-day output of the bank's risk measurement model?			
– Are the results of stress testing exercises reviewed periodically by senior management and reflected in the policies and limits set by management and the board of directors (or equivalent management committee in the case of Philippine branches of foreign banks)?			
– Where stress tests reveal particular vulnerability to a given set of circumstances, are prompt steps taken to manage those risks appropriately (e.g., by hedging against that outcome or reducing the size of the bank's exposures)?			
9. Does the bank have a routine in place for ensuring compliance with a documented set of internal policies, controls and procedures concerning the operation of the risk measurement system?			
– Is the bank's risk measurement system well documented, i.e. through a risk management manual that describes the basic principles of the risk management system and that provides an explanation of the empirical techniques used to measure market risk?			
10. Is an independent review of the risk measurement system carried out regularly in the bank's own internal auditing process?			

– Does this review include both the activities of the business trading units and of the independent risk control unit?			
– Does the review of the overall risk management process take place at regular intervals (ideally not less than once a year)?			
– Does the review address the following:			
– the adequacy of the documentation of the risk management system and process?			
– the organization of the risk control unit?			
– the integration of market risk measures into daily risk management?			
– the approval process for risk pricing models and valuation systems used by front and back- office personnel?			
– the validation of any significant change in the risk measurement process?			
– the scope of market risks captured by the risk measurement model?			
– the integrity of the management information system?			
– the accuracy and completeness of position data?			
– the verification of the consistency, timeliness and reliability of data sources used to run internal models, including the independence of such data sources?			
– the accuracy and appropriateness of volatility and correlation assumptions?			
– the accuracy of valuation and risk transformation calculations?			
– the verification of the model's accuracy through frequent backtesting as discussed In Item II.2 above?			
III. Specification of Market Risk Factors			
A. Interest Rates			
Is there a set of risk factors corresponding to interest rates in each currency in which the bank has interest rate-sensitive on- or off-balance sheet positions?			

1. Does the risk measurement system model the yield curve using one (1) of a number of generally accepted approaches, e.g., by estimating forward rates of zero coupon yields?			
2. Is the yield curve divided into various maturity segments in order to capture variation in the volatility of rates along the yield curve, with one (1) risk factor corresponding to each maturity segment?			
3. For material exposures to interest rate movements in the major currencies and markets, does the bank model the yield curve using a minimum of six (6) risk factors?			
4. Does the risk measurement system incorporate separate risk factors to capture spread risk (e.g., between bonds and swaps)?			
B. Equity Prices			
1. Are there risk factors corresponding to each of the equity markets in which the bank holds significant positions?			
• Is there, at a minimum, a risk factor that is designed to capture market-wide movements in equity prices (e.g., a market index)?			
2. Does the sophistication and nature of the modeling technique for a given market correspond to the bank's exposure to the overall market as well as its concentration in individual equity issues in that market?			
C. Exchange Rates			
Does the risk measurement system incorporate risk factors corresponding to the individual foreign currencies in which the bank's positions are denominated, i.e., are there risk factors corresponding to the exchange rate between the Philippine peso and each foreign currency in which the bank has a significant exposure?			
IV. Quantitative Standards			
1. Is "Value-at-risk" (VaR) computed on a daily basis?			
2. Is a 99th percentile, one-tailed confidence interval used?			
3. Is an instantaneous price shock equivalent to a ten (10) day movement in prices used, i.e., is the minimum "holding period" ten (10) trading days?			

• If VaR numbers are calculated according to a shorter holding period, is this scaled up to ten (10) days by the square root of time?			
4. Is the historical observation period (sample period) at least one (1) year?			
If a weighting scheme or other methods for the historical observation period are used, is the "effective" observation period at least one year (that is, the weighted average time lag of the individual observations is not less than six (6) months)?			
5. Are data sets updated no less frequently than once every three (3) months?			
• Are data sets reassessed whenever market prices are subject to material changes?			
6. For banks with option transactions			
• Does the bank's model capture the non-linear price characteristics of options positions?			
• Is a ten (10)-day price shock applied to options positions or positions that display option-like characteristics?			
• Does the bank's risk measurement system have a set of risk factors that captures the volatilities of the rates and prices underlying option positions, i.e., vega risk?			
• For banks with relatively large and/or complex options portfolios, does the bank have detailed specifications of the relevant options volatilities, i.e., does the bank measure the volatilities of options positions broken down by different maturities?			
V. Stress Testing			
1. Does the bank have a rigorous and comprehensive stress-testing program in place?			
2. Do the bank's stress scenarios cover a range of factors that can create extraordinary losses or gains in trading portfolios, or to make the control of risks in those portfolios very difficult, e.g., low-probability events in all major types of risks, including the various components of market, credit, and operational risks?			

• Do the stress scenarios shed light on the impact of such events on positions that display both linear and non-linear price characteristics (i.e. options and instruments that have options-like characteristics)?			
3. Are the bank's stress tests both of a qualitative and quantitative nature, incorporating both market risk and liquidity aspect of market disturbances?			
• Do quantitative criteria identify plausible stress scenarios to which banks could be exposed?			
4. Are the results of stress testing reviewed periodically by senior management?			
• Are the results of stress testing reflected in the policies and limits set out by management and the board of directors (or equivalent management committee in the case of Philippine branches of foreign banks)?			
• If the bank's testing reveals particular vulnerability to a given set of circumstances, does the bank take prompt steps to manage those risks appropriately (e.g., by hedging against the outcome or reducing the size of its exposures)?			
VI. External Validation			
Is the model accuracy validated by external auditor?			
• If yes, does the validation include –			
– Verification of the internal auditors' report on their review of the bank's overall risk management process?			
– Ensuring that the formula used in the calculation process, as well as for pricing of options and other complex instruments, are validated by a qualified unit, which is independent from the trading area?			
– Checking the adequacy of the structure of the internal models with respect to the bank's activities?			
– Checking the results of the backtesting to ensure that the internal model provides a reliable measure of potential loss over time?			

– Ensuring the transparency and accessibility of the data flows and processes associated with the risk measurement system?			

Footnotes

1. Referring generally to the risk management group functions in the BAP Financial Markets Risk Reference Manual.

2. The questions in this checklist may already be addressed by other materials submitted by the Bank. In such cases, please indicate in this column the appropriate reference document.