GUIDELINES TO INCORPORATE MARKET RISK IN THE RISK-BASED CAPITAL ADEQUACY FRAMEWORK

(Appendix to Section 125)

Introduction

1. These guidelines describe the approach to be used by the Bangko Sentral to determine the minimum level of capital to be held by a bank against its market risk. The guidelines are broadly consistent with the recommendations of the Basel Committee on Banking Supervision in a document entitled "Amendment to the Capital Accord to Incorporate Market Risks" issued in January 1996.

2. Under these guidelines, banks shall be required to measure and apply capital charges against their market risk, in addition to their credit risk.

3. Market risk is defined as the risk of losses in on- and off-balance sheet positions arising from movements in market prices. The risks addressed by these guidelines are:

   – the risks pertaining to *interest rate-related instruments* and *equities* in the trading book; and
   – *Foreign exchange risk* throughout the bank.

Coverage of capital requirement for market risk

4. The capital requirement for market risk shall apply to all UBs and KBs.

5. The minimum CAR covering combined credit risk and market risk shall apply to banks which are subject to market risk capital requirement on both solo basis (i.e., head office plus branches) and consolidated basis (i.e., parent bank plus subsidiary financial allied undertakings, but excluding insurance companies).

Methods of measuring market risk

6. There are two (2) alternative methods recognized for the measurement of market risk, as follows:

   (a) The *standardized approach* shall be used by all banks which are subject to market risk capital requirement, except by those which may be allowed by Bangko Sentral to use the alternative method described in paragraph (b) below. The method of measuring market risk under the standardized approach is set out in the Instructions for Accomplishing the Report on

Computation of the Adjusted Risk- Based Capital Adequacy Ratio Covering Combined Credit Risk and Market Risk.

(b) The *internal models approach* allows banks with the necessary system to use their own internal risk management models to calculate market risk. The use of this approach is subject to prior Bangko Sentral approval. Approval shall be based on meeting certain qualitative and quantitative conditions relating to the models themselves and the controls surrounding them, as set out in *Annex "A"*. Banks may on a transitional basis be allowed to use a combination of the standardized approach and the models approach to measure their market risk, provided any such "partial" model shall cover a complete risk category (e.g., interest rate risk or foreign exchange risk). The reporting under the internal models approach is contained in the Instructions for Accomplishing the Report on Computation of the Adjusted Risk-Based Capital Adequacy Ratio Covering Combined Credit Risk and Market Risk.

Calculation of the capital adequacy ratio (CAR)

7. The adjusted CAR covering combined credit risk and market risk shall be calculated using the qualifying capital expressed as a percentage of the total risk- weighted assets (including credit risk and market risk-weighted assets). The components of this calculation are as follows:

   – *Market risk-weighted assets* are the sum of the capital charges for all market risk categories calculated using either the standardized approach or the internal models approach [multiplied by 125% for those calculated using the standardized methodology to be consistent with the higher capital charge for credit risk, i.e., ten percent (10%) as opposed to BIS recommended eight percent (8%)] multiplied by 10. (The multiplier 10 is the reciprocal of the Bangko Sentral required minimum capital adequacy ratio for credit risk of ten percent (10%). The effect is to convert the sum of the market risk capital charges into a risk-weighted assets equivalent which can then be directly added to the total credit risk-weighted assets.)

   – *In calculating the capital charge for foreign exchange exposures*, the net open position for non-deliverable forwards (NDFs) shall be multiplied by 187.5% in lieu of the 125% factor referred to above starting 01 January 2012.

   – *Credit risk–weighted assets* is the total risk weighted assets calculated in accordance with applicable and existing capital adequacy framework, less the part calculated for on-balance sheet debt securities and equities in the trading book. (The credit risk-weighted assets for on-balance sheet debt securities and equities are deducted because they represent an element now covered by the market risk capital charge); and

– *Qualifying capital* is the same as that calculated in accordance with applicable and existing capital adequacy framework.

8. Banks shall maintain a minimum adjusted risk-based CAR covering combined credit risk and market risk of ten percent (10%) calculated in this manner on solo basis and on consolidated basis.
   The trading book

The trading book

9. A key feature of the market risk framework is the definition of the trading book of a bank. This is set out in the Instructions for Accomplishing the Report on Computation of the Adjusted Risk-Based Capital Adequacy Ratio Covering Combined Credit Risk and Market Risk. Banks are expected to adopt a consistent approach to allocating transactions into their trading and non-trading (i.e., banking book), and clear audit trail for this purpose should be created at the time each transaction is entered into. The Bangko Sentral shall monitor banks' practices to ensure that there is no abusive switching between different books to inappropriately reduce capital charges.

Required reports

10. Banks shall submit quarterly reports of their adjusted risk-based CARs covering combined credit risk and market risk on solo basis and on consolidated basis to the appropriate supervising department of the Bangko Sentral in accordance with the prescribed forms within fifteen (15) banking days and thirty (30) banking days after the end of reference quarter for solo report and consolidated report, respectively. These reports shall be in addition to the reports on risk-based CAR covering credit risk required to be submitted in applicable and existing capital adequacy framework.

11. One (1) of three (3) alternative report forms prescribed, shall be used depending on the complexity of the bank's operations, to wit:

    (a) For UBs/KBs with expanded derivatives authority;
    (b) For UBs/KBs with expanded derivatives authority but without option transactions; or
    (c) For UBs/KBs without expanded derivatives authority.

12. The abovementioned reports shall be classified as Category A-2 Reports.

(Circular Nos. 890 dated 02 November 2015 and 827 dated 28 February 2014)

Annex A

REQUIREMENTS FOR THE USE OF INTERNAL MODELS TO MEASURE MARKET RISK

I. General Criteria

1. The use of internal models shall be conditional upon the explicit prior approval of the Bangko Sentral.

2. The Bangko Sentral will only give approval if at a minimum:

   – It is satisfied that the bank's risk management system is conceptually sound and is implemented with integrity;
   – The bank has in the Bangko Sentral's view 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 areas;
   – The bank's models have in the Bangko Sentral's judgment a proven track record of reasonable accuracy in measuring risk; and
   – The bank regularly conducts stress tests along the lines discussed in Part V below.

3. The Bangko Sentral may require a period of initial monitoring and live testing of a bank's internal model before it is used for supervisory capital purposes.

4. In addition to these general criteria, banks using internal models for capital purposes shall be subject to the requirements detailed in Parts II to VII below.

II. Qualitative Standards

5. Banks using internal models must have market risk management systems that are conceptually sound and implemented with integrity. Accordingly, a number of qualitative criteria that banks would have to meet before they are permitted to use a model-based approach are specified in paragraph 6 below. The extent to which banks meet the qualitative criteria may influence the level at which the Bangko Sentral will set the multiplication factor referred to in Part IV, paragraph 8(j) below. Only those banks whose models are in full compliance with the qualitative criteria as listed in this section will be eligible for application of the minimum multiplication factor.

6. The qualitative criteria are:

(a) The bank should have an independent risk control unit that is responsible for the design and implementation of the bank's risk management system. The unit should 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. This unit must be independent from business trading units and should report directly to senior management of the bank.

(b) The unit should conduct a regular backtesting program, i.e. an ex-post 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.

(c) The board of directors (or equivalent management committee in the case of Philippine branches of foreign banks) and senior management should be actively involved in the risk control process and must regard risk control as an essential aspect of the business to which significant resources need to be devoted. In this regard, the daily reports prepared by the independent risk control unit must be 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.

(d) The bank's internal risk measurement model must be closely integrated into the day-to- day risk management process of the bank. Its output should accordingly be an integral part of the process of planning, monitoring and controlling the bank's market risk profile.

(e) The risk measurement system should be used in conjunction with internal trading and exposure limits. In this regard, trading limits should be 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.

(f) A routine and rigorous program of stress testing should be in place as a supplement to the risk analysis based on day-to-day output of the bank's risk measurement model. The results of stress testing exercises should be reviewed periodically by senior management and should be 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, prompt steps should be taken to manage those risks appropriately (e.g., by hedging against that outcome or reducing the size of the bank's exposures).

(g) Banks should 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. The bank's risk measurement system must be well documented, for example, 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.

(h) An independent review of the risk measurement system should be carried out regularly in the bank's own internal auditing process. This review should include both the activities of the business trading units and of the independent risk control unit. A review of the overall risk management process should take place at regular intervals (ideally not less than once a year) and should specifically address, at a minimum:

– 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; and
– the verification of the model's accuracy through frequent backtesting as described in paragraph (b) above.

III. Specification of Market Risk Factors

7. A bank's internal market risk measurement system must specify an appropriate set of market risk factors, i.e., the market rates and prices that affect the value of the bank's trading positions. The risk factors contained in a market risk measurement system should be sufficient to capture the risks inherent in the bank's portfolio of on-and off- balance sheet trading positions. Although banks will have some discretion in specifying the risk factors for their internal models, the following guidelines should be fulfilled:

(a) For interest rates, there must be 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.

– The risk measurement system should model the yield curve using one (1) of a number of

generally accepted approaches, for example, by estimating forward rates of zero coupon yields. The yield curve should be divided into various maturity segments in order to capture variation in the volatility of rates along the yield curve; there will typically be one (1) risk factor corresponding to each maturity segment. For material exposures to interest rate movements in the major currencies and markets, banks must model the yield curve using a minimum of six (6) risk factors. However, the number of risk factors used should ultimately be driven by the nature of the bank's trading strategies. For instance, a bank with a portfolio of various types of securities across many points of the yield curve and that engages in complex arbitrage strategies would require a greater number of risk factors to capture interest rate risk accurately; and

– The risk measurement system must incorporate separate risk factors to capture spread risk (e.g., between bonds and swaps). A variety of approaches may be used to capture the spread risk arising from less than perfectly correlated movements between government and other fixed-income interest rates, such as specifying a completely separate yield curve for non- government fixed-income instruments (for instance, swaps or local government unit securities) or estimating the spread over government rates at various points along the yield curve.

(b) For equity prices, there should be risk factors corresponding to each of the equity markets in which the bank holds significant positions.

– At a minimum, there should be a risk factor that is designed to capture market-wide movements in equity prices (e.g., a market index). Positions in individual securities or in sector indices could be expressed in "beta- equivalents" relative to this market-wide index;

– A somewhat more detailed approach would be to have risk factors corresponding to various sectors of the overall equity market (for instance, industry sectors or cyclical and non-cyclical sectors). As above, positions in individual stocks within each sector could be expressed in beta-equivalents relative to the sector index; and

– The most extensive approach would be to have risk factors corresponding to the volatility of individual equity issues.

– The sophistication and nature of the modeling technique for a given market should correspond to the bank's exposure to the overall market as well as its concentration in individual equity issues in that market.

(c) For exchange rates, the risk measurement system should incorporate risk factors corresponding to the individual foreign currencies in which the bank's positions are denominated. Since the value-at-risk (VaR) figure calculated by the risk measurement system will be expressed in Philippine peso, any net position denominated in a foreign currency will introduce a foreign exchange risk. Thus, there must be 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

8. Banks will have flexibility in devising the precise nature of their models, but the following minimum standards shall apply for the purpose of calculating their capital charge:

(a) *"Value-at-risk"* (VaR) must be computed on a daily basis.

(b) In calculating VaR, a 99th percentile, one-tailed *confidence interval* is to be used.

(c) In calculating VaR, an instantaneous price shock equivalent to a 10-day movement in prices is to be used, i.e., the minimum "*holding period*" will be ten (10) trading days. Banks may use VaR numbers calculated according to shorter holding periods scaled up to ten (10) days by the square root of time. (For the treatment of options, also see paragraph (h) below.)

(d) The choice of *historical observation period* (sample period) for calculating VaR will be constrained to a minimum length of one (1) year. For banks that use a weighting scheme or other methods for the historical observation period, the "effective" observation period must be at least one (1) year (that is, the weighted average time lag of the individual observations cannot be less than six (6) months).

(e) Banks should update their data sets no less frequently than once every three (3) months and should also reassess them whenever market prices are subject to material changes. The Bangko Sentral may also require a bank to calculate its VaR using a shorter observation period' if in the Bangko Sentral's judgment, this is justified by a significant upsurge in price volatility.

(f) No particular *type of model* is prescribed. So long as each model used captures all the material risks run by the bank, as set out in Part III, banks will be free to use models based, for example on variance- covariance matrices, historical simulations, or Monte Carlo simulations.

(g) Banks will have discretion to recognize empirical *correlations* within broad risk categories

(e.g., interest rates, exchange rates and equity prices, including related options volatilities in each risk factor category). The Bangko Sentral may also recognize empirical correlations across broad risk factor categories, provided that the Bangko Sentral is satisfied that the bank's system for measuring correlations is sound and implemented with integrity.

(h) For banks with option transactions, banks' models must accurately capture the unique risks associated with options within each of the broad risk categories. The following criteria apply to the measurement of options risk:

– Banks' models must capture the *non-linear price characteristics* of options positions;

– Banks are expected to ultimately move towards the application of a full 10-day price shock to options positions or positions that display option-like characteristics. In the interim, the Bangko Sentral may require banks to adjust their capital measure for options risk through other methods, e.g., periodic simulations or stress testing; and

– Each bank's risk measurement system must have a set of risk factors that captures the *volatilities of the rates* and prices underlying option positions, i.e., *vega* risk. Banks with relatively large and/or complex options portfolios should have detailed specifications of the relevant volatilities. This means that banks should measure the volatilities of options positions broken down by different maturities.

(i) Each bank must meet, on a daily basis, a *capital requirement* expressed as the higher of (i) last trading day's VaR number or (ii) an average of the daily VaR measures on each of the preceding sixty (60) trading days (both measured according to the parameters specified in this section) multiplied by a multiplication factor.

(j) The *multiplication factor* shall be set by the Bangko Sentral on the basis of its assessment of the quality of the bank's risk management system subject to an absolute minimum of three (3). Banks will be required to add to this factor a "plus" directly related to the ex-post performance of the model (to be determined on a quarterly basis), thereby introducing a built-in positive incentive to maintain the predictive quality of the model. The plus will range from 0 to 1 based on the number of backtesting exceptions (i.e., the number of times that actual/ hypothetical loss exceeds the VaR measure) for the past 250 trading days of the reference quarter-end as set out in Table 5 of the Instructions for Accomplishing the Report on Computation of the Adjusted Risk- Based Capital Adequacy Ratio Covering Combined Credit Risk and Market Risk. (Table 3 for banks with expanded derivatives authority but without option transactions, and banks without expanded derivatives authority.)

(k) Banks using models will be subject to a separate capital charge to cover the *specific risk* of interest rate- related instruments and equity securities as defined in the standardized approach to the extent that this risk is not incorporated into their models. However, for banks using models, the total specific risk charge applied to interest rate- related instruments or to equities should in no case be less than half the specific risk charges calculated according to the standardized methodology.

V. Stress Testing

9. Banks using internal models for measuring market risk capital requirements must have in place a rigorous and comprehensive stress testing program. Stress testing to identify events or influences that could greatly impact banks is a key component of a bank's assessment of its capital position.

10. Banks' stress scenarios should 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. These factors include low-probability events in all major types of risks, including the various components of market, credit, and operational risks. Stress scenarios should 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).

11. Banks' stress tests should be both of a qualitative and quantitative nature, incorporating both market risk and liquidity aspects of market disturbances. Quantitative criteria should identify plausible stress scenarios to which banks could be exposed. Qualitative criteria should emphasize that two (2) major goals of stress testing are to evaluate the capacity of the bank's capital to absorb potential large losses and to identify steps the bank can take to reduce its risk and conserve capital. This assessment should be integral to setting and evaluating the bank's management strategy and the results of stress testing should be regularly reported to senior management and, periodically, to the board of directors (or equivalent management committee in the case of Philippine branches of foreign banks).

12. Banks should combine the use of supervisory stress scenarios with stress tests developed by banks themselves to reflect their specific risk characteristics. Specifically, the Bangko Sentral may ask banks to provide information on stress testing in the following three (3) broad areas:

(a) Supervisory scenarios requiring no simulation by the bank. Banks should provide the Bangko Sentralinformation on the largest losses experienced during the reference quarter. This loss information could be compared to the level of capital that results from a bank's internal measurement system. For example, it could provide Bangko Sentral with a picture of how

many days of peak day losses would have been covered by a given VaR estimate.

(b) Scenarios requiring a simulation by the bank. Banks should subject their portfolios to a series of simulated stress scenarios and provide Bangko Sentral with the results. These scenarios could include testing the current portfolio against past periods of significant disturbance, for example, the early 80's banking crisis or the 1997 Asian financial crisis, incorporating both the large price movements and the sharp reduction in liquidity associated with these events. A second type of scenario would evaluate the sensitivity of the bank's market risk exposure to changes in the assumptions about volatilities and correlations. Applying this test would require an evaluation of the historical range of variation for volatilities and correlations and evaluation of the bank's current positions against the extreme values of the historical range. Due consideration should be given to the sharp variation that at times has occurred in a matter of days in periods of significant market disturbance.

(c) Scenarios developed by the bank itself to capture the specific characteristics of its portfolio. A bank should also develop its own stress test which it identifies as most adverse based on the characteristics of its portfolio. It should provide the Bangko Sentral with a description of the methodology used to identify and carry out the scenarios, as well as with the description of the results derived from these scenarios.

The results should be reviewed periodically by senior management and should be 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). Moreover, if a bank's testing reveals particular vulnerability to a given set of circumstances, the Bangko Sentral would expect the bank to take prompt steps to manage those risks appropriately (e.g., by hedging against that outcome or reducing the size of its exposures).

VI. External Validation

13. The validation of models' accuracy by external auditors and the Bangko Sentral should at a minimum include the following steps:

(a) Verify that the *internal validation* processes described in Part II, paragraph 6 (h) are operating in a satisfactory manner;

(b) Ensure that the *formulae* used in the calculation process, as well as for the pricing of options and other complex instruments, are validated by a qualified unit, which in all cases should be independent from the trading area;

(c) Check that the *structure* of internal models is adequate with respect to the bank's activities and geographical coverage;

(d) Check the results of the bank's *backtesting* of its internal measurement system (i.e., comparing VaR estimates with actual profits and losses) to ensure that the model provides a reliable measure of potential losses over time. This means that banks should make the results, as well as the underlying inputs to their VaR calculation, available to the Bangko Sentral and/or external auditors on request; and

(e) Make sure that data flows and processes associated with the risk measurement system are *transparent and accessible*. In particular, it is necessary that auditors or the Bangko Sentral is in a position to have easy access, whenever they judge it necessary and under appropriate procedures, to the models' specifications and parameters.

VII. Combination of Internal Models and the Standardized Methodology

14. Unless a bank's exposure to a particular risk factor is insignificant, the internal models approach will require banks to have an integrated risk measurement system that captures the broad risk factor categories (i.e., interest rates, exchange rates and equity prices, with related option volatilities being included in each risk factor category). A bank which has developed one or more models will no longer be able to revert to measuring the risk measured by those models according to the standardized methodology (unless the Bangko Sentral withdraws approval for that model).

15. The following conditions will apply to banks using such combinations:

(a) Each broad risk factor category must be assessed using a single approach (either internal models or the standardized approach), i.e., no combination of the two (2) methods will be permitted within a risk category or across banks' different entities for the same type of risk;

(b) All the criteria laid down in this Annex will apply to the models being used;

(c) Banks may not modify the combination of the two (2) approaches they use without justifying to the Bangko Sentral that they have a good reason for doing so;

(d) No element of market risk may escape measurement, i.e., the exposure for all the various risk factors, whether calculated according to the standardized approach or internal models, would have to be captured; and

(e) The capital charges assessed under the standardized approach and under the models approach are to be aggregated according to the simple sum method.