COMMUNIQUÉ ON THE CALCULATION OF MARKET RISK BY RISK MEASUREMENT MODELS AND ASSESSMENT OF RISK MEASUREMENT MODEL

SECTION ONE
Purpose, Scope, Grounds, Definitions, and Permission

Purpose and Scope:

ARTICLE 1 – (1) The purpose of this Communiqué is to set down standards of internal models to be used by banks for calculation of market risk, as well as the procedures and principles relating to assessment of internal models and calculation of market risk by internal models.

Grounds:

ARTICLE 2 – (1) This Communiqué is issued by virtue of and in reliance upon articles 43, 45 and 93 of the Banking Law no. 5411 dated 19/10/2005, and fourth paragraph of article 9 of the Regulation on Measurement and Assessment of Capital Adequacy of Banks.

Definitions:

ARTICLE 3 – (1) The terms used in this Communiqué shall have the meanings designated to them below;
:

     a) Bank: Banks defined in article 3 of the Banking Law no. 5411;

     b) Basis risk: The probability of loss arising out of negative effects on the bank's net interest revenues or economic value of the increase or decrease of one of the different interest rates used as a base in bilateral or multilateral transactions of the bank as regards the other interest rates;

     c) Back-testing: Test applied by banks in order to measure the accuracy and performance of their internal models;

     ç) Incremental risk: The probable risk exposure arising out of default of issuer or change of creditworthiness of financial instruments tracked in trading books, except for securitization positions;

     d) Agency: Banking Regulation and Supervision Agency;

     e) Liquidity Horizon: The time during which a position may be disposed of without being exposed to a material price risk;

f) Event Risk: The probable loss that may be caused by unforeseeable changes in risk factors which may affect the portfolio value;

g) Value at Risk: Value estimated by various numerical methods and expressing within a certain period and at a certain probability level the highest loss that may be exposed to by a portfolio or asset held, as a result of probable changes due to fluctuations in interest rates, foreign exchange rates, commodity prices and share prices;

ğ) Number of Deviations: The number of events when the daily loss occurring in portfolio value as a result of probable changes due to fluctuations in interest rates, foreign exchange rates, commodity prices and share prices in a specific period exceeds the daily value at risk estimated by the bank's internal model as a result of a comparison there between;

h) Stress Value at Risk: The value at risk of the existing portfolio of the bank calculated by calibration to the bank's portfolio of historical data of the inputs of value at risk model relating to a material financial stress period of one year under the assumptions of a holding period of ten days and a unilateral confidence interval of ninety-nine percent;

ı) Stress Test: All of the techniques used for analysis of effects of the unexpected market developments on the portfolio value;

i) Regulation Regulation on Measurement and Assessment of Capital Adequacy of Banks.

Permission:

ARTICLE 4 – (1) Banks are required to receive a permission from the Agency in order to calculate any one or some or all of their capital requirements relating to general market risk, specific risk, foreign exchange risk and commodity risk as a part of the amount subject to market risk by using internal model rather than standardized approach. Permission is given as a model permission covering all risks or as a model permission covering only some certain risk types and a partial permission of use for use of standardized approach for the risk types uncovered by the model.

SECTION TWO
Criteria for Using Internal Model for Market Risk

Approval for Market Risk Internal Models:

ARTICLE 5 – (1) In the use of an internal model for market risk components except specific risk, the following general criteria are sought;

a) It is satisfied that the bank's risk management system is conceptually sound and is implemented with integrity,

b) The bank should have sufficient numbers 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,

c) The bank's models should have a proven historical record of reasonable accuracy in measuring risk,

ç) The bank should regularly conduct stress tests according to Article 10.

(2) In the approval process, to evaluate the effect of internal model on capital adequacy and usability of internal model, Board has right to require a parallel reporting period while the bank calculates capital adequacy with standardized period and reports both of standardized and internal model results.

(3) Banks using internal models for capital purposes are subject to the requirements in following articles.

Qualitative Standards:

ARTICLE 6 – (1) To be permitted to use a models-based approach qualitative criteria on risk management should be met. Nevertheless, if there are some deficiencies that do not prevent the permission, Board has right to increase the multiplication factor in Article 9 to compensate the risks that are result of those deficiencies. The qualitative criteria on risk management include:

a) The bank should have a risk management unit that must be independent of executive units and be directly reporting to board of directors, and 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.

b) The unit should conduct a regular back-testing programme, which includes 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 unit should also conduct the initial and on-going validation of the internal model.

ç) Board of directors and senior management should be actively involved in the risk management process and must regard risk management 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 management 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 programme of stress testing should be in place as a supplement to the risk analysis based on the day-to-day output of the bank's risk measurement model. The results of stress testing should be reviewed periodically by senior management, used in the internal assessment of capital adequacy, and reflected in the policies and limits set by management and the board of directors. Where stress tests reveal particular vulnerability to a given set of circumstances, prompt steps should be taken to manage those risks appropriately by hedging against that outcome or reducing the size of the bank's exposures, or increasing capital.

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 through a risk management manual or any other written document that describes the basic principles of the risk management system and that provides an explanation of the empirical techniques used to measure market risk.

ğ) As a part of internal audit system of the bank intending to use the model, internal audit unit must regularly audit the risk management process at least once a year, and the audit issues must, together with frequency of audit, be incorporated in policies and implementation procedures for internal audit activities. The audit must contain at least the following issues:
1) The adequacy of the documentation of the risk management system and process, and the organization of risk management unit,
2) The integration of market risk measures into daily risk management and reliability of management information system,
3) The approval process for risk pricing models and valuation systems used by front and back-office personnel,
4) The scope of market risks captured by the risk measurement model and the validation of any significant change in the risk measurement process,
5) The accuracy and completeness of position data; the accuracy and appropriateness of volatility and correlation assumptions; and the accuracy of valuation and risk transformation calculations,
6) Control and validation processes used for assessment of independence, consistency and reliability of data sources used in internal models, and for assessment of timely accessibility of data; and
7) The verification and control of the model's accuracy through frequent back-testing that are used in validating the models.

Standards on Specification of Market Risk Factors:

ARTICLE 7 – (1) An important part of a bank's internal market risk measurement system is the specification of 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.

(2) While specifying the risk factors for their internal models, the following rules should be fulfilled:

a) Factors that are deemed relevant for pricing should be included as risk factors in the value-at-risk model. Where a risk factor is incorporated in a pricing model but not in the value-at-risk model, the bank must justify this omission to the satisfaction of Agency. In addition, the value-at-risk model must capture nonlinearities for options and other relevant products, as well as correlation risk and basis risk. Moreover, Agency has to be satisfied that proxies are used which show a good track record for the actual position held.

b) As for the interest rate risk, risk measurement system is required to cover basic risk factors relating to on-balance sheet or off-balance sheet positions sensitive to interest rate of the bank for each currency. In this context;
1) Banks model the yield curves by using any one of the generally accepted approaches. For certain currencies and markets that are subject to material interest rate risk, yield curve is separated into minimum six maturity bands for the purpose of reflection of changes in volatility of interest rates. For those currencies, banks must model yield curve using a minimum of six risk factors. Besides, the number of risk factors should be in line with trading strategies of the bank. Risk measurement system must further cover the risks arising out of lack of full correlation between different yield curves;
2) The risk measurement system must incorporate separate risk factors to capture spread risk. 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 estimating the spread over government rates at various points along the yield curve.

c) The risk measurement system should incorporate risk factors corresponding to the individual foreign currencies, in which the bank's positions are denominated, and gold. For investments made in collective investment undertakings, the actually held foreign currency positions are taken into account. Banks may further take into consideration the statement of third parties relating to foreign currency positions of collective investment undertaking, providing that its accuracy is adequately proven. Since the value-at-risk figure calculated by the risk measurement system will be expressed in the bank's domestic currency, 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 domestic currency and each foreign currency in which the bank has a significant exposure.

ç) There should be risk factors corresponding to each of the equity markets in which the bank holds significant positions. In this context;
1) 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 "beta-equivalent" position would be calculated from a market model of equity price returns by

regressing the return on the individual stock or sector index on the risk-free rate of return and the return on the market index;

2) 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;

3) Risk factors corresponding to the volatility of individual equity issues would be used as a more extensive approach.

4) The sophistication and nature of the modelling 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.

d) There should be risk factors corresponding to each of the commodity markets in which the bank holds significant positions. In this context;

1) For banks with relatively limited positions in commodity-based instruments, a straightforward specification of risk factors would be acceptable. Such a specification would likely entail one risk factor for each commodity price to which the bank is exposed. In cases where the aggregate positions are quite small, it might be acceptable to use a single risk factor for a relatively broad sub-category of commodities;

2) For more active trading, the model must also take account of variation in the "convenience yield" between derivatives positions such as forwards and swaps and cash positions in the commodity.

Quantitative Standards:

ARTICLE 8 – (1) While banks will have flexibility in devising the precise nature of their models, but the following minimum quantitative standards will apply for the purpose of calculating their capital charge:

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

b) In calculation, a 99th percentile, one-tailed confidence interval is to be used.

c) In calculation, a 10 day holding period is to be used. Banks may use value-at-risk numbers calculated according to shorter holding periods scaled up to ten days by the square root of time. Banks that are using shorter holding periods must justify the reasonableness of its approach to the satisfaction of Agency.

ç) The choice of historical observation period for calculating value-at-risk will be constrained to a minimum length of one 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 year. The weighted average time lag of the individual observations cannot be less than 6 months.

d) Banks must update their data sets no less frequently than once every months and should also reassess them whenever market prices are subject to material changes. This updating process must be flexible enough to allow for more frequent updates. While there is a significant upsurge

in price volatility, Agency, directly or with demand of banks, may require a bank to calculate its value-at-risk using a shorter observation period.

e) So long as each model used captures all the material risks run by the bank, as set out in article 7, banks will be free to choose model type.

f) Banks will have discretion to recognise empirical correlations within broad risk categories. Agency may also permit using empirical correlations across broad risk factor categories, provided that it is satisfied that the bank's system for measuring correlations is sound and implemented with integrity.

g) Banks' models must accurately capture the unique risks associated with options and option-like positions. The following criteria apply to the measurement of options risk:
1) Banks' models must capture the non-linear price characteristics of options positions;
2) 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. Agency may require banks to adjust their capital measure for options risk through simulations or stress testing;
3) 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.

ğ) In addition, a bank must calculate a 'stressed value-at-risk' measure. The period used in stressed value-at-risk must be approved by the supervisor and yearly reviewed. The stressed value-at-risk must be calculated at least weekly.

h) Risk measurement model for commodity risk must further cover the risks emerging from fluctuations of market prices in net open positions, relating to basis risk due to holding similar but not fully correlated commodities, and relating to changes arising out of maturity mismatches in forward prices. Furthermore, characteristics of the market and particularly the opportunities provided to investors for close-out of their positions and the delivery dates are also taken into consideration.

Calculation of Capital Requirement through Risk Measurement Model:

ARTICLE 9 – (1) Capital requirement to be calculated by banks using internal model is equal to the amount found by addition of capital requirement calculated as per article 8 to the total sum of amounts referred to in subparagraphs (a) and (b) herein below:

a) The larger one of the value at risk of the previous day calculated according to the parameters specified in this Communiqué and the amount found by multiplication of the average of daily values at risk of the recent 60 business days by adapted multiplication factor (mc); and

b) The larger one of the stress value at risk of the previous day most recently calculated according to the parameters specified in this Communiqué and the amount found by

multiplication of the average of daily stress values at risk of the recent 60 business days multiplication factor (ms).

(2) Adapted multiplication factors (mc and ms) are the values found by addition of the plus multiplication factor corresponding in the following Table to the number of deviations within the last two hundred and fifty business days as determined by back-testings to be conducted only on value at risk, to the minimum multiplication factors. Without prejudice to the provisions of first paragraph of Article 6 hereof, minimum multiplication factors are equal to three. The number of deviations should be consistently calculated according to the results of back-testing relating to actual and hypothetical changes in portfolio value. Deviation occurs when the change in portfolio value exceeds one daily value at risk calculated by the model used by the bank. Number of deviations is determined at least once every three months, and is the larger one of the numbers of deviations calculated by taking the actual and hypothetical changes in portfolio value into consideration.

Number of Deviations	Plus Multiplication Factor
Less than 5	0.00
5	0.40
6	0.50
7	0.65
8	0.75
9	0.85
10 or more	1.00

(3) Providing that it is demonstrated that the estimations of model are accurate, but deviations have occurred due to exceptions, the Agency may permit that the deviations arising out of such exception are not taken into consideration in determination of plus multiplication factors contained in the Table.

(4) If the number of deviations reveals that the model is not adequately accurate and sensitive, the Agency requests that measures aimed at correction and improvement of the model are taken immediately or cancels the permission of use of the model.

(5) Banks are required to inform the Agency urgently within maximum five days about the increases of number of deviations calculated over the back-testing results and requiring a change in application of plus multiplication factor.

Standards on Stress Testing
ARTICLE 10 – (1) Banks that use the internal models approach for meeting market risk capital requirements must have in place a rigorous and comprehensive stress testing program. Identifying events or influences that could greatly impact banks is a key component of a bank's assessment of its capital position.

(2) Banks' stress scenarios need to cover a range of factors that can create extraordinary losses or gains in trading portfolios, or make the control of risk 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 need to shed light on the impact of such events on options and options-like positions that display both linear and nonlinear price characteristics.

(3) Banks' stress tests should include both of a quantitative and qualitative criteria, 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 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 is integral to setting and evaluating the bank's management strategy and the results of stress testing should be routinely and frequently communicated to senior management and, periodically, to the bank's board of directors.

(4) Banks should combine the use of supervisory stress scenarios with stress tests developed by banks themselves. In this context;

a) For each reporting period, banks should keep the capital adequacy results of stress scenarios that include comparably both the loss information of regulatory scenarios and the level of capital that results from a bank's internal measurement system ready to supervision. Within this scope, it could provide that how many days of peak day losses would have been covered by a given value-at-risk estimate.

b) Banks should subject their portfolios to a series of simulated stress scenarios and provide supervisory authorities with the results. These scenarios could include testing the current portfolio against past periods of significant disturbance, for example, the crisis periods in Turkish economy and global financial crises, incorporating both the large price movements and the sharp reduction in liquidity associated with these events. Moreover, the sensitivity of the bank's market risk exposure to changes in the assumptions about volatilities and correlations should be evaluated. 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 variations.

c) In addition to the scenarios prescribed by Agency, a bank should develop its own scenarios which it identifies as most adverse based on the characteristics of its portfolio. Banks should provide Agency with a description of the methodology used to identify and carry out the scenarios.

(5) The results should be reviewed periodically by senior management and should be reflected in the policies and limits. Moreover, if the testing reveals particular vulnerability to a given set of circumstances, banks should immediately inform the Agency. Agency may require bank to take preventative actions, including hedging against that outcome or reducing the size of its exposures, to manage those risks appropriately.

Combination of Internal Models and the Standardized Methodology
ARTICLE 11 – (1) Unless a bank's exposure to a particular risk factor is insignificant, the internal models approach will in principle require banks to have an integrated risk measurement system. Banks which start to use models for one or more risk factor categories will, over time, be

expected to extend the models to all their market risks. A bank will no longer be able to revert to measuring the risk measured by internal models according to the standardized methodology, unless Agency withdraws approval for that model. The following conditions will apply to banks using the combination of internal model and standardized methodology;

a) Each broad risk factor category must be assessed using either internal models or the standardized approach. However, banks may incur risks in positions which are not captured by their models, for example, in remote locations, in minor currencies or in negligible business areas. Such risks should be measured according to the standardized methodology.

b) All the criteria laid down in this Communique will apply to the models being used.

c) Banks can not modify the combination of the two approaches they use without justifying Agency that they have a good reason for doing so.

ç) No element of market risk may escape measurement.

THIRD PART
Incorporating Specific Risk into Value-at-Risk Measurement and Internal Validation Standards

Criteria on Adding Specific Risk to Value-at-Risk Measurement
ARTICLE 12 – (1) Where a bank has a value-at-risk measure that incorporates specific risk from equity risk positions and where Agency has determined that the bank meets all the qualitative and quantitative requirements for internal market risk models, as well as the additional criteria and requirements set out in paragraphs 5 to 8 below, based on the consent of Agency, the bank can use value-at-risk model to calculate capital charge for equity risk instead of standardized method.

(2) For interest rate risk positions other than securitization exposures and n-th-to-default credit derivatives, the bank can use value-at-risk measurement to calculate capital charge for specific risk instead of standardized method when all of the following conditions hold;

a) The bank has a value-at-risk measure that incorporates specific risk and this measurement meets all the qualitative and quantitative requirements for internal market risk models, as well as the additional criteria and requirements set out in paragraphs 5 to 8 below.

b) The bank's internally developed approach adequately captures incremental default and migration risks for positions subject to specific interest rate risk according to the standards laid out in Article 13 below.

c) With approval of Agency.

(3) The bank is allowed to include its securitization exposures and n-th-to-default credit derivatives in its value-at-risk measure. Notwithstanding, it is still required to hold additional capital for these products according to the standardized measurement methodology with the exceptions in Article 14 including correlation trading positions of securitization exposures and n-th-to-default credit derivatives.

(4) The criteria for supervisory recognition of banks' modelling of specific risk require that a bank's model must capture all material components of price risk and be responsive to changes in market conditions and compositions of portfolios. Banks need not capture default and migration risks for positions subject to the incremental risk capital charge. In particular, the model must;

a) explain the historical price variation in the portfolio;
b) capture concentrations, such as magnitude and changes in composition;

c) be robust to an adverse market environment;

ç) capture event risk and name-related basis risk;

d) be validated through backtesting.

(5) The assessment in paragraph 4 includes:

a) For sub-paragraph (a), the key ex ante measures of model quality are "goodness-of-fit" measures which address the question of how much of the historical variation in price value is explained by the risk factors included within the model. One measure of this type which can often be used is an R-squared measure from regression methodology. If this measure is to be used, the risk factors included in the bank's model would be expected to be able to explain a high percentage, such as 90%, of the historical price variation or the model should explicitly include estimates of the residual variability not captured in the factors included in this regression. For some types of models, it may not be feasible to calculate a goodness-of-fit measure. In such instance, based on the proposals and reasons that are presented by the bank, Agency would determine alternative measure or decide that the model does not meet criteria in paragraph (a) of Article 5.

b) For sub-paragraph (b), the bank would be expected to demonstrate that the model is sensitive to changes in portfolio construction and that higher capital charges are attracted for portfolios that have increasing concentrations in particular areas or sectors.

c) For sub-paragraph (c), the bank should be able to demonstrate that the model will signal rising risk in an adverse environment. This could be achieved by incorporating in the historical estimation period of the model at least one full credit cycle and ensuring that the model would not have been inaccurate in the downward portion of the cycle. Another approach for demonstrating this is through simulation of historical or plausible worst-case environments.

ç) For sub-paragraph (ç), for equity positions, events that are reflected in large changes or jumps in prices must be captured, e.g. merger break-ups/takeovers. Banks should also be able to demonstrate that the model is sensitive to material idiosyncratic differences between similar but not identical positions, for example debt positions with different levels of subordination, maturity mismatches, or credit derivatives with different default events.

d) For sub-paragraph (d), banks which apply modelled estimates of specific risk are required to conduct backtesting aimed at assessing whether specific risk is being accurately captured. The methodology a bank should use for validating its specific risk estimates is to perform separate backtests on sub-portfolios using daily data on sub-portfolios subject to specific risk. The key sub-portfolios for this purpose are traded-debt and equity positions. However, if a bank itself decomposes its trading portfolio into finer categories such as emerging markets or traded corporate debt. Banks are required to commit to a sub-portfolio structure and stick to it unless it can be demonstrated to the supervisor that it would make sense to change the structure.

(6) The bank's model must conservatively assess the risk arising from less liquid positions and/or positions with limited price transparency under realistic market scenarios. In addition, the model must meet minimum data standards. Proxies may be used only where available data is insufficient or is not reflective of the true volatility of a position or portfolio, and only where they are appropriately conservative.

(7) Banks should avail themselves of improvements in techniques and best practices.

(8) Banks are required to have in place a process to analyze exceptions identified through the backtesting of specific risk. This process is intended to serve as the fundamental way in which banks correct their models of specific risk in the event they become inaccurate. There will be a presumption that models that incorporate specific risk are "unacceptable" if the results at the sub-portfolio level produce ten or more exceptions. Banks with "unacceptable" specific risk models are expected to take immediate action to correct the problem in the model and to ensure that there is a sufficient capital buffer to absorb the risk that the backtest showed had not been adequately captured. The rules for incorporating exceptions to capital adequacy measurement process for market risk components other than specific risk are valid for capital adequacy measurement through value-at-risk model for specific risk.

Capital Charge for Incremental Risk
ARTICLE 13 – (1) The bank must have an approach in place to capture in its regulatory capital default risk and migration risk of in positions subject to a capital charge for specific interest rate risk, with the exception of securitization exposures and n-th-to-default credit derivatives, that are incremental to the risk captured by the value-at-risk calculation.

(2) The bank must demonstrate that the approach used to capture incremental risks meets a soundness standard comparable to that of the internal-ratings based approach for credit risk, under the assumption of a constant level of risk, and adjusted where appropriate to reflect the impact of liquidity, concentrations, hedging, and optionality. A bank that does not capture the incremental risks through an internally developed approach must use standardized measurement method for specific risk.

(3) Incremental risk approach for default risk and migration risk is subject to below standards and criteria:

a) This approach should cover the additional default and creditworthiness variation risks of all positions being subject to capital requirement calculation for interest rate specific risk relating to financial instruments, with the exception of securitization exposures and n-th-to-

default credit derivatives. Depending upon the approval of the Agency, banks may permanently incorporate all of their share certificate and share certificate-based derivative positions quoted and traded in the exchange, consistently with the method of internal measurement and management of risks by them. This approach reflects the effects of correlation between default and creditworthiness variation events. The diversification effect between default and creditworthiness variation events and other market risk factors should not be reflected.

b) The approach measuring the incremental risk measures the losses related to default and internal or external creditworthiness variation risks so as to cover a period of one year and a confidence interval of nine hundred and ninety-nine per thousand. Correlation assumptions are supported by an objective data analysis established on a conceptually robust frame. This approach handling the incremental risk reflects issuer concentration and concentrations that may occur inside and between product classes under stress conditions. This approach is relied upon an assumption of existence of a fixed risk level for a period of one year. Trading positions or a certain number of positions which are exposed to default or creditworthiness variation risks within the liquidity horizon are re-determined at the end of liquidity horizon so as to protect the initial risk level. Banks may, alternatively, use the one yearly fixed position assumption subject to the condition of acting consistently.

c) Liquidity horizon is, particularly depending upon the size of position, determined according to the period needed for disposal of position or for protection from material price risks under the market conditions of a high volatility. Liquidity horizon reflects the real practices and experiences in both systematic and bank-specific fluctuation periods. Liquidity horizon should be measured under prudent assumptions, and should be of an adequate length so as not to materially affect the price of sales or the price of risk protection in itself. Liquidity horizon for a position or a set of positions is at least three months. In determination of liquidity horizon appropriate for a position or a set of positions, internal policies pertaining to bank's value adjustments and management of low liquidity positions must be taken into consideration. While determining the liquidity horizon for a set of positions rather than an individual position, the bank meaningfully defines the criteria specified for definition of set of positions in such manner to reflect the liquidity differences. Liquidity horizon should be higher for the concentrated positions. Liquidity horizon of securitization process should reflect the time needed for combination, sales and securitization of assets or for protection from material risk factors under market conditions of high volatility.

ç) Risk protection may be included in the approach of a bank in order to reflect the additional default and creditworthiness variation risks. Long and short positions may be netted if they are related with the same financial product. Risk protection or diversification effects relating to long and short positions containing the different securities or different products of the same obligor or relating to long and short positions belonging to different issuers may be accepted only if the gross long and short positions in different products are clearly modeled. Banks should reflect the effects of material risks that may arise out of the time slice between maturity of risk protection and liquidity horizon. Furthermore, risk protection strategies must also reflect the material basis risk potential arising out of product, prioritization in capital structure, internal or external rating, maturity, transfer or other changes in products. Even if a bank approaches the risk event underlying the risk protection transaction, it reflects this risk protection transaction as long as it can continue the risk protection transaction. Additional residual risks arising out of dynamic

risk protection strategies must be reflected onto capital requirement. For the sake of rebalancing of risk protection within the liquidity horizon relating to the position of risk protection for the trading books positions subject to risk protection by dynamic risk protection strategies, the bank is required to comply with the following conditions:

1) It must prefer to consistently model the risk protection over the relevant trading books positions; and

2) It must demonstrate that a better risk measurement is provided by rebalancing; and

3) It must be able to demonstrate that the product markets used for risk protection purposes are liquid enough to assure rebalancing even under market conditions of high volatility.

d) In the approach reflecting the incremental risk, the effects of other positions which are non-linear and show material non-linear behaviors affecting the price changes, such as options and structured credit derivatives should be reflected. Banks should take into consideration the model exposure value which is covered by the nature of price risk assessment and estimated processes of the subject products.

e) The approach reflecting the incremental risk should be based upon objective and current data.

f) As a part of independent review of risk measurement system and validation of internal model, banks should meet the following conditions with respect to incremental risks:

1) Fitness of the model approach towards correlation and price changes to the portfolio must be validated. Selection and weighting of systematic risk factors are also included therein.

2) A series of stress tests, including sensitivity and scenario analyses, should be conducted. In the said stress test, the quantitative and qualitative fitness of the approach particularly for concentration should be assessed. Said tests should not be limited by the series of the historically tested events.

3) Appropriate quantitative validation, also including the related internal model comparisons, is applied. The approach reflecting the incremental risks must be consistent with the internal risk management methodology aimed at defining, measuring and managing the trading risks of banks.

g) Banks must document in writing their approaches reflecting the incremental risks in such manner to reflect their correlation and other modeling assumptions with adequate transparency.

ğ) If and when the approach reflecting incremental risks of the bank is, though not consistent with all requirements specified in this paragraph, consistent with the bank's inherent approach created for definition, measurement and management of the bank's own risks, then and in this case, the bank may be permitted to calculate its capital requirement by its own approach. However, in this case, the bank must demonstrate that the capital requirement calculated by its

own approach will not be less than the capital requirement to be calculated in the case of compliance with all of requirements mentioned in this article. The Agency reviews the compliance with this rule at least once a year.

(4) Incremental risk calculation is repeated at least weekly. The capital charge for incremental risk is given by the maximum of the average of the incremental risk measures over 12 weeks and the most recent incremental risk measure.

Capital Charge for Comprehensive Risk Measure
ARTICLE 14 – (1) Subject to supervisory approval, a bank may incorporate its correlation trading portfolio in an internally developed approach that adequately captures not only incremental default and migration risks, but all price risks, "comprehensive risk measure". The value of such products is subject in particular to the following risks which must be adequately captured:

a) the cumulative risk arising from multiple defaults, including the ordering of defaults, in tranched products;

b) credit spread risk, including the gamma and cross-gamma effects;

c) volatility of implied correlations, including the cross effect between spreads and correlations

ç) basis risk, including both

1) the basis between the spread of an index and those of its constituent single names; and

2) the basis between the implied correlation of an index and that of bespoke portfolios;

d) recovery rate volatility, as it relates to the propensity for recovery rates to affect tranche prices; and

e) to the extent the comprehensive risk measure incorporates benefits from dynamic hedging, the risk of hedge slippage and the potential costs of rebalancing such hedges.

(2) The comprehensive risk measure approach must meet all of the requirements specified in paragraphs 2, 3, and 4 of Article 13. This exception only applies to banks that are active in buying and selling these products. For the exposures that the bank does incorporate in this internally developed approach, the bank will be required to subject them to a capital charge equal to the higher of the capital charge according to this internally developed approach and 8% of the capital charge for specific risk according to the standardized measurement method. It will not be required to subject these exposures to the treatment according to paragraph 2 of Article 13. It must, however, incorporate them in both the value-at-risk and stressed value-at-risk measures.

(3) For a bank to benefit from this practice, an exception of paragraph 3 of Article 12:

a) Have sufficient market data to ensure that it fully captures the salient risks of these exposures in its comprehensive risk measure in accordance with the standards set forth above;

b) Through backtesting or any other method, demonstrate that its risk measures can appropriately explain the historical price variation of these products; and

c) Ensure that it can separate the positions for which it holds approval to incorporate them in its comprehensive risk measure from those positions for which it does not hold this approval.

(4) In addition to these data and modelling criteria, for a bank to apply this exception it must regularly apply a set of specific, predetermined stress scenarios to the portfolio that receives internal model regulatory capital treatment (i.e., the 'correlation trading portfolio'). These stress scenarios will examine the implications of stresses to (i) default rates, (ii) recovery rates, (iii) credit spreads, and (iv) correlations on the correlation trading desk's P&L. The bank must apply these stress scenarios at least weekly and report the results, including comparisons with the capital charges implied by the banks' internal model for estimating comprehensive risks, at least quarterly to Agency. Any instances where the stress tests indicate a material shortfall of the comprehensive risk measure must be reported to Agency in a timely manner. Based on these stress testing results, Agency may impose a supplemental capital charge against the correlation trading portfolio, to be added to the bank's internally modelled capital requirement.

(5) The capital charge for comprehensive risk is given by the maximum of the average of the comprehensive risk measures over 12 weeks and the most recent comprehensive risk measure.

Model Validation Standards
ARTICLE 15 – (1) Risk management unit should construct processes in place to ensure that internal models have been adequately validated by suitably qualified parties independent of the development process to ensure that they are conceptually sound and adequately capture all material risks.

(2) This validation includes installation, structuring, modification and periodic validations. Installation validation is performed when the model is installed in the bank, and structuring validation is performed when material changes are made in the model, and modification validation is performed at the time of material structural changes in the market or of changes in portfolio composition to such extent to distort the appropriateness and adequacy of the model, while periodic validation is performed with regular zones independently from other validations. More extensive model validation is particularly conducted where specific risk is also modelled and is required to meet the further specific risk criteria. As techniques and best practices evolve, banks should avail themselves of these advances.

(3) Model validation should not be limited to backtesting, but should, at a minimum, also include the following:

a) Tests to demonstrate that any assumptions made within the internal model are appropriate and do not underestimate risk. This may include the assumption of the normal

distribution, the use of the square root of time to scale holding period or where extrapolation or interpolation techniques are used, or pricing models.

b) In addition to regular backtesting programme, banks must conduct backtesting that includes hypothetical changes. Based on hypothetical changes in portfolio value, this backtesting would occur were end-of-day positions to remain unchanged. It excludes fees, commissions, bid-ask spreads, net interest income and intra-day trading. Moreover, additional validation tests are required which may include:

1) Testing carried out for longer periods than required for the regular backtesting programme

2) Testing carried out using confidence intervals other than the 99 percent interval required under the quantitative standards

3) Testing of portfolios below the overall bank level.

c) The use of hypothetical portfolios to ensure that the model is able to account for particular structural features that may arise, that include at least below:

1) Where data histories for a particular instrument do not meet the quantitative standards and where the bank has to map these positions to proxies, then the bank must ensure that the proxies produce conservative results under relevant market scenarios;

2) Ensuring that material basis risks are adequately captured. This may include mismatches between long and short positions by maturity or by issuer.

ç) Ensuring that the model captures concentration risk that may arise in an undiversified portfolio.

SECTION THREE
Miscellaneous and Final Provisions

Repealed Communiqué:
ARTICLE 16 – (1) The Communiqué on Calculation of Market Risk by Risk Measurement Methods and on Assessment of Internal models, promulgated in the Official Gazette edition 28337 on 6/28/2012, is hereby repealed and superseded.

Effective Date:
ARTICLE 17 – (1) This Communiqué becomes effective on 31/03/2016.

Enforcement:
ARTICLE 18 – (1) The provisions of this Communiqué will be enforced and executed by the President of the Banking Regulatory and Supervision Agency.