BEST PRACTICE GUIDELINE

From the Banking Regulation and Supervision Agency:

GUIDELINE ON MARKET RISK MANAGEMENT

FIRST PART

Objective and Scope

1. The objective of this guideline is to declare best practices expected from banks about market risk management as part of the article 35 entitled "the objective of risk management and the establishment of risk management system" of "Regulation on Internal Systems and Internal Capital Adequacy Assessment Process of Banks" published in the Official Gazette dated July 11,2014 Nr:29057

2. The guideline is based on the provisions of Article 93 of Banking Law Nr:5411 dated October 19,2005 and the Article 7/A entitled "Best Practices Guides" of Regulation on Procedures and Principles For Supervision by the Banking Regulation and Supervision Agency published in the Official Gazette dated July 22,2006 Nr:26236.

3. In accordance with the principles in this guideline, also considering the bank's size and complexity, an effective and sound market risk management is supposed to be established on the following aspects on both consolidated and nonconsolidated basis:

   a) senior management oversight;
   b) procedures and principles of internal policy and implementation related to risk management; and
   c) adequate risk measurement, monitoring, and control processes.

4. The principles in this guideline are prepared as guides to provide sound market risk management practices. Banks should consider these principles in accordance with their risk appetite, risk profile and capital strength.
5. Market risk refers to the risk caused by fluctuations in market prices, in particular, changes in interest rates, foreign exchange rates, credit spreads, and equity and commodity prices.
6. Market risk may arise from other forms of financial risk such as credit and market liquidity risks. For example, a downgrading of the credit standing of an issuer could also lead to a drop in the market price of the security issued by that issuer. Likewise, a major sale of a relatively illiquid security by another holder of the same security could also considerably depress the price of the security.
7. There may be other factors besides the ones cited above that cause market risk. Banks should consider all risk factors which may affect market risk that they are exposed to, and they must manage these risks soundly.

8. Banks should also take into account the general market and macroeconomic conditions in which they operate in their assessment and management of risks and their loss absorbing capacity.

SECOND PART

Definitions

9. Terms used in this guideline are defined as follows:

a) basis risk: possible losses arising from the negative effects on the bank's net interest income or economic value which occurs when one of the interest rates (that is used as basis in two-or multi-party transactions made by the bank) rises or decreases more than the other does;

b) credit spread: the premium above government or risk-free rate, required by the market for taking on credit exposures.

c) optionality risk: the possible risk that may arise from the negative effects on the bank's net interest income or economic value due to the financial products which contain optionality including embedded ones;

ç) market liquidity risk: that defined in the Article 138 of Guideline on Stress Test to be Used In Capital and Liquidity Planning of Banks;

d) risk appetite: that defined in the Article 3 of the Regulation on Internal Systems and Internal Capital Adequacy Assessment Process of Banks;

e) risk capacity: that defined in the Article 3 of the Regulation on Internal Systems and Internal Capital Adequacy Assessment Process of Banks;

f) risk profile: that defined in the Article 3 of the Regulation on Internal Systems and Internal Capital Adequacy Assessment Process of Banks;

g) swap spread: the premium between the interest rate paid by the party that pays fixed interest and the interest rate of government or risk free rate in swap transactions;

ğ) senior management: that defined in the Article 3 of the Regulation on Internal Systems and Internal Capital Adequacy Evaluation Process of Banks;

h) top management: that defined in the Article 3 of the Regulation on Internal Systems and Internal Capital Adequacy Evaluation Process of Banks;

ı) yield curve risk: the possibility of losses that may arise from the negative effects on the bank's net interest income or economic value which result from the possible changes in slope and shape of the yield curve; and

i) re-pricing risk: the possibility of losses that may arise from the negative effects of interest rate changes on the bank's net interest income or economic value which occur because of re-pricing structure of possible changes of assets, liabilities or off-balance sheet items.

THIRD PART

Senior Management Oversight, Strategies, Policies and Procedures

Principle-1 Banks establish written strategies, policies, and procedures related to market risk management and these aspects are put into action with the Board's approval. The Board enables senior management with monitoring and controlling the risk in accordance with the strategies, policies, and procedures; and keeping appropriate sources for controlling and evaluating market risk.

10. Banks should develop a sound and well informed strategy to manage market risk and the strategy should be approved by the institution's Board of Directors (Board). The Board, based on the recommendation of senior management, should first determine the level of market risk the institution is willing to take and the level of possible losses. This level should be set with consideration given to the amount of market risk capital set aside against unexpected losses.
11. Banks should develop a strategy that balances its business goals with its market risk appetite.
12. In setting their market risk strategy, banks should consider the following factors:
    a) economic, market and liquidity conditions and their impact on market risk;
    b) whether the institution has the expertise to take positions in specific markets and is able to identify, measure, evaluate, monitor, report and control or mitigate the market risk related to the markets in that position; and
    c) bank's portfolio mix and how it would be affected if more market risk was assumed.

13. Banks should be aware that in executing their hedging strategies, offsetting or hedged instruments can still be exposed to market risks when the hedge is not perfect. Hedging strategies generally incorporate and rely on certain assumptions about the correlation between two instruments/assets. Therefore, the effectiveness of these strategies will be affected if these assumptions are proved to be inaccurate or no longer valid. Banks should evaluate the impact of a breakdown in these assumptions and the effectiveness of hedging strategies.
14. Banks should put in place a process by which significant changes in the size or scope of their activities would trigger an analysis of the adequacy of capital. In this context, banks

are encouraged to have an internal capital allocation system that meaningfully links identification, monitoring and evaluation of market risks to economic capital.

15. Market risk strategy should be periodically reviewed by the Board and senior management taking into consideration its financial performance, market risk capital and updated market developments. There should also be a process to detect and report the deviations from the approved market risk strategy, operation limits and position types.
16. Compensation plans should be regulated in a way that does not encourage assuming an excessive market risk and should not contradict the general compensation policy and market risk strategy.
17. Market risk policies should be formulated and should periodically be reviewed and approved by the Board. These policies should reflect the strategy and processes of the bank, including managing and controlling market risk . The Board should enable the bank's management to ensure that these strategies, policies and processes are implemented effectively and fully integrated into the bank's overall risk management process. In addition, the breaches of policies should receive the prompt attention of the appropriate level of management and the bank's Board where necessary.
18. Policies should be applied on a consolidated and nonconsolidated basis and the policies should clearly:
    a) indicate the methods used in valuation of positions and assessments and measurement of market risk and the way they are used and reported in the bank, including reporting made to the Board;
    b) spell out the process by which the Board decides on the maximum market risk the bank is able to take and the frequency of review of risk limits;
    c) set out the scope of activities of the business units exposing to market risk;
    d) determine the lines of responsibilities of the Board, senior management, units within the internal systems and other personnel responsible for managing market risk;
    e) establish the processes of determination of appropriate capital levels against unexpected losses;
    f) identify procedures and principles related to new products;
    g) cover the principles for investigation, reporting, and resolution of the market risk control limit structure, determining limits and limit excesses, capital requirements calculations, and irregular or disputed transactions;
    h) contain established controls for providing risk mitigation techniques and their effectiveness in accordance with assumed market risk size and complexity;
    i) identify processes of reviewing or updating policies in cases of considerably changes occurred in the bank's market risk profile; and
    j) identify factors related to extent, type, and size of different shocks which used in factors related to stress tests and scenario analyses, and internal calculation.
19. Banks should establish appropriate written procedures to implement the market risk policy, strategy and processes. Procedures should explain the work flows and processes that are necessary to perform the related market risk controls, in detail. The procedures should be periodically reviewed and updated to take into account new activities, important changes in systems (information management, reporting, risk management, payment,

clearing etc.) and structural changes in the market. The procedures should cover all activities that cause market risk.

20. Senior management should employ necessary personnel with required expertise and experience to define/identify, measure, monitor, and control market risk. In case of temporal absence of employee of key importance, by keeping employee in adequate quality and quantity providing business continuity, appropriate division of labor should be established. Necessary software infrastructure should be established and always be kept accessible to relevant bank's employee to announce strategies, policies and procedures which should be ensured that they are understood by the employee.

FOURTH PART

Risk Measurement, Monitoring And Control Processes

Principle-2 Banks establish a sound and comprehensive risk management frameworks, systems, and processes concerning measurement, monitoring, and controlling of the market risk; and execute their business in accordance with the above-cited factors.

21. Framework and processes concerning measurement, monitoring, and controlling of the market risk should at least contain the following factors:
    a) a framework to identify risks;
    b) an appropriately detailed structure of market risk limits that are consistent with the institution's risk appetite, risk profile and capital strength, and which are understood by, and regularly communicated to, relevant staff;
    c) guidelines and other parameters established by the bank and used to govern market risk-taking;
    d) rules and criteria for allocation of positions to the trading book;
    e) appropriate management information system (MIS) for accurate and timely identification, aggregation, monitoring, controlling, and reporting of market risk, including transactions between the bank and its affiliates, to the institution's Board and senior management;
    f) exception tracking and reporting processes that ensure prompt action at the Board or senior management level, where necessary;
    g) effective controls around the use of models to identify and measure market risk;
    h) valuation policies, including policies and processes for considering and making appropriate valuation adjustments for uncertainties in determining the fair value of assets and liabilities (concentrated or less liquid positions); and
    i) action plans for possible concentrated risks (pricing differences, keeping more capital, more frequent reporting etc.).
22. Market risk management should be included by overall risk management system. This integrity would enable the bank to understand and manage its consolidated risk amount more effectively.
23. The risk management system should be commensurate with the scope, size and complexity of trading, other financial activities and the market risks assumed. This system should enable the various market risk amounts to be accurately and adequately

identified, measured, monitored and controlled. All significant risks should be measured and aggregated on a bank-wide basis. Limits for market risks that are consistent with the maximum risk amounts authorized by the Board and senior management should be set. These limits should be in accord with the bank's business plan related to the market risk, and the planning concerning the strategy of market risk, risk capacity and capital adequacy.

24. Risk management system should be able to quantify risk amounts and monitor changes in market risk factors (e.g. changes in interest rates, foreign exchange rates, equity prices and commodity prices) and other market conditions on a daily basis. A bank whose risk levels fluctuate significantly within a trading day should at reasonable intervals monitor its risk profile on an intra-day basis. The system should enable the risks to be identified promptly and remedial action to be taken quickly in response to adverse and sudden changes in market factors.
25. An independent risk management function should be established, with the responsibility for defining risk management policies, setting procedures for market risk identification, measurement and assessment, and monitoring the institution's compliance with established policies and market risk limits.
26. Banks should ensure that transactions are captured on a timely basis and that marked-to-market positions are revalued frequently. Valuation processes of positions exposed to the market risk should be robust and independent of the risk-taking function. The valuation process should use consistent and prudent practices and reliable market data verified independently. In the absence of market prices, internal or industry-accepted models should be used. Models and supporting statistical analyses used in valuations should be appropriate, consistently applied, and have reasonable assumptions. These should be validated before deployment. Staff involved in the validation process should be adequately qualified and independent of those who assume market risks and develop models. Models should be periodically reviewed. More frequent reviews may be necessary if there are changes in models or in the assumptions resulting from developments in market conditions. It should be ensured that these changes are cautiously taken into consideration by the model.
27. The Board and senior management should establish effective processes to manage market liquidity risk arising from transactions that originate market risks. The management of market liquidity risk should be an integral part of the bank's daily operations. The Board and senior management should take note of the size and depth of the markets the bank is active in and identify the appropriate risk-taking principles related to the above-cited markets. These principles should take into account the bank's ability to access alternative markets or credit lines under different scenarios. They should also consider the risks associated with early termination of financial transaction contracts.
28. In assessment to be made considering new financial products and services, risk management system should include performing analyses about the possible effects of the new products and services on the bank's market risk profile. In case of trading a new financial product, more prudent limits should be identified for a definite time.

Principle- 3 Banks should have a risk measurement system that covers all transactions and activities which contain market risk and includes all significant market risk factors and that is commensurate with scope and complexity of activities.

29. Banks should implement suitable measures for all market risks assumed. The monitoring of these measures is an inseparable part of daily risk management process.
30. Risk measurement system should be able to measure current risks and potential market risks in terms of marked-to-market or marked-to-model pricing. Besides, this system should be able to cover volume increases, new valuation methodologies and new products.
31. Banks should establish the processes of adequate developing, test, implementation and sustainability providing the use of market risk measurement and appropriate valuation models.
32. Measurement of interest rate risk should cover re-pricing risk, yield curve risk, basis risk and optionality risks that arise from the positions in trading calculations. Incomes and expenses, that are sensitive to changes in interest rates, should also be taken into account.
33. Interest rate risk in each currency should be calculated separately. Yield curves should be divided into various maturity segments to capture variation in the volatility of rates along the yield curves. For each currency, sufficient number of yield curves should be used to reflect the risk factors that the bank is exposed to. Additional risk measures should be used to be able to consider credit spread and swap spread risks as well.
34. There should be separate risk factors corresponding to each of the equity markets in which a bank has positions. The measurement of equity risk should capture the risk exposure to price movements in the overall equity market, specific sectors of the equity market, and individual equity issues where appropriate.
35. In measurement of foreign exchange risk, each of foreign exchange rates should be considered as a different risk factor. The measurement should also consider the risks arising from changes in values or asset-liability mismatch.
36. In addition to risk arising from changes in their spot prices, commodities also pose other risks such as basis risk (the risk that the relationship between prices of similar commodities alters through time), interest rate risk (the risk of a change in the cost of carry for forward positions and options) and forward gap risk (the risk that the forward price may change for reasons other than a change in interest rates). Banks that are active in commodities trading should also account for income of holding between derivatives positions and cash positions in the commodity. All significant levels of commodity risks should be properly managed.
37. Banks, considering credit spread, are exposed to a risk that arises from changes in issuer's creditworthiness in instruments, such as bonds and credit derivatives. Credit instruments are susceptible to default risk as well as credit migration risk. Default risk is the risk of direct losses from an obligor's default and of indirect losses that could arise from a default event, whereas credit migration risk is the risk of direct losses from rating downgrades or upgrades and of indirect losses that could arise from a credit migration event. Banks should identify, measure, monitor, control and report such risks.
38. Banks should regularly evaluate market liquidity risk and the facilities of protecting their positions. The risk of tighter liquidity in less developed and developing markets calls for

more prudent additional approaches. Banks should properly analyze these markets and be able to measure and manage risks in the markets. Where it is not possible to measure the market liquidity risk, the risk should be evaluated qualitatively and reported.

39. The risk management system should be able to access, to the extent practicable, accruals related information as well as current risks and rediscounts on a daily basis.
    This information should be retained for internal audit and control purposes. As far as possible, the system should also cover information about customers. Banks should have a system that is active in treasury and financial derivatives should have a system that is able to monitor trading positions, market movements and credit risks daily and preferably on instant basis.
40. Banks should consider correlations between markets and between categories of risk when evaluating their risk positions. Although individual risks, such as market and credit risks, may appear manageable when viewed independently, these correlations could result in the transmission of shocks from stressed conditions in one market to other markets or may increase the bank's total risk. Due to such correlations, by considering that the bank's risk appetite can be exceeded; the correlations can be included by risk assessments through appropriately constructed scenarios in stress tests. Banks whose trading and other financial activities are limited in volume, scope and complexity, may use less sophisticated methodologies.
41. Correlation between various market risk factors in different countries for different maturity should be considered in risk aggregation. In such exercises, the correlation computation method should be theoretically sound and periodically validated. Where correlation cannot be accurately determined, it should not be assumed as "zero" and the bank should discreetly incorporate the correlations into risk measurement system. Market risk measurement systems should enable market risk to be separated on the basis of factors such as risk type (interest rate, exchange etc.), customer, instrument or business unit.
42. Risk measurement systems should accurately capture market risks associated with options. Options face non-linearity in prices while embedded options, such as instruments with prepayment rights, create uncertainty in cash flow.
43. Market risk measurement models and assumptions previous to use and at least once a year when they are in usage should be reviewed and the results should be reported to senior management. In these reviews, the models should be independently validated, back-tested and re-calibrated when necessary. Validation should include verifying the consistency, timeliness, reliability, independence and completeness of data sources; the accuracy and appropriateness of volatility and correlation assumptions; and the accuracy of valuation and risk factor calculations. A back-testing program should be conducted and reported regularly to verify that the models are reliable in measuring potential losses over time. The verification should be done at both consolidated and nonconsolidated levels to ensure that exceptional losses are not concealed in the aggregation. Exceptional back-testing may be used, to the extent reasonably possible, when there are significant market developments or when there are changes in the model or its major assumptions. The Board and senior management should be cognizant of the strengths and limitations of the bank's market risk

measurement systems, while determining the appropriate risk limits and they should enable the limitations of important level of the models are well understood and reported.

44. A screening process should be in place to ensure the integrity of data fed into the risk management system. Data used should be appropriate (e.g. marked-to-market data for trading activities), accurate, complete (e.g. both on- and off-balance and sheet positions), timely, frequently updated and sourced independently of the position-taking units. While it may use market data from reputable sources, a bank may process and integrate the data to better meet its needs. For instance, when calculating correlations and other parameters, banks should use an observation period that would be relevant for all the financial instruments they trade in. However, in this case the weighting and processing of data should be verified. As a counter check, a separate data source could also be used to calculate parameters where necessary. Missing data should be addressed by appropriate methods, such as bootstrapping or interpolation techniques, and the integrity of "outliers" should be verified. Data feed to its market risk management system should be automated to reduce errors arising from the staff. Sufficient documentation should be provided for data sources used. Management should be cognizant of common data problems. Data adjustments should be documented, and the way of structuring it and reasons should be comprehensible.

Principle- 4 Risk measurement related to the market risk and the results of risk monitoring are reported to the Board, senior management, and the managers of relevant business lines in time.

45. Reporting risk management related to the market risk should be carried out in appropriate frequency in terms of current risk condition, complexity level of assumed risks by giving place to relevant limits and past estimates and realization, measure and status of management that receives reports.
46. Market risk reports for the Board, senior management, and relevant business lines' managers, also considering the need of line management, at least include the following aspects:
    a) general explanations for risk development and the profitability state of positions that are exposed to the market risk;
    b) the development of risk appetite indicators such as the ratio of value that is exposed to risk to the current value of relevant position or nominal value;
    c) limits, use of them, and the cases in which the limits exceeded;
    d) assumptions and parameters that underlie market risk assessment process and the changes in them;
    e) Value at risk calculations;
    f) internal capital requirement and capital obligations; and
    g) stress test and back-testing implementation and their results.

Principle-5 Banks determine market risk limits in accord with risk management policies and implement these limits.

47. Banks should determine risk limits for business units including production types and relevant employee level and these limits should be approved and periodically reviewed by the Board and senior management. Total risk position, valuation results and used limit levels are reported to the risk management unit's manger by the next workday at the latest. In chase of changes in market conditions or the resources of the bank, risk limits should be reviewed immediately and the circumstances of review should be documented. Limits should be integrated, where applicable, with consolidated limits on the basis of major types of risks. Banks should ensure consistency between the different types of limits. They should also set limits that are sufficiently granular for effective risk control. For instance, limits for trading desks, portfolios, and dealers by markets, products, instruments and tenors, should be set, where appropriate. Limits should be clearly understood by, and changes clearly communicated to, all relevant parties.
48. Compliance with limits should be monitored by a unit independent of the risk-taking parties. Banks should have procedures prescribing the course of action for limit excesses. These actions should include investigating the reasons for the excesses, reporting the incidents to management and seeking approval from the Board or senior management. The procedures should also prescribe the actions required for the approval of temporary excesses and limit increases.

Principle- 6 In market risk measurement and monitoring, stress tests and scenario analyses should be used as well as the models being developed.

49. Stress testing should form an integral part of market risk management process. Banks should choose scenarios based on analyzing historical data of changes in market risk factors or creating forward-looking scenarios. The objective should be to allow the bank to assess the effects of changes in market risk factors on its holdings and financial condition. Hence, although it is a low probability, the scenarios that may cause major losses should be taken in to consideration. Scenario analysis and stress tests should include both quantitative and qualitative features.
50. Stress testing and scenario analysis should be conducted on a bank-wide basis, taking into account the effects of unusual changes in market and non-market risk factors. Such factors include prices, interest rates, volatilities, market liquidity, historical correlations and assumptions in stressed market conditions, the bank's vulnerability to worst case scenarios or the default of a large counterparty and maximum cash inflow and outflow assumptions.
51. Scenario analysis and stress testing would enable the Board and senior management to assess the potential impact of various market related changes on the bank's balance of income and expenses and capital position and business plans. The Board and senior management should regularly review the results of scenario analyses and stress testing, including the major assumptions that underpin them. The results of such works should be considered during the establishment and review of policies and limits. Considering the potential losses projected by the scenario analysis and stress tests and the likelihood of such losses occurring, in addition to the fact that the Board and senior management may take additional measures to manage the risks, action plans can also be implemented.

52. Stress testing should be conducted both on a bank-wide and trading desks basis. In determining trading test limits, the results of the above-cited tests should be used.
53. Frequency of stress testing and reporting should be determined in terms of the position taken in trading calculations. In any case, this duration should not be more than a month.
54. Banks should have the capacity to conduct stress testing daily.
55. In addition to principles and bases in this guideline related to stress testing, principles and bases in the "Guideline on Stress Tests to be Used in Capital and Liquidity of Banks" should also be taken into account.

Principle- 7 Banks should regularly implement a program containing activities of independently reviewing and monitoring the integrity, accuracy, and effectiveness of the established market risk management. Such activities are conducted by internal independent teams or independent third parties (e.g. an independent audit institution).

56. Audits and reviews to be conducted within the context of the program should also cover the activities of relevant business line and the internal control functions related to the activities. The results of audit and review along with the remedial actions for identified weaknesses should periodically and directly be reported to the Board or an authorized committee (e.g. audit committee).
57. The reviews and assessments should at least include the following factors:
    a) adequacy of the extent of market risk management processes (considering type, content, and complexity level of positions that caused market risk, should be probed whether they have been dealt with adequately in the bank's market risk management process);
    b) accuracy and suitability of used risk management systems with integration level of outputs, produced by the systems, into daily risk management activities and decision making processes;
    c) results of verification reports related to the models used in pricing and valuation;
    d) credibility, completeness, integrity, and consistency of data and data sources;
    e) accuracy and suitability of model assumptions; and
    f) testing the models that have been used through retrospective tests.