Unofficial Translation

This translation is for the convenience of those unfamiliar with the Thai language

Please refer to Thai text for the official version

Notification of the Bank of Thailand
No.FPG. 94/2551
Re: Regulations on Market Risk and Capital Requirements for Market Risk of Financial Institutions

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1. Rationale

Market risk is defined as the risk of potential losses of the financial institutions arising from the price volatility or position value including assets, liabilities and contingent liabilities held by the financial institutions. Market risk factors affecting such price or value are change in interest rate, foreign exchange, equity price and commodity price. Holding a large number of instruments or positions exposed to market risk may lead to potential losses to financial institutions' revenue and capital adequacy if the market price of such position is highly volatile. The potential losses due to the change in market price are consist of 2 factors; (1) factors which impact the whole system in the same direction which is called general market risk and (2) change in price arising from the issuer which is called specific risk of debt and equity. Therefore, financial institutions shall adequately maintain capital for potential losses, especially, positions in the trading book which may be impacted in the short term. In addition, financial institutions shall have an appropriate risk management system and tools for measuring, monitoring and controlling risk according to the size and complexity of financial institutions' transactions.

In order to supervise financial institutions' capital for market risk to be in line with the international standards institutions and efficiently and comprehensively reflect the market risk as well as to ensure the appropriateness of market risk management, the Bank of Thailand thereby issued the Notification of the Bank of Thailand on Supervision of Market Risk for financial institutions. In particular, the capital requirements for market risk shall be applied on financial institutions with trading book positions at or above the threshold for 1) interest rate and equity positions in trading book and 2) foreign exchange and commodity positions both in trading book and banking book. There are three approaches for capital requirements calculation, for instance, 1) standardised approach, 2) internal model approach and 3) mixed approach. Financial institutions intending to apply the internal model approach or the mixed approach

shall obtain prior approval from the Bank of Thailand. In addition, financial institutions shall have an appropriate risk management system and tools for measuring, monitoring and controlling risk according to the size and complexity of financial institutions' transactions, as well as, develop an appropriate internal control system.

The Bank of Thailand has issued the Notification of the Bank of Thailand on Supervision of Market Risk of Financial Institutions on 3 Aug 2008 to be in accordance with the Financial Institution Business Act B.E. 2551 (2008) and to compile the circulars regarding supervision policy for market risk and regulations on capital requirements for market risk of financial institutions in the same Notification. Financial institutions which are permitted by the Bank of Thailand to apply the internal model approach, mixed approach, or any particular approach on a case by case basis may proceed without seeking for further approval.

In this regard, the Bank of Thailand has modified the Notification of the Bank of Thailand on Supervision of Market Risk and Capital Requirements for Market Risk of Financial Institutions to be consistent with the principle of the capital requirements for market risk under the Base II (2006). The main essence of the regulation which has been modified are the additional capital charge for specific risk of interest rate risk under the standardised approach, as well as, the scope and preparation of trading book policy by prescribing the additional prudential valuation guidance for a better clarification.

2. Statutory Power

By virtue of Section 30 and Section 71 of the Financial Institution Business Act B.E. 2551 (2008)

3. Repealed/Amended Notification and Circulars

Repealed notification and circulars are listed in attachment 1.

4. Scope of Application

This Notification shall apply to all financial institutions according to the law on financial institution business except credit foncier companies.

5. Content

5.1 Definition

In this Notification

"Market risk" means the risk in which financial institutions may encounter losses due to the change in on and off-balance-sheet positions arising from movements in interest rate, equity price, foreign exchange rate and commodity price. The movements in interest rate and equity price can be caused by general market risk and/or specific risk.

"Trading book" means positions in **financial instruments and commodities**[1] held with trading intent or hedging other positions in trading book. This includes all types of financial derivatives which have not been used to hedge risk of the banking book positions. Whereas, financial instruments in trading book shall be free of any restrictive covenants on their tradability or able to be hedged completely. In addition, such positions shall be frequently and accurately valued, and the portfolio should be actively managed.

"Banking book" means positions in financial instruments or other transactions which are not held with trading intent or financial instruments which financial institutions intend to hold for long-term goal or hold to maturity.

"Trading Intent position" means positions held intentionally for short-term resale and/or with the intent of benefiting from price movements or lock in arbitrage profit in different markets, including proprietary positions and positions arising from client servicing such as matched principal brokering and market making.

"Capital" means

(1) Capital for locally-incorporated banks as prescribed as the total capital in **the Notification of the Bank of Thailand on Supervision of Capital for Commercial Banks.**

(2) Capital for foreign bank branches as prescribed in **the Notification of the Bank of Thailand on Supervision of Capital for Commercial Banks.**

(3) Capital for finance companies as prescribed as the total capital in the Notification of the Bank of Thailand on Capital Supervision for Finance Companies.

"Trading book position at and above the threshold" means trading book positions which financial institutions consider to be a significant level (threshold) according to the regulation on assessing level of trading book positions prescribed by the Bank of Thailand (attachment 2).

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[1] **At present, the Bank of Thailand permits commercial banks to engage in only derivative transactions linked to commodities.**

"Trading book position below the threshold" means trading book positions which financial institutions consider to be less than significant level (threshold) according to the regulation on assessing level of trading book positions prescribed by the Bank of Thailand (attachment 2).

"Market risk-weighted asset" means risk-weighted assets which are calculated by multiply the capital requirements for market risk as prescribed herein, with 12.5.

"Board of Directors" mean the board of directors of a locally-incorporated financial institution or the management with relevant authority and responsibility of a foreign bank branch.

5.2 Scope of market risk supervision

Financial institutions shall comply with the market risk supervision which covers a component of risk arising from change in interest rate, equity, foreign exchange, and commodity. The details are prescribed in 5 topics as follows:

5.2.1 Assessing level of trading book positions

5.2.2 Internal control for market risk management

5.2.3 Preparation of trading book policy

5.2.4 Capital requirements for market risk

(1) Capital requirements for market risk under standardised approach

(2) Capital requirements for market risk under internal model approach

(3) Capital requirements for market risk under mixed approach

5.2.5 Data reporting

5.3 Compliance with market risk supervision regulation

Financial institutions shall assess the level of trading book positions as prescribed in 5.4, in order to determine the level of compliance that is consistent with the nature, volume, and complexity of positions as follows;

5.3.1 Financial institutions with trading book positions **at or above the threshold**, set out by the Bank of Thailand, shall comply with requirements in 5.2.1 – 5.2.5.

5.3.2 Financial institutions with trading book positions **below the threshold**, set out by the Bank of Thailand, shall comply with requirements in 5.2.1 – 5.2.3 and shall calculate capital requirements for market risk only for commodity as prescribed in 5.2.4-5.2.5.

5.4 Regulation on assessing level of trading book positions

5.4.1 Financial institutions shall refer to the level of trading book positions which the Bank of Thailand considers to be a significant level (threshold), according to the regulation on assessing level of trading book positions as prescribed in attachment 2. On this, the Bank of Thailand may periodically review the threshold of the trading book positions to be align with the financial market environment and accounting standard which may be changed in the future.

5.4.2 All financial institutions shall assess their level of trading book positions and compare to the threshold. The assessment is calculated according to the reporting form on trading book position, prescribed by the Bank of Thailand. Currently, such report is available on the Data Management System in which financial institutions shall submit on a monthly basis (see example in attachment 2.1). On this,

(1) Financial institutions with trading book positions **at or above the threshold** shall continually comply with requirement in 5.3.1. **Financial institutions may request for an approval from the Bank of Thailand to revoke such compliance in which the Bank of Thailand may consider on a case-by-case basis** providing that financial institutions have a significant reason. For instance, the financial institution has a policy to revoke trading activities or its trading book positions are very low for a long period of time, etc.

(2) Financial institutions with trading book positions **below the threshold** shall comply with requirement in 5.3.2, as well as, regularly monitor the financial institutions' positions. The Bank of Thailand will review the threshold every 6 months.

5.5 Internal control for market risk management

The board of directors and senior management of the financial institutions shall develop an internal control system for market risk management

which shall be complied to the regulations on internal control for market risk management as prescribed by the Bank of Thailand in attachment 3. On this, such internal control system shall incorporate the following;

5.5.1 Roles and responsibilities of the board of directors and senior management of the financial institutions

5.5.2 Guideline on risk measuring, monitoring, and assessment

5.5.3 Guidelines on risk controlling and segregation of duties

5.5.4 Guidelines on record keeping and internal communication

5.5.5 Internal audit system and corrective action

5.6 Regulations on preparation of trading book policy

Financial institutions shall prepare trading book policy in consistent with the nature, level, and complexity of the financial institutions' positions, according to the regulations on preparation of trading book policy as prescribed by the Bank of Thailand **in attachment 4** as follows;

5.6.1 Trading book consists of positions in financial instruments such as debt instruments, equity that financial institutions held with trading intent or hedging other positions in trading book, as well as, all derivative transactions that are not held for hedging banking book positions. Financial instruments in trading book shall be free of any restrictive covenants on their tradability. In addition, such positions shall be frequently and accurately valued, as well as, the portfolio should be actively managed.

5.6.2 Financial institutions shall prepare such policy in written for the examination by the Bank of Thailand upon request. Such policy shall incorporate minimum details as prescribed by the Bank of Thailand, especially, policy on classifying of financial instruments in the trading book and the banking book, policy on transferring transactions or risk positions between a trading book and a banking book, holding period of trading book positions, policies, trading strategy and procedures in managing positions.

5.6.3 The board of directors or other delegated committee shall approve such policies and communicate to involved parties for implementation.

5.6.4 Such policies shall explicitly prescribe a periodical reviewing period in order to be consistent with situations and changes in business. Any major modifications shall be approved by the board of directors or the delegated committee.

5.6.5 Financial institutions shall set out an appropriate valuation system for trading book positions, as well as, adequate internal control system so that the board of directors and senior management can be ensured that such valuation system is accurate, appropriate, and reliable. (details as prescribed in attachment 4.2)

5.7 Capital requirements for market risk

5.7.1 Financial institutions with positions exposed to market risk shall maintain sufficient capital for market risk on an ongoing basis.

5.7.2 Financial institutions with trading book positions **at and above the threshold** shall maintain capital for market risk according to risk factors as prescribed in (1) to (4) below for financial institutions with trading book positions **below the threshold**, they shall maintain capital for market risk only for the risk factor prescribed in (4).

(1) Interest rate risk arising from positions in trading book

(2) Equity risk arising from positions in trading book

(3) Foreign exchange risk arising from all foreign exchange positions

(4) Commodity risk arising from all commodity positions

On this, financial institutions with trading book positions below the threshold shall maintain capital for relevant credit risk for all trading book positions according to the Notification of the Bank of Thailand on Supervision of Capital for Commercial Banks and the Notification of the Bank of Thailand on Capital Supervision for Finance Companies.

In addition, financial institutions shall maintain market risk capital for credit derivatives in trading book according to the Notification of the Bank of Thailand on Permission for Commercial Banks to Engage in Credit Derivatives.

5.7.3 The Bank of Thailand may order financial institutions with trading book positions **below the threshold** to maintain capital for all risk factors or any factor in addition to the commodity risk as prescribed in article 5.7.2 (4) and **credit derivatives in trading book** if the Bank of Thailand foresees that such order

enhance financial institutions' stability. In such case, the Bank of Thailand may consider such order afterwards.

5.7.4 Financial institutions shall calculate capital requirements for the risk factors as prescribed in 5.7.2 with one of the following approaches;

(1) Standardised approach; **or**

(2) Internal model approach; **or**

(3) Mixed approach between standardised approach and internal model approach.

5.7.5 Financial institutions shall multiply the capital requirements for market risk as prescribed in 5.7.4. with 12.5, resulting in the market risk-weighted assets. This market risk-weighted assets shall be applied in the calculation of capital requirements in proportion of total risk-weighted assets which shall be not less than the ratio prescribed by the Bank of Thailand according to **the Notification of the Bank of Thailand on Supervision of Capital for Commercial Banks and the Notification of the Bank of Thailand on Capital Supervision for Finance Companies.**

On this, total risk-weighted assets **mean the sum of credit risk-weighted assets, market risk-weighted assets and operational risk-weighted assets. The credit risk-weighted assets shall be calculated according to the Notification of the Bank of Thailand on Supervision of Capital for Commercial Banks and the Notification of the Bank of Thailand on Capital Supervision for Finance Companies** (In calculating credit risk-weighted assets for financial institutions with trading book positions at and above the threshold, financial institutions shall not include instruments in trading book[2]; however the counterparty risk from OTC derivatives in all books shall be included and operational risk-weighted assets shall be calculated according to **the Notification of the Bank of Thailand on Supervision of Capital for Commercial Banks.**

5.8 <u>Calculation of capital requirement for market risk under standardised approach</u>

5.8.1 Financial institutions can apply standardised approach to calculate capital requirements for market risk. The capital requirements are depended on the value of position held by the financial institutions and capital

[2] Due to the fact that the credit risk arising from debt and equity instruments in the trading book is already incorporated in specific risk which is incurred from specific factors of issuers in assessing market risk.

charge categorised by risk factors which are interest rate risk, equity risk, foreign exchange risk and commodity risk. The capital charge of each risk factor is determined by the Bank of Thailand. The capital charge for general market risk is estimated from the sensitivity of the position value to changes in each risk factor, by not taking into account the correlation between those risk factors.

On this, the calculation of capital requirements for market risk under standardised approach according to risk factors are as follows;

Risk factor	**Capital charge for each risk factor**		**Calculation details**
	Specific risk	**General market risk**	
Interest rate (including credit derivatives)	0 – 12 % depending on credit risk of the issuer.	0 – 12.5 % depending on remaining maturity or the next interest fixing date of such instrument	**Attachment 5 and Notification of the Bank of Thailand on Permission for Commercial Banks to Engage in Credit Derivatives.**
Equity	2, 4 and 8 % depending on liquidity of such equity and the diversification of investment.	8 %	**Attachment 6**
Foreign exchange	None	8 %	**Attachment 7**
Commodity	None	0.6 % – 15 % depending on remaining maturity	**Attachment 8**
Options	Calculation of capital requirements for options can be calculated in 3 methods; 1) Simplified method 2) Delta plus method and 3) Contingent loss method		**Attachment 9**

5.9 <u>Calculation of capital requirement for market risk under internal model approach</u>

Financial institutions can apply internal model approach to calculate capital requirements for market risk after getting an approval from the Bank of Thailand. In assessing risk by this approach, financial institutions shall comply with the relevant regulations and guidelines. **Details are shown in attachment 10 as follows;**

5.9.1 Qualitative standards

5.9.2 Specification of market risk factors

5.9.3 Quantitative standards

5.9.4 Regulation on stress testing

5.9.5 Regulation on backtesting and specification of plus factor

5.9.6 Regulation on of specific risk assessment under the internal model approach

5.10 Calculation of capital requirement for market risk under mixed approach

5.10.1 Financial institutions can apply mixed approach, which is a combination of standardised approach and internal model approach to calculate capital requirements for market risk in each risk factor. However, the Bank of Thailand does not permit financial institutions to apply 2 different approaches in calculating capital requirements for the same risk factor. For instance, calculate capital requirements for interest rate risk for different type of instruments with both standardised approach and internal model approach, except risk assessment for options or positions which are difficult to assess risk and get the approval from the Bank of Thailand.

5.10.2 If financial institutions apply the internal model approach in calculating capital requirements for any particular risk factor, the Bank of Thailand does not permit financial institutions to apply the standardised approach for such risk factor, except for the case that the Bank of Thailand has revoked the permission to apply the internal model approach. However, during the development of internal model for assessing all market risk factors, the Bank of Thailand does not set the timeframe for financial institutions to apply the internal model approach together with the standardised approach in calculating the capital requirements.

On this, financial institutions shall refer to the relevant regulations, regarding the mixed approach in **attachment 11**.

5.11 Data reporting

Financial institutions shall prepare and submit report on assessing level of trading book positions, currently available on the Data Management System under Total Trading Book Position set (DS_TBP), and other relevant reports on capital

requirements for market risk in the form of excel file to the Bank of Thailand according to the regulations on preparation of data reporting as prescribed in **attachment 12.**

6. Effective Date

This Notification shall come into force as from the dates of its publication in the Government Gazette.

Announced on 27th November 2008

(Mrs. Tarisa Watanagase)
Governor
Bank of Thailand

Attachments

Re: Regulations on Supervision of Market Risk and Capital Requirement for Market Risk of Financial Institutions

Attachment	1	Repealed / amended notification and circulars
Attachment	2	Regulations on assessing level of trading book positions
Attachment	2.1	Reporting form and reporting instructions for trading book positions
Attachment	3	Regulations on internal control for market risk management
Attachment	4	Regulations on preparation of trading book policy
Attachment	4.1	Example of financial instruments classified in a trading book
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Attachment	5	Regulations on calculation of capital requirement for interest rate risk under standardised approach
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Attachment	5.3	List of accepted credit rating agencies
Attachment	5.4	Guidelines on recording treatment for financial derivatives positions
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Attachment	9	Regulations on calculation of capital requirement for market risk of options
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Attachment	9.2	Example of calculation of capital requirement for options risk under scenario analysis or contingent loss approach
Attachment	10	Regulations on calculation of capital requirement for market risk under internal model approach

Attachment	10.1	List of documents and related information required for obtaining permission to apply internal model approach
Attachment	10.2	Guidelines on stress test conducting under stress scenarios prescribed by the Bank of Thailand and examples
Attachment	10.3	Example of calculation of capital requirement for market risk (in case of using internal model to calculate specific risk)
Attachment	11	Regulations on calculation of capital requirement for market risk under mixed approach
Attachment	12	Regulations on preparation of relevant data and reports

Attachment 1

Repealed / amended notification and circulars

No.	Date of the Notification of the Bank of Thailand / Circulars	Type	Reference No.	Subject
1	3 Aug 2008	Notification of the Bank of Thailand	FPG.56/2551	Regulations on Supervision of Market Risk and Capital Requirements for Market Risk of Financial Institutions

Attachment 2

Regulations on assessing level of trading book positions

1. Financial institutions shall assess level of trading book positions in accordance with guidelines prescribed by the Bank of Thailand in order to determine the threshold level. The level of trading book positions which is considered significant are:

1.1 The amount of baht-equivalent trading book positions of all currencies averaged over the last 6 months of 3,000 million baht and above or

1.2 The proportion of the amount of baht-equivalent trading book positions to the sum baht-equivalent of total assets, total liabilities, and total derivative transactions in all currencies, averaged over the last 6 months of 5% and above.

1.3 The Bank of Thailand may occasionally consider reviewing threshold of trading book positions to be in line with the financial market conditions and the associated accounting standards that may change in the future.

2. In calculating the amount of trading book positions for the objective as prescribed in 1., financial institutions shall combine on-balance sheet trading book positions, derivative transactions in a trading book and all foreign exchange positions of all currencies (the sum of 2.1, 2.2, and 2.3) as follows:

2.1 The sum of long and short positions in debt instruments and equity instruments in a trading book and Repo, Reverse repo and security borrowing and lending (SBL) transactions, as prescribed in the regulations on trading book policy. Financial institutions shall report such amount in fair value.

2.2 The total amount of derivative transactions in a trading book means the sum of the notional amount[1] of all derivative transactions less the sum of the notional amount of derivative transactions used to hedge positions in a banking book which separately reports according to risk types of derivatives.

[1] Notional amount means the contractual amount of derivative contract. In case where the derivative contract derived from plain vanilla derivatives or has leveraged the contractual amount or has exchanged the contractual amount several times (Structured product), financial institutions shall sum the contractual amount of all transactions separating by types of risk on the report. For transaction with high complexity, financial institution shall consult the Bank of Thailand on a case by case basis.

2.3 Aggregate foreign exchange position means the higher amount between 1) the absolute value of sum baht-equivalent of all net FX overbought positions, and 2) the absolute value of sum baht-equivalent of all net FX oversold positions.

3. For assessing the amount of trading book positions as prescribed in 1.2, the sum of all assets, liabilities, and derivative transactions means the sum baht-equivalent of total assets, total liabilities, and total derivative transactions in all currencies

Financial institutions may refer to "Reporting instructions for trading book positions" as prescribed in attachment 2.1 for more detail.

Attachment 2.1

Bank Name.....

Reporting Form on Trading Book Positions

for the 6-month period from Jan. (Jul.).....to Jun. (Dec.).....Year .....

	January to June (or July to December)						Average Proportion (%)
	Jan. (Jul.)	Feb. (Aug.)	Mar. (Sep.)	Apr. (Oct.)	May (Nov.)	Jun. (Dec.)	
1. Proportion of trading book positions (% to sum of total assets, liabilities, and derivative transactions)							

unit: Baht

2. On-balance sheet trading book positions	Amount at month-end						Average
Debt instruments positions							
Positions from Repo / Reverse repo and security borrowing and lending							
Equity instruments positions							
Total on-balance sheet trading book positions							

3. Derivative transactions in a trading book	Amount at month-end						Average
Derivatives linked to interest rate and debt instrument							
Derivatives linked to equity price and stock index							
Derivatives linked to foreign exchange							
Derivatives linked to commodity price							
Total derivative transactions in a trading book							

4. Foreign exchange positions of all currencies							

5. Total trading book positions (2.+3.+4.)							

6. Total assets, liabilities, and derivative transactions	Amount at month-end						Average
Total assets							
Total liabilities							
Derivative transactions in a trading book							
Derivative transactions in a banking book							
Total assets, liabilities, and derivative transactions							

Reporting instructions for trading book positions

A. General definitions

1. This report is a report on trading book positions of financial institutions which is used to classify financial institutions into 2 groups; 1) financial institutions with trading positions at and above the threshold level and 2) financial institutions with trading positions below the threshold level. The objective of this classification is to identify the scope of implementation of the market risk supervision policy. This report has categorised the types of trading book positions as follows; 1) Proportion of trading book positions pursuant to the regulations prescribed by the Bank of Thailand to the sum of total assets, total liabilities, and total derivative transactions 2) On-balance sheet trading book positions 3) Derivative transactions in a trading book 4) Foreign exchange positions of all currencies 5) Total trading book positions and 6) Total assets, liabilities, and derivative transactions. The reported amount shall be in accordance with the regulations and procedures as prescribed by the Bank of Thailand under regulations on assessing amount of trading book positions. Financial institutions shall prepare supporting documents used in the preparation of the report, including arrange for an audit trail for an examination by the Bank of Thailand as well.

2. Financial institutions shall prepare the monthly report on trading book positions on a consolidated basis for all offices on the last day of every month and submit such report to the Financial Institutions Data Division, Data Management Department, Bank of Thailand, every 6 months, within 21 days from the end of June and December. The reported amount shall be in thousands, with “,” after a thousandth and millionth digit.

3. Should there be any inquiries regarding this report, please contact the Prudential Policy Department, Financial Institutions Policy Group, Bank of Thailand, Tel. 0-2283-6821, 0-2283-5483, 0-2356-7688 and 0-2283-5804.

B. Definitions

This report is a report on trading book positions, which is used to identify the scope of implementation of market risk supervision policy. In this regard, financial institutions shall monthly report trading book positions for 6 months (starting January to June or July to December) and the 6-month averaged positions (sum of 6- month outstanding divided by 6), and submit them to the Bank of Thailand. The report is

categorised according to types of transaction and position in a trading book as follows:

1. Proportion of trading book positions pursuant to the regulations prescribed by the Bank of Thailand (% to sum of total assets, liabilities, and derivative transactions) means the ratio of total trading book positions of financial institutions calculated as a percentage of total assets, liabilities, and derivative transactions of financial institutions (from 5.*100 / 6.).

2. On-balance sheet trading book position means total of on-balance sheet trading book positions which can be categorised by types of position as follows:

2.1 Debt instruments position means the sum of fair value of long and short positions in debt instruments held by financial institution in a trading book in accordance with the trading book policy

2.2 Position from Repo (borrowing of money) or security lending (lending of securities) and Reverse repo (lending of money) or security borrowing (borrowing of securities) transactions in the following cases:

(1) In case of Repo transactions pledged with instruments in a trading book or instruments in a banking book in which the money borrowed is used for trading book transactions

(2) In case of security lending transactions which the security received is used for other trading book transactions

(3) In case of Reverse repo or security borrowing transactions which financial institutions intend to use the collateralised security or the borrowed security for other transactions with trading intent e.g. use of bond in Reverse repo or security borrowing transactions to settle for short selling bond.

2.3 Equity position means the sum of fair value of long and short positions in equity instruments held by financial institutions in a trading book in accordance with the trading book policy.

Total on-balance sheet trading book position means the sum of trading book positions arisen from debt instruments positions, Repo / Reverse repo and security borrowing / lending positions, and equity instruments positions of financial institutions (the sum of 2.1 to 2.3).

3. Derivative transactions in a trading book mean the sum of notional amount of all derivative transactions in a trading book of financial institutions, categorised by type of derivatives as follows:

3.1 Derivatives linked to interest rate and debt instrument mean the sum of the notional amount of derivatives linked to interest rate, debt instrument or **credit derivatives**, which financial institutions undertake for themselves or for their clients e.g. forward bond, bond options, interest rate swap, interest rate options, etc. However, this does not include derivative transactions that financial institutions undertake to hedge positions in a banking book in accordance with the regulations specified by the Bank of Thailand.

3.2 Derivatives linked to equity price and stock index mean the sum of notional amount of derivatives linked to equity price or stock price index, which financial institutions undertake for themselves or for their clients, e.g. equity swaps, etc. However, this does not include derivative transactions that financial institutions undertake to hedge positions in a banking book in accordance with the regulations specified by the Bank of Thailand.

3.3 Derivatives linked to foreign exchange mean the sum of notional amount of derivatives linked to foreign exchange that financial institutions undertake for themselves or for their clients in accordance with the regulations specified by the Bank of Thailand e.g. FX forward/future, FX swaps, cross currency swaps, etc.

3.4 Derivatives linked to commodity price mean the sum of notional amount of derivatives linked to commodity price which financial institutions undertake for themselves or for their clients in accordance with the regulations specified by the Bank of Thailand.

Total derivative transactions in a trading book means the sum of notional amount of derivatives linked to interest rate, equity price, stock index or commodity price in a trading book of financial institutions (the sum of article 3.1 to article 3.4).

4. Aggregate foreign exchange position of all currencies means the higher amount between 1) the absolute value of the sum baht-equivalent of all net FX overbought positions and 2) the absolute value of the sum baht-equivalent of all net FX oversold positions.

5. Total trading book positions mean the sum of on-balance sheet trading book positions, derivative transactions in a trading book, and foreign exchange positions of all currencies (the sum of 2., 3., and 4.).

6. Total assets, liabilities, and derivative transactions mean the sum of total assets, total liabilities, and total derivative transactions.

6.1 Total assets mean the outstanding of all financial institutions' assets.

6.2 Total liabilities mean the outstanding of all financial institutions' liabilities.

6.3 Derivative transactions in a trading book mean the sum of notional amount of all derivative transactions in a trading book of financial institutions (equals to amount in 3.).

6.4 Derivative transactions in a banking book mean the sum of notional amount of all derivative transactions in a banking book of financial institutions.

Total assets, liabilities, and derivative transactions means the sum of total assets, total liabilities, derivative transactions in a trading book, and derivative transactions in a banking book (the sum of 6.1 to 6.4).

Attachment 3

Regulations on internal control for market risk management

1. Role and responsibility of the board of directors of the financial institutions[1] and senior management

1.1 The board of directors of the financial institution has duties and responsibilities in market risk management as follows:

1) Approve and periodically review business strategies and major policies of financial institutions.

2) Acknowledge and understand types of market risk that financial institutions exposed to as well as ensure that the market risk management system covers all types of transactions of the financial institutions.

3) Specify risk appetite.

4) Approve the market risk management system and delegate to responsible sub-committees or senior management to set procedures and implement.

5) Approve organisational structure (regarding the risk management) in order to balance the power.

6) Ensure that senior management has set adequate and appropriate internal control policies.

1.2 Senior management has duties and responsibilities in market risk management as follows:

1) Implement the strategies and policies approved by the board of directors.

2) Set a process to identify, assess, control, and monitor market risk of financial institutions.

3) Adequately allocate resources to support the risk management system.

[1] or other delegated committee in case of branches of foreign banks

4) Clearly specify role and responsibilities, line of authority and reporting.

5) Adequately and appropriately set internal control policies, including strictly monitor policies compliance.

6) Ensure that associated policies are constantly reviewed to be in line with strategies and changing environment.

7) Approve guideline on new financial products, including objectives and procedure of the transaction, as well as relevant market risk factors; analyse risk and impact that may occur to the financial institutions; approve guidelines on assessing, auditing, and controlling those risks, including consideration of related legal, accounting, and tax issues, and report to the board of directors.

1.3 The board of directors and/or senior management may delegate the line of authority to sub-committees or managers of lower level of seniority to manage or take any action in market risk management, however, the board of directors and senior management are still subjected to this responsibility. Therefore, the board of directors and senior management shall closely monitor to ensure that the delegated responsibilities are accurately and effectively carried out.

1.4 The board of directors and/or senior management shall establish a contingency plan to support a crisis as a result of the market risk, including a succession plan for a change in the personnel responsible for managing or controlling market risk in order to ensure continuity of operations.

1.5 The board of directors or sub-committees shall establish an appropriate remuneration policy to induce and retain high quality personnel and maintain the integrity of operations. However, the compensation should not depend too much on the operating performance or profits to prevent an incentive to increase risk to an unacceptable level. The compensation should be based on quality of works compared to an acceptable level of risk, including compliance with the organisation's rules and practices on market risk management.

1.6 The board of directors and/or senior management shall ensure that a recruitment process focuses on experience, expertise, and other relevant qualifications appropriate for the assignment.

1.7 The board of directors and/or senior management shall provide adequate and regular training for the management and staffs e.g. training on new financial

instruments and related laws. In addition, an appropriate periodic job rotation of staffs in various positions should be implemented so that they can be substituted of each other, resulting in a more flexible and effective personnel management.

1.8 The board of directors and/or senior management is responsible for supporting morale and integrity by setting up a prudent policy and procedure to prevent any act that may adversely affect the organisation's reputation.

1.9 The board of directors and/or senior management shall develop a corporate culture which emphasise on internal control so that staff at all level realise and understand their role in internal control process and strictly comply.

2. Guideline on risk measuring, monitoring, and assessment

Financial institutions shall establish an effective risk management and internal control system that can continuously measure, monitor, and assess market risk that may adversely affect the goal of financial institutions. Such risk assessment shall include risk arisen from all types of transactions and shall be reviewed periodically to be able to manage new risk factors or other risk factors that are still not be controlled.

3. Guidelines on risk controlling and segregation of duties

3.1 Financial institutions shall incorporate an internal control system as an important part of operation by specifying a framework and detailed control procedures for every level of an organisation as follows:

1) Supervision by the board of directors and senior management to monitor effectiveness of compliance of overall organisation.

2) Review of operations in various units by management of those units. Such review should be conducted more often and into more details than the review by the board of directors and senior management.

3) Physical control that emphasises security controls for important work places e.g. the trading room and computer room in order to reduce risk arisen from unauthorised transactions. The security system shall include protection of valuable assets such as deposits and financial instruments.

4) Conforming to the risk management control of the organisation by appointing senior officers or unit with necessary expertise to responsible for ensuring a strict compliance to the rules and regulations of the organisation. Where the irregularity

or causes of problem are found in compliance of staff, such irregularity or causes shall be reported to senior management for corrective actions.

5) Determination of line of authority and responsibilities of staff of various levels shall be documented in writing which shall specify details of authority, delegation of authority, and restriction in delegation of authority.

6) Verification of transaction details and effectiveness of risk hedging, including reconciliation of various accounts in order to track errors.

7) Documentation of relevant agreements with counterparty shall be conducted with accuracy and completeness by specifying detailed responsibilities of each party. In addition, there should be a procedure to verify the legitimacy of such counterparty before entering into the transactions.

8) Senior management shall establish a clear segregation of duties with no duplication or intersection of assignment or allow any opportunity for any action of own interests. In addition, senior management should specify any conflicts of interest and try to prevent or reduce the possibility that such events will occur, as well as regularly monitor by independent delegates.

3.2 Financial institutions shall specify rules or code of conduct to be used as a guideline for relevant staff, corresponding to business structure, size, and complexity. Financial institutions shall specify the ethical values, such as, acceptance of gifts, avoidance of conflicts of interests or personal benefits, and keeping of confidentiality of organisation.

4. Guidelines on record keeping and internal communication

4.1 Financial institutions shall have an adequate data recording system, which entails information of all types of transactions related to the business e.g. financial data, operation, and compliance of staff personnel, including external market conditions information related to a decision-making process. Such information shall be reliable, accessible, timely, and stored in an appropriate standardised form. In addition, the system shall be provided with security, accessible only by involved persons, and monitored by independent responsible staff. There should also be a back-up system and a recovery process available for emergency case.

4.2 Financial institutions shall establish an internal control system for accounting record of on and off-balance sheet items in order to ensure completeness,

accuracy and reliability, especially, data on treasury transactions and financial derivatives used for hedging or trading.

4.3 Financial institutions shall establish an effective internal communication system to encourage understanding and conforming to the policy and rules of the organisation, as well as, to ensure that all data are submitted to relevant staff completely and accurately.

5. Internal audit system and corrective action

5.1 Financial institutions shall continuously audit the internal control system by incorporate the potential risk assessment as part of the operation of the financial institutions. Thus, the problems or errors can be detected and solved in a timely manner. In addition, financial institutions shall review and assess the internal control system regularly. Frequency and scope of audit shall be in accordance with the nature, complexity and risk of various transactions of financial institutions.

5.2 Financial institutions shall appoint the internal auditors who have knowledge, capability, experience and expertise in financial institution businesses. Such auditors shall understand their roles and responsibility and be independent from other business units.

5.3 Financial institutions shall set a process for reporting or informing of any problems or irregularities found on internal audit system to the related management according to the line of authority in a timely manner. In addition, financial institutions shall summarise critical problems or irregularities and escalate to the board of directors or audit committee and senior management in timely manner for further collective actions.

5.4 Financial institutions shall develop a guideline to handle problems and complaints as well as timeframe to resolves such problems. Financial institutions shall assign staff who do not have direct involvement in such complaints to collect, record, investigate and examine such complaints. These staff shall also be responsible for providing explanation for further understanding of appellants or processing the compensation to such appellants.

Attachment 4

Regulations on preparation of trading book policy

1. Definitions: Financial institutions shall refer to the following definitions for preparation of trading book policy[1]

1.1 Trading book position means position of **financial instruments and commodities**[2] held with trading intent or for hedging of other positions in a trading book, including all types of financial derivatives which have not been used to hedge banking book's position. In addition, financial instruments in a trading book shall not be restricted in terms of trading or hedging. Also, such positions shall be valued accurately and regularly as well as managed properly.

1.2 Banking book consists of position of financial instruments or other transactions which are not intended for trading or financial instruments which the financial institutions intend to hold for a long period of time or hold to maturity.

1.3 Trading intend position means short-term positions with intention to resell and/or to benefit from price changes or profit from price arbitrage in the different markets, including both positions of financial institutions and positions resulting from clients' transactions such as matched principal brokering service and position as a result of being market makers.

1.4 Financial instrument means any agreement which causes financial assets of one entity to increase and financial liabilities or equity instruments of the other entity to increase simultaneously. Financial instruments include debt instruments, equity instruments and derivative transactions.

1.5 Financial asset means cash, equity instruments of other entity and contractual obligation to receive cash or other financial assets of other entity, or an agreement to exchange financial assets or equity instruments under conditions that potentially favourable to the entity.

1.6 Financial liability means contractual obligation to deliver cash or other financial assets or an agreement to exchange financial liabilities under conditions that potentially unfavourable to the entity.

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[1] Grouping of financial institutions' transactions according to regulations on supervision of the market risk is not directly related to the grouping according to the Accounting Standard No 40.

[2] Currently, the Bank of Thailand has allowed commercial banks to engage in derivatives linked to commodity price.

1.7 Financial instruments classified in a trading book (example on attachment 4.1) shall have one of the following characteristics:

1) Debt instruments, equity instruments, and other securities that have the same characteristic as debt instruments or equity instruments in which financial institutions hold with trading intent or

2) All types of derivative transactions linked to interest rate, equity price, foreign exchange, and commodity price, except derivative transactions used to hedge positions in a banking book[3] or

3) Repo (borrowing of money) or security lending and Reverse repo (lending of money) or security borrowing in the following cases:

- In case of Repo transactions pledged with instruments in a trading book or instruments in a banking book in which the money borrowed is used for trading book transactions.
- In case of security lending transactions which the security received is used for other trading book transactions
- In case of Reverse repo or security borrowing transactions which financial institutions intend to use the collateralised security or the borrowed security for other transactions with trading intent e.g. use of bond in Reverse repo or security borrowing transactions to settle for short selling bond.

Financial institutions may include a term-related Repo-Style transactions that are classified as banking book position into a trading book for calculation of capital requirement for market risk. In such case, financial institutions shall include all transactions aforementioned in calculation and shall conform to such practice constantly. In addition, all Repo transactions are required to maintain capital for counterparty credit risk.

2. <u>Preparation of trading book policy</u>

Financial institutions shall prepare a trading book policy in accordance with the amount and complexity of transactions as follows;

2.1 Financial institutions shall prepare a trading book policy in writing in order to determine positions in a trading book and to calculate capital requirement for

[3] In case where instruments in a trading book is used to hedge banking book positions, both one-on-one or partial or portfolio hedging, such instruments shall be transferred to the banking book.

market risk in accordance with guidelines and scope set out under supervision of market risk as prescribed in this Notification and shall be available for an examination by the Bank of Thailand upon request.

2.2 Financial institutions shall incorporate the trading book policy as part of the overall risk management policy.

2.3 The board of directors of the financial institutions or other designated committee shall be responsible for approving the policy. Such policy shall be distributed to all relevant parities and complied with. In addition, financial institutions shall have evidences that demonstrate the compliance with such policy and internal control of the financial institutions.

2.4 The regular reviews of such policy shall be clearly determined to be in line with the changing situation and business. If there is an enhancement on a significant area of the policy, the revision shall be approved by the board of directors of the financial institutions or other designated committee.

3. Scope of trading book policy

Financial institutions shall determine scope of the trading book policy to cover the following aspects:

3.1 All activities which financial institutions set out as activities in a trading book which will be used in calculating capital requirement for market risk.

3.2 Scope and guideline on daily marked to market of the trading book positions by referring to active liquid two-way market.

3.3 In case the fair value of the positions are assessed by marked to model, financial institutions shall identify details as follows:

3.3.1 Identify the significant risk of positions with marked to model for fair value assessment.

3.3.2 Hedging of significant risk of positions that are marked to model and scope of financial instruments used to hedge risk from liquid market.

3.3.3 Receiving of reliable information for important assumptions and parameters used in the model.

3.4 Scope and guideline which financial institutions can apply for assessing fair value of positions and such value shall be acquirable from external parties on a regular basis.

3.5 Scope and guideline concerning on legal restrictions or other operational regulations which may impact ability to liquidate trading book position in a timely manner.

3.6 Scope and guideline on actively manage the trading book position.

3.7 Scope and guideline on transferring risk and positions between a trading book and a banking book.

4. Details on trading book policy

Financial institutions shall set out the details regarding trading book positions which shall entail the following aspects:

4.1 Guideline or policy in which financial institutions use in categorising financial instruments into trading book, including transaction details or instruments with trading intent and normally classified as trading book positions.

4.2 Policy on transferring transactions or risk positions between a trading book and a banking book in which financial institutions shall clearly appoint authorised or responsible persons for approval such transfer. In this regard, these persons shall be a sub-committee or senior management who responsible for controlling and managing market risk. In addition, consideration of information and appropriated supporting reason shall be required for such action.

4.3 Clearly defined timeframe of position held in a trading book which should be shorter than timeframe of position held in a banking book. However, it shall be in accordance with the trading strategy of the financial institutions.

4.4 Clear trading strategy, policy and procedures in managing positions which shall cover following details:

1) Clear trading strategy for trading book positions, especially, strategy for complicated financial instruments or group of securities which require special attention;

2) Clear guideline on conduction of transaction between trading desks, both internal and external transactions;

3) Clearly identify overall market risk limit and limit for each risk element and for other sub-level limit, as well as develop a clear and appropriate monitoring system;

4) Scope and responsibilities of trading room dealer and authorised persons in various levels for conducting transactions and managing positions under established risk limits in accordance with trading strategy;

5) Procedures used in valuation of trading book positions, at least on a daily basis, according to the price from marked to market or model or other appropriate price whereas such price shall be applied continually, as well as the assessment of quality and type of market inputs used in the valuation procedures, for instance, market turnover. **Details on prudential valuation guidance for trading book positions are prescribed in attachment 4.2;**

However, in case where financial institutions have managed risk by using a back to back approach, which no remaining market risk at all, the Bank of Thailand allows financial institutions to assess fair value of derivative transactions used for back to back at the end of the month instead.

6) Guideline on setting cushion reserves for the position that is difficult to assess by using market price or market has low liquidity in term of price and trading volume.

4.5 Guideline and necessary details for positions used to hedge assets or underlying positions. In this regard, financial institutions shall classified the hedging positions in the same book as underlying assets or hedged items and whenever the positions are not under such obligations, such positions shall be reversed to the previous book.

4.6 Method to be used in assessing market risk, including relevant process and procedures such as designating responsible persons, reviewing of accuracy and submission of data to the Bank of Thailand, etc.

4.7 Clear policy, internal control process and responsible persons for examining the compliance with the trading book policy, especially, in grouping of financial instruments or transferring instruments between books and monitoring on positions which are not complied with the trading strategy, as well as setting up audit trail.

In case where financial institutions use credit derivatives in their trading book to hedge against credit risk of positions in the banking book which are internal deals, such positions are not considered as hedged transactions according to the intention of capital requirement for credit risk. However, if financial institutions engage in credit derivatives with external counterparties to hedge for aforementioned banking book positions, such credit derivatives shall not be classified as trading book positions and capital requirement for market risk is not required. On this, financial institutions shall comply with the Notification of the Bank of Thailand on Permission for Commercial Banks to Engage in Credit Derivatives and Notification of the Bank of Thailand on Permission for Finance Companies to Engage in Credit Default Swaps and Credit Linked Notes.

Attachment 4.1

Example of financial instruments classified in a trading book

1. All types of transferable financial instruments

2. Transferable unit trust traded in an authorised market or OTC

3. Short-term financial instruments e.g. Treasury bills, transferable CDs and commercial paper e.g. B/E

4. Financial future contracts, including cash settled instruments

5. Forward interest rate agreements

6. Interest rate, currency, and equity swaps

7. Options, warrants

8. Repo transactions pledged with instruments in a trading book or instruments in a banking book in which the money borrowed is used for trading book transactions

9. Security lending transactions which the security received is used for other trading book transactions

10. Reverse repo or security borrowing transactions which financial institutions intend to use the collateralised security or the borrowed security for other transactions with trading intent e.g. use of bond in Reverse repo or security borrowing transactions to settle for short selling bond

11. Other derivative transactions not used for hedging banking book positions

Attachment 4.2

Prudential valuation guidance for trading book positions

Financial institutions shall develop a prudential valuation system which contains details as follows:

1. Valuation and internal control system

Financial institutions shall establish an appropriate valuation system for trading book positions and obtain adequate internal control system so that the board of directors and senior management will be confident that such valuation system is accurate, appropriate and reliable. The valuation system shall be incorporated into the overall risk management or other risk management system of financial institutions. Financial institutions shall determine details of valuation and internal control system as follows:

1.1 Preparation of policy and procedures of valuation process for trading book positions, including clearly setting out the responsibilities of valuation unit, defining scope relevant to the valuation, source of market input, frequency of valuation conducted by independent unit, valuation adjustment and validation procedure for accuracy of value from the valuation.

1.2 Establish a unit responsible for performing valuation and reporting to the board of directors or other designated committee. Such line of authority or responsible unit shall be independent from front office.

2. Valuation methodologies

2.1 Marking to market

Financial institutions shall, at least daily, mark to market valuation of positions by using input from independent and acceptable sources in order to come up with the value of positions that close to the close out prices, for instance, prices referred from the Reuter, Bloomberg, or various acceptable agencies, etc. In addition, financial institutions shall use more prudent side of bid or offer that is consistent with the status of financial institutions' positions.

2.2 Marking to model

In case where marking to market is not possible, financial institutions may apply marking to model. However, the marking to model shall be

prudent and use market inputs, as well as, consider in a conservative manner. Financial institutions which apply the making to model shall set out detailed regulations as follows;

1) Senior management shall be aware of the factors which may impact the fair-valued positions which are subject to marked to model and shall understand the uncertainty from such valuation which may create in the reporting of risk and performance of the financial institutions.

2) Financial institutions shall use market inputs to the extent possible and shall regularly review the appropriateness of market inputs used in the model.

3) The valuation methodologies used for valuation of positions shall be generally accepted for those particular positions.

4) The model which has been developed by the financial institutions shall be based on appropriate assumptions, which have been reviewed by an independent unit during the development process. Moreover, the model shall be obtained approval from an independent unit other than a trading unit. In addition, validation of mathematics, model assumptions, and software implementation shall be conducted.

5) Financial institutions shall establish formal change control procedures regarding model improvement as well as maintain documents related to the improvement / changes of the model for further reference and validate.

6) Financial institutions shall take into consideration the weaknesses of model used in valuation as well as the impacts of such weaknesses to the outcome of the model used in risk management. Thus, financial institutions shall prepare and submit report, as it deem appropriate, to the senior management.

7) Financial institutions shall periodically verify the accuracy of the model at least once a year. In case of significant fluctuations in the market price, financial institutions shall verify the accuracy of the model more frequent. In addition, financial institutions shall assess the appropriateness of the assumptions, analyse performance versus risk factors, and compare actual close out values and model outputs.

2.3 Independent price verification

Financial institutions shall regularly conduct independent price verification by establish procedures to verify accuracy of market prices and/or model inputs. The verification shall be performed by a unit independent of the trading unit, at least monthly. The objective of the verification is to reveal any errors or bias in pricing which is distinct from the daily marked to market performed by the trading unit for trading intent only. Financial institutions shall maintain relating documents for an examination by the Bank of Thailand.

3. Valuation adjustments / reserves

3.1 Financial institutions shall establish procedures for considering valuation adjustments and/or reserves, especially, for positions valued by marking to model and less liquid positions. Various factors shall be taken into consideration such as position concentration, amount of time it would take to hedge out the position / risks within the position, the volatility of bid and offer spreads, ability of independent market quotes, volatility of trading volumes, trading expenses, early termination, and model risk. Furthermore, to consider the appropriateness of valuation adjustments and reserves, financial institutions shall consider using an external independent valuation party to perform such action.

3.2 The Bank of Thailand may require financial institutions to maintain reserves for less liquid positions or positions that are illiquid due to market circumstances, as well as periodically review the appropriateness of such reserves.

In this regards, valuation adjustments and reserves shall impact tier 1 capital or total capital of the financial institutions.

Attachment 5

Regulations on calculation of capital requirement for interest rate risk under standardised approach

1. Definitions

Financial institutions shall refer the following definitions in assessing market risk capital requirement:

1.1 **Market risk means** the risk of losses in on and off-balance sheet positions arising from movements in interest rate, equity price, foreign exchange rate, and commodity price. **The changes in interest rate and equity price may be caused by general market risk and/or specific risk of the issuer.**

1.2 Debt instrument means instruments that pay fixed and float interest, transferable certificate of deposits, non-convertible preferred stocks, and convertible debt instruments (e.g. bonds and convertible preferred stocks) which have nature or trading characteristics similar to debt instruments (e.g. fixed dividends payment and non-voting rights). However, if such debt instruments have nature or trading characteristics similar to equity instruments, they shall be categorised as equity instruments.

a. Derivatives linked to financial instruments mean derivative transactions whose value depend on changes in the value of underlying instruments e.g. forward bonds, bond futures, and equity swaps in case of referencing equity instruments.

b. Interest rate derivatives mean derivative transactions whose value depend on changes in interest rate e.g. interest rate futures, forward rate agreements (FRAs), cross currency swaps, interest rate swaps, interest rate options, equity swaps (in case of referencing interest rate e.g. LIBOR) and forward foreign exchange positions.

c. Offsetting of instruments mean exemption of opposite positions in accordance with the Bank of Thailand's regulations. Such positions shall be excluded from the capital requirement calculation as prescribed in the detail regarding offsetting of positions for each type of risk which shall be explained later.

2. Calculation of capital requirement for interest rate risk under standardised approach

Financial institutions shall calculate capital requirement for interest rate risk under standardised approach for instruments classified in a trading book, such as debt instruments, derivatives linked to debt instruments or interest rate, securities that have characteristic similar to debt instruments, and non-convertible preferred stocks (example of instruments classified in a trading book for calculating capital requirement for interest rate risk under standardised approach are prescribed in **attachment 5.1**) as follows;

2.1 Interest rate risk arising from trading book positions of financial institutions can be categorised into 2 types, which are;

1) Specific risk means the risk incurred from changes in value of financial instruments arising from factors, other than general market risk, that are related to an issuer of that instruments e.g. changes in the credit rating of issuer.

2) General market risk means the risk incurred from changes in value of underlying instruments arising from changes in market factors e.g. interest rate volatility, etc.

2.2 The capital requirement for interest rate risk under standardised approach shall equal to the sum of

1) capital requirement for specific risk and

2) capital requirement for general market risk where long and short positions can be offset in each currency.

3. Guidelines for exemption of transactions from the calculation of capital requirement for interest rate risk

3.1 Financial institutions shall exclude positions related to interest rate from calculation of capital requirement for interest rate risk for both specific and general market risk if the long and short positions can be fully offset as in the following manners: 1) same underlying instrument (including derivatives position) 2) same issuer 3) same coupon rate 4) same reference currency, and 5) same maturity.

3.2 Financial institutions shall separately establish a book of the fully offset positions according to 3.1, from a trading book for an examination by the Bank of Thailand.

4. Guideline on calculation of capital requirement for specific risk

Calculation of specific risk capital requirement for interest rate risk covers both long and short positions in debt instruments classified in a trading book and derivatives linked to debt instruments[1]. In calculating specific risk capital requirement, the value of the trading book position shall be multiplied by a capital charge corresponding to the categories of issuers as prescribed in the table below. However, the value of an instrument can be 1) the market value or the marked to model value[2] for debt instruments or debt instruments underlying the derivative transactions and 2) the delta-weighted value for options[3] linked to debt instruments. (Calculation example prescribed in **attachment 5.2 and 9.1**)

In calculating specific risk capital requirement, financial institutions shall apply the capital charge in accordance with the categories of issuers classified in 3 categories as follows;

Table 1

Capital Charge for interest rate risk: specific risk

Categories	Rating	Remaining maturity	Capital charge
Government debt instruments	AAA to AA-	-	0%
	A+ to BBB-	6 months or less	0.25%
		Greater than 6 months, and up to and including 24 months	1.00%
		Exceeding 24 months	1.60%
	BB+ to B-	-	8.00%
	Lower than B-	-	12.00%
	Non-rated	-	8.00%
Qualified debt	Investment grade	6 months or less	0.25%

[1] Interest rate and currency swap, FRAs, forward foreign exchange contracts, and interest rate futures are exempted from specific risk capital requirement due to the fact that these are not derivatives linked to debt instruments and thus they do not have an issuer. However, these derivatives shall be included in calculation of general market risk capital requirement. In addition, derivatives traded over the counter shall be included in calculation of capital requirement for counterparty risk as well.

[2] The marking to market or marking to model shall be assessed from 1) price quoted by an agency and money market 2) contractual price of over the counter contract in case of no market price 3) valuation using discounted cash flows method referencing money market interest rate or 4) other methods approved by the Bank of Thailand.

[3] Please see more details in **Regulations on capital requirement calculation for market risk of options**

Categories	Rating	Remaining maturity	Capital charge
instruments		Greater than 6 months, and up to and including 24 months Exceeding 24 months	1.00% 1.60%
Other debt instruments	BB+ to BB- Below BB- Unrated	- - -	8.00% 12.00% 8.00%

Government debt instrument means an instrument issued, accepted, given aval or guaranteed on principal and interest without any condition by the following organisations;

(1) Government, Ministry of Finance or central banks of various countries (including Thai government and the Bank of Thailand) denominated in local currency of those countries

(2) Financial Institutions Development Fund (FIDF) or Deposit Protection Agency (DPA) and juristic person that fully owned by FIDF or DPA

In this regard, in case where the sum of assets in (1) and (2) in the amount not exceeding liabilities of the financial institutions, the capital charge shall equal to 0 percent and for exceeding portion, the capital charge shall be applied according to rating.

(3) The Bank for International Settlement, International Monetary Fund, European Central Bank and European Community shall apply the capital charge of 0 percent.

Qualified debt instrument means an instrument with followings characteristics;

(1) Rated investment-grade by at least two international credit rating agencies listed in attachment 5.3;

(2) Rated investment grade by at least one recognised credit rating agency and the issuer has securities listed on a recognised stock exchange; or

(3) Instrument issued or accepted, given aval, guaranteed or provided credit risk protection by following institutions. However, consideration on remaining maturity shall be taken into account.

a) Thai financial institutions under supervision of the Bank of Thailand such as commercial banks, finance companies, credit foncier companies or asset management companies

b) Foreign financial institutions under supervision of oversee supervisor[4]

c) Municipal organisation, government organisation or state enterprises[5]

d) Multilateral development banks (MDBs) in accordance with the Notification of the Bank of Thailand on Calculation of Credit Risk-Weight Assets for Commercial Banks under the Standardised Approach

Other debt instrument means other unqualified debt instruments.

Unrated debt instrument can be classified as qualified debt instruments for calculating specific risk capital requirement as follows;

(1) In case where financial institutions apply standardised approach in calculating capital requirement for credit risk, the unrated debt instruments shall be classified as qualified debt instruments if the issuers obtain other rated instruments that deem to be comparable to the unrated debt instruments. However, the issuer shall have securities listed on a recognised stock exchange.

(2) In case where financial institutions apply IRB approach in calculating capital requirement for credit risk, the unrated debt instruments shall be classified as qualified debt instruments according to financial institutions' internal rating which the rating system is approved by the Bank of Thailand. However, the issuer shall has securities listed on a recognised stock exchange.

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[4] Only financial institutions registered in Thailand with rating grade 1-3 (Investment grade) as prescribed in the Notification of the Bank of Thailand on Calculation of Credit Risk-Weight Assets for Commercial Banks under the Standardised Approach. In calculating risk weight assets under standardised approach, financial institutions shall apply the rating grade of the countries which the financial institutions are registered for both local currency and foreign currency, however, the risk weight of the financial institutions shall be applied.

[5] Only government organisation or state enterprises which the central bank or financial institutions supervisor in those countries consider as claim on financial institutions and only government organisation or state enterprises registered in Thailand with rating grade 1-3 as prescribed in the Notification of the Bank of Thailand on Calculation of Credit Risk-Weight Assets for Commercial Banks under the Standardised Approach.

Debt instruments issued by non-qualified issuers shall receive the same specific risk charge as unrated debt instruments. However, for certain type of debt instruments or positions which the Bank of Thailand deems that those instruments have inappropriate specific risk charge, the Bank of Thailand may require such instruments to

(1) apply higher specific risk charge than the requirement as prescribed in the table, however, such amount shall not be higher than the value of the positions or instruments; and

(2) not offset such positions with other instruments or positions when calculating capital requirement for general market risk.

5. Guidelines on calculation of capital requirement for general market risk

5.1 In calculating general market risk capital requirement for interest rate risk, a choice between two methods is permitted, 1) a maturity method and 2) a duration method. Under these two methods, trading book positions shall be slotted into the table according to the maturity ladder or next interest rate fixing date. In each method, the capital requirement is the sum of 4 following components;

1) the net long and short positions in the whole trading book (according to each period)

2) a small proportion of the matched positions in each time-bands (vertical disallowance)

3) a larger proportion of the matched positions across different time-bands period (horizontal disallowance)

4) a net capital requirement for positions in options (if any) (referencing regulations on calculation of market risk capital requirement for options)

5.2 The reporting for this section shall cover long and short positions of debt instruments, debt instruments underlying derivative transactions, interest rate derivatives in a trading book, as well as, interest rate risk arising from future contracts, forward positions of other positions in a trading book.

5.3 Financial institutions shall use separate maturity ladders for each currency and capital requirement shall be calculated for each currency

separately and then, summed with no offsetting between the positions of opposite sign (see details and examples in attachment 5.2 and 5.4).

6. Procedures on calculating capital requirement for general market risk under maturity method

Financial institutions shall comply with following procedures in calculating capital requirement for general market risk under maturity method. However, opposite positions of instrument of the same amount and same issuer in the same issues, including swaps, forwards, futures, and FRA contracts with similar characteristic and in line with the regulations prescribed in 8.2, shall be exempted from the calculation. In addition, financial institutions shall prepare supporting documents for an examination by the Bank of Thailand.

Step 1: Long and short positions shall be slotted into a maturity ladder separated in each currency[6], comprising thirteen time-bands for instruments with coupon rate of 3 percent or more, and fifteen time-bands for instruments with coupon rate lower than 3 percent as set out in Table 2. However, fixed rate instruments shall be classified according to the remaining maturity and floating rate instruments[7] shall be classified according to the residual maturity to the next interest fixing date.

Step 2: The sum of long positions and the sum of short positions in each time-band shall be multiplied by the corresponding capital charge of each time band as set out in Table 2, which designed to reflect the price sensitivity of those positions to assumed changes in yield. However, zero coupon bonds or deep-discount bonds shall be slotted according to the time-bands set out in the third column of the table. (for instruments with a coupon of less than 3 percent)

Step 3: Offset the weighted long and short positions in each time-band resulting in a single short or long position for each band. However, the positions allowed to be offset in each time-band include different instruments and different maturities. Therefore, a 10 percent capital charge to reflect basis risk and repricing risk shall be levied on the smaller of the offsetting positions, be it long or short. For example, for a certain time-band, if the sum of weighted long positions is equal to 100 million baht whereas the sum of weighted short position is 90 million baht, the

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[6] All transactions slotted into the table of all currencies shall be converted into Thai Baht (see additional details in attachment 5.2). Currency tables shall be prepared separately into 8 major currencies, i.e., THB, USD, YEN, EURO, GBP, HKD, SGD and MYR. Other currencies may be slotted together under other currencies table.

[7] In slotting transactions according to various time bands, financial institutions shall take into consideration the remaining maturity or residual maturity to the next interest fixing date without taking into account the existing puts and calls.

vertical disallowance (without +/- sign) of such time band would be 10 percent of 90 million baht or 9 million baht.

Table 2
Maturity method: time-bands and weights

Zone	Band- Coupon 3% or more	Band- Coupon less than 3%	Capital charge	Assumed changes in yield
1	1 month or less	1 month or less	0.00%	1.00%
	More than 1-3 months	More than 1-3 months	0.20%	1.00%
	More than 3-6 months	More than 3-6 months	0.40%	1.00%
	More than 6-12 months	More than 6-12 months	0.70%	1.00%
2	More than 1-2 years	More than 1.0-1.9 years	1.25%	0.90%
	More than 2-3 years	More than 1.9-2.8 years	1.75%	0.80%
	More than 3-4 years	More than 2.8-3.6 years	2.25%	0.75%
3	More than 4-5 years	More than 3.6-4.3 years	2.75%	0.75%
	More than 5-7 years	More than 4.3-5.7 years	3.25%	0.70%
	More than 7-10 years	More than 5.7-7.3 years	3.75%	0.65%
	More than 10-15 years	More than 7.3-9.3 years	4.50%	0.60%
	More than 15-20 years	More than 9.3-10.6 years	5.25%	0.60%
	Over 20 years	More than 10.6-12 years	6.00%	0.60%
		More than 12-20 years	8.00%	0.60%
		Over 20 years	12.50%	0.60%

Step 4: The result of the above calculation in step 1 to 3, two set of weighted positions shall be obtained which are (1) net weighted long or short position in each time-band (i.e. 10 million baht from example in step 3) and (2) vertical disallowance, which has no sign (i.e. 9 million baht from example in step 3). In this step, financial institutions shall be allowed to conduct horizontal offsetting by offset net long and short position across different time-bands. First, offset between weighted net long and short position in same zone according to the sign, resulting in a single net long or short position in each zone. Then, offset between the net position in different zone according to the sign (both with the adjacent zone and cross over to other zone). The matched portion from within the same zone and across different zones shall be brought to calculate horizontal disallowance by multiplying with capital charge as set out in Table 3 in order to calculate capital requirement (as example prescribed in attachment 5.2).

Table 3

Summary of capital requirement for market risk (equal to sum of)

1. Total net positions	Net position as a result of difference of weighted long and short positions in each time band (ignoring +/- sign)	x 100%
2. Vertical disallowance	Offsetting of sum of weighted long and short position in each time-band	x 10%
3. Horizontal disallowance	Offsetting of net weighted positions within zone 1	x 40%
	Offsetting of net weighted positions within zone 2	x 30%
	Offsetting of net weighted positions within zone 3	x 30%
	Offsetting between zone 1 and 2 positions after offsetting positions within the same zone	x 40%
	Offsetting between zone 2 and 3 positions after offsetting positions within the same zone	x 40%
	Offsetting between zone 1 and 3 positions after offsetting positions within the same zone	x 100%

7. Procedures on calculating capital requirement for general market risk under duration method

Financial institutions with the necessary capability may apply duration method, which is a more accurate method of measuring general market risk. Under this method, price sensitivity of each position to changes in market yield shall be separately calculated. However, financial institutions which intend to apply this method shall obtain prior approval from the Bank of Thailand in terms of method and information system. In addition, once this method has been employed, it shall be used on continuous basis and if there is any change, financial institutions shall seek for an approval from the Bank of Thailand. In this regard, financial institutions shall comply with the following procedures:

Step 1: Weight long and short positions by price sensitivity of each instrument to the change in yield. This can be done by multiplying present market value of a position with modified duration[8] and then, multiplying with assumed change in yield as set out in last column of Table 4.

Step 2: Slot the result from step 1, both long and short positions into a duration-based ladder with the fifteen time-bands as set out in Table 4, resulting in total weighted long and short positions of each time band. Then, calculate overall net open position from every time band.

Step 3: Offset the weighted long and short positions from step 2 in each time band, resulting in net weighted positions of each time band, then, add vertical disallowance (no +/- sign) of 5 percent of offsetting positions designed to capture basis risk and repricing risk as in maturity method.

Step 4: Carry forward the net weighted position of the same time band, same zone and across different zones for horizontal offsetting, and then, calculate horizontal disallowance with the same yield and method used in aforementioned maturity method.

Table 4
Duration Method: time-bands and assumed changes in yield

Zone	Duration	Assumed changes in yield
1	1 month or less	1.00%
	More than 1-3 months	1.00%
	More than 3-6 months	1.00%
	More than 6-12 months	1.00%
2	More than 1-1.9 years	0.90%
	More than 1.9-2.8 years	0.80%
	More than 2.8-3.6 years	0.75%
3	More than 3.6-4.3 years	0.75%
	More than 4.3-5.7 years	0.70%
	More than 5.7-7.3 years	0.65%
	More than 7.3-9.3 years	0.60%
	More than 9.3-10.6 years	0.60%
	More than 10.6-12 years	0.60%
	More than 12-20 years	0.60%
	Over 20 years	0.60%

8. Guidelines on calculation of capital requirement for interest rate risk of derivative transactions

8.1 Guidelines on recording derivative transactions

To calculate capital requirement for interest rate derivatives and derivatives linked to financial instruments, financial institutions shall apply the two legs approach which the positionswill be treated as a combination of a long (receiving leg) and a short (paying leg) positions in accordance with their underlying instruments (please find additional details in **attachment 5.4**). The details can be

summarised as follows;

1) Positions in forward contracts and FRAs (both linked to financial instruments and interest rate, excluding foreign exchange) shall be treated as a combination of two legs. The first leg shall be the underlying instrument with a residual maturity equal to the period until delivery or exercise of the contract, plus - where applicable - the life of the underlying instrument. The other leg shall be treated as a zero coupon bond with remaining maturity equals to the period until delivery or exercise of the contract.

2) Position in future contracts shall generally be treated as a combination of a long and a short position and the recorded amount shall be the same as the amount in the case of forwards.

3) Position in forward foreign exchange shall be treated as two positions in two currencies with a long position (currency expected to receive in the future) and a short position (currency expected to pay in the future), in zero coupon government bonds in which the remaining maturities are equivalent to maturity of the forwards.

4) Position in swap contracts shall be treated as two notional positions in relevant financial instruments and remaining maturities. For instance, interest rate swaps, which financial institution is receiving floating interest rate and paying fixed interest rate, will be treated as 1) a long position (receiving leg) in a zero coupon bond with floating yield and remaining maturity is equivalent to the period until the next interest fixing date, and 2) a short position (paying leg) in a bond with fixed coupon rate and remaining maturity is equivalent to the residual life of the swap contract.

8.2 Guidelines on offsetting of derivative transactions for calculation of general market risk

8.2.1 In general, the offsetting of transactions for calculation general market risk shall refer to 3. and 8.1, as mentioned earlier. In additions, the opposite positions between long or short positions in a particular debt instrument and positions in underlying instrument which come from the separation of futures or forwards shall be fully offset. However, the remaining positions of futures or forwards that are exposed to interest rate risk shall be further calculated[8].

[8] The offsetting between a long position in government bond and a short forwards or futures of the same bond can be treated as 1) a short position in instrument intended to deliver, with remaining maturity equals to the

8.2.2 The positions of futures, swaps, FRAs and forwards, which can be offset, shall be the positions with the same underlying instruments, notional amount and currency. Furthermore, they shall also comply with the following guidelines;

For future contracts

1) Opposite positions of the future contracts with the same underlying instruments and different of remaining maturities of such positions is not over 7 days.

For swaps, FRAs, and forwards

1) The reference rate for floating rate positions shall be identical e.g. LIBOR or SIBOR, etc. and the contractual interest rate shall be closely match e.g. within 15 basis points.

2) The next interest fixing date or maturity date (in case of instrument with fixed coupon or forwards) or the remaining maturity shall be in accordance with following conditions;

- if either of the instruments to be offset has the next interest fixing date or a remaining maturity less than 1 month, both instruments shall have the same next interest fixing dates or same maturity dates;

- if either of the instruments to be offset has the next interest fixing date or a remaining maturity more than 1 month up to 1 year, the next interest fixing dates or the maturity dates of both instruments shall be within 7 days of each other;

- if either of the instruments to be offset has the next interest fixing date or a remaining maturity more than 1 year, the next fixing dates or the maturity dates of both instruments shall be within 30 days of each other.

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remaining maturity of the underlying instrument plus the period until delivery according to the forward contract; and 2) a long position in a zero coupon instrument, with remaining maturity equals to the period until delivery date. For instance, financial institution has a long position in US Treasury bond with remaining maturity of 10 years and 3 months, while the contract is still effective on the reporting date, and has a short position in a forward contract of 10-year US Treasury bond with the contract maturity of 3 months, the long and short positions in such bond (with maturity 10 years and 3 months) can be fully offset. However, the long position with a zero coupon bond from the forward contract with remaining maturity until the delivery date (3 months) shall be included in the relevant currency table.

8.3 Example of offsetting positions

a) Long or short positions in FRAs in the same currency which have the same notional amount, settlement date, and remaining maturity shall be offset, and exempted from the calculating if the differences of contractual interest rates of both instruments are not more than 15 basis points.

b) Opposite swap contracts shall be offset if their reference floating rates are 6-month SIBOR, and the differences of fixed rates of both contracts are not more than 15 basis points.

c) Positions shall be offset if the reference dates of the opposite positions e.g. the next interest fixing date or remaining maturity are within the period as specified in 8.2.2.

d) Bond future with opposite positions shall be offset if the delivered instruments or bonds are the same type and have remaining maturity within 7 days of each other.

Table 5
Summary of treatment of financial derivatives

Instrument	Specific risk charge	General market risk charge
<u>Exchanged-traded future</u>		
- Government debt instruments	No	Yes, as two positions
- Corporate debt instruments	Yes	Yes, as two positions
- Index on interest rates (e.g. LIBOR)	No	Yes, as two positions
<u>OTC forward</u>		
- Government debt instruments	No	Yes, as two positions
- Corporate debt instruments	Yes	Yes, as two positions
- Index on interest rates (e.g. LIBOR)	No	Yes, as two positions
<u>FRAs, Swaps</u>	No	Yes, as two positions
<u>Forward foreign exchange</u>	No	Yes, as one position in each currency
<u>Options</u> - Government debt instruments - Corporate debt instruments - Index on interest rates (e.g. LIBOR) - FRAs, Swaps	 No Yes No No	Choose either (1) Carve out together with the associated hedging positions - simplified approach - scenario analysis - internal model (2) General market risk charge according to the Delta-plus method (gamma and vega should maintain additional capital requirement)

Attachment 5.1

Example of instruments classified in a trading book used for calculating capital requirement for interest rate risk under standardised approach

- All types of debt instruments e.g. bonds, debentures, FRN, FRCD
- Non-convertible preferred shares
- Convertible securities with characteristics resembling debt instruments e.g. preferred shares, bonds with an option
- Transferable certificate of deposit
- Bills of Exchange certified by commercial banks
- All derivative transactions not used for hedging of banking book positions

Guidelines for instruments different from aforementioned or with complex structures

- Each financial institution shall specify a treatment for calculation of associated risk in the document regarding policy on classifying and recording assets in a trading book.
- In certain cases, the treatment of each type of instruments can be difference. For instance, in the case of bonds whose coupon payment depends on a stock index, the risk of such position shall be separated according to market risk components which are, equity risk, interest rate risk, and foreign exchange risk.

- Interest rate risk from dividends of equity will be prescribed in "equity risk"

- Should there be any questions or in case where financial institutions have traded an instrument with unique characteristic for the first time, financial institutions shall consult with the Bank of Thailand on case-by-case basis.

Attachment 5.2

Example of recording treatment of interest rate risk under maturity method and equity risk under standardised approach

Assuming that a financial institution has the following transactions in a trading book as at the end of December 2002 (given the current exchange rate of THB/USD equals to 42 Baht/USD, and all transactions recorded in the table shall be converted into baht-equivalent amount).

Example 1 A long position in a US Treasury bond in USD with a coupon rate of 7.5 percent per annum. The bond's face value is equivalent to 43,000 thousands baht, remaining maturity of 8 years. The book value and the market value is equivalent to 44,000 thousands baht (at current exchange rate).

Position recording (interest rate risk only)

The baht-equivalent market value of the long position shall be recorded into two separate categories; 1) record in the specific risk table for US Treasury bond with 0 percent capital charge, and 2) record a long position with the amount of 44,000 thousand baht in the maturity ladder for general market risk according to the remaining maturity of USD with the coupon rate over 3 percent in the time-band of 7-10 years.

Example 2 A long position in a floating rate bill with no credit rating, coupon rate of 6.5 percent per annum, issued by a US corporate (denominated in USD). The face value is equivalent to 40,000 thousand baht. The next interest fixing period is 9 months and the market value is equivalent to 40,732 thousand baht.

Position recording (interest rate risk only)

The baht-equivalent market value of the long position shall be recorded into two separate categories; 1) record in the specific risk table for non-rating corporate bonds (unqualified category) with 8 percent capital charge, and 2) record a long position with the amount of 40,732 thousand baht in the maturity ladder for general market risk according to the remaining maturity of USD with over 3 percent in the time-band of 6-12 months.

Example 3 Long positions in 10 future contracts, each contract has a 5-year US Treasury bills as an underlying, with USD 100,000 face value. Each contract will be delivered in 3 months (Debt derivative). The chosen instrument to be delivered is a US treasury bills with a coupon rate of 6.375 percent, remaining maturity of 5 years, quoted price at 100.0625 (percent), and the conversion factor of 0.9423.

Position recording (interest rate risk only)

1. Calculate the market value as

USD 100,000 x 10 x 100.0625 percent / 0.9423

= USD 1,061,896 or THB 44,599,650

2. Record in the specific risk table with 0 percent risk charge (government bonds).

3. Record as two separate positions in the USD table for general market risk as follows;

A short position in a zero coupon instrument, remaining maturity of 3 months in the time-band of 1 – 3 months,

A long position in bills with coupon rate over 3 percent, remaining maturity of 5.25 years in the time-band of 5 – 7 years

Example 4 Position of single currency interest rate swaps (Interest rate derivative) with notional amount denominated in HKD equivalent to 150,000 thousands baht, remaining maturity of 2.5 years. A financial institution receives floating interest rate annually, and pays fixed interest rate of 8 percent per annum. Currently, the annual floating rate is at 5.5 percent and the next fixing period is 6 months.

Position recording (interest rate risk only)

1. Calculate the recorded value, using the present value method (mark to model approach) as follows;

Assume following HKD zero coupon yields

Maturity	Yields
1M	5.31
3M	5.36
6M	5.81
1Y	6.16
2Y	6.69
3Y	7.07

(These yields may be derived from a zero coupon bond, cash rates or swap rates, etc.)

Cash flows from swaps can be separated into 2 legs as follows;

1.1 **Pay fixed rate bond**

8 percent of 150,000 thousands baht in 6 months

8 percent of 150,000 thousands baht in 18 months

108 percent of 150,000 thousands baht in 30 months

The zero rates for 18 months can be derived from the linear interpolation of rates between 1 year and 2 years, which is equal to

Zero rate (18 months) = (6.16 + 6.69) / 2 = 6.425 percent

Similarly,

Zero rate (30 months) = (6.69 + 7.07) / 2 = 6.88 percent

Therefore, PV of the pay fixed rate leg is equal to 159,766 thousands baht, using the present value by discounted cash flows of 3 cash flows according to the time period of 6, 18 and 30 months.

1.2 Receive floating rate paper

105.5 percent of 150,000 thousands baht in 6 months

Therefore, PV of the received floating rate leg is equal to 153,783 thousands baht, using the present value by discounted cash flows.

2. Since there is no issuer in case of interest rate derivatives, there is no specific risk.

3. For general market risk charge, record the following in the HKD table;

3.1 Record a long position in 6-month instrument with the value of **153,783 thousand baht** for the received floating rate in the time-band of 3-6 months.

3.2 Record a short position in a 2.5 years instrument with a coupon rate of 8 percent for the paid fixed rate with the value of **159,766 thousand baht** in the time-band of 2 –3 years.

Example 5 A long position in an interest rate future contract, referencing a 3-month HIBOR, with notional amount denominated in HKD equivalent to 50,000 thousand baht, exercising period in 6 months

Position recording (interest rate risk only)

1. Since there is no issuer in case of interest rate derivatives, there is no specific risk.

2. For general market risk charge, record the following in the HKD table;

2.1 A long position in a 9-month zero coupon instrument, in the time-band of 6 – 12 months

Calculate the recorded value, using the present value method as follows;

Zero rate (9 months) = (5.81 + 6.16) / 2 = 5.985 percent (9M x 0.75, 6M x 0.5)

PV of 50,000 thousand baht over 9 months = 50,000 thousand baht / (1 + (0.05985 x 0.75)) = **47,850 thousand baht**

2.2 A short position in a 6-month zero coupon instrument, in the time band of 3 – 6 months

Calculate the recorded value, using the present value method as follows;

Zero rate (6 months) = 5.81 percent

PV of 50,000 thousands baht over 6 months = 50,000 thousands baht / (1 + (0.0581 x 0.5)) = **48,598 thousand baht**

Example 6 A short position in FRA (9, 15) in 6-month HIBOR, notional amount denominated in HKD equivalent to 20,000 thousand baht, exercising period in 9 months

Position recording (interest rate risk only)

1. Since there is no issuer in case of interest rate derivatives, there is no specific risk.

2. For general market risk charge, record the following in the HKD table;

2.1 A long position in a 15-month zero coupon instrument, in the time band of 1.0 - 1.9 years

Zero rate (15 months) = 6.16 + ((6.69-6.16) x 0.25) = 6.2925 percent

PV of 20,000 thousand baht over 15 months= 20,000 thousand baht / $(1 + 0.062925)^{1.25}$ = **18,532 thousand baht**

2.2 A short position in a 9-month zero coupon instrument, in the time-band of 6 - 12 months

PV of THB 20,000 thousand baht over 9 months = 20,000 thousand baht x 0.957 = **19,140 thousand baht**

Example 7 Written cap on 6-month LIBOR, with amount of GBP 2 million, with a cap rate of 8 percent, the next interest fixing date within 6 months, the remaining maturity of 2 years (assume the transaction date is the same as the reporting date)

Position recording (interest rate risk only)

1. Since there is no issuer in case of interest rate derivatives, there is no specific risk.

2. For general market risk charge, assume the Delta-plus method is used, record the following in the GBP table;

2.1 Separate the cap position into a short 3 call options on 6-month FRA e.g. 6 against 12, 12 against 18, and 18 against 24 (since the interest rate in the first 6 months is already specified on the reporting date, that particular option shall be expired)

Assume the delta ratios of those options equal to	
6 against 12	0.055
12 against 18	0.17
18 against 24	0.225

Assume that the discounting factors equal to

6M	0.9674
12M	0.9346
18M	0.9009
24M	0.8673

Assume the THB/GBP exchange rate = 60

Recorded value of the first option

1. A long position over 6 – 12 months

   = GBP 2M x 0.055 x 0.9346

   = 6,170 thousands baht (approximately)

2. A short position over 3 – 6 months

   = GBP 2M x 0.055 x 0.9674

   = 6,385 thousand baht (approximately)

Recorded value of the second option

3. A long position over 1 – 1.9 years (Cap rate over 3 percent)

   = GBP 2M x 0.17 x 0.9009

   = 18,380 thousand baht (approximately)

4. A short position over 6 – 12, with the value equals

   = GBP 2M x 0.17 x 0.9346

   = 19,065 thousand baht (approximately)

Recorded value of the last option

5. A long position over 1.9 – 2.8 years (Cap rate over 3 percent)

   = GBP 2M x 0.225 x 0.8673

   = 23,415 thousand baht (approximately)

6. A short position over 1.0 – 1.9 years

= GBP 2M x 0.225 x 0.9009

= 24,325 thousand baht (approximately)

(Calculation of gamma and vega is not mentioned here)

Example 8 A long position in interest rate future contract, referencing 3.5 years US Treasury bonds with coupon rate of 5 percent, the baht-equivalent market value is 50,000 thousands baht, exercising period in 6 months.

Position recording (interest rate risk only)

1. Use the market value which is equivalent to 50,000 thousands baht

2. Since there is an issuer in case of a derivative linked to government bond, the specific risk shall be calculated, however the capital charge equals to 0 percent.

3. For general market risk charge, record 2 positions in the USD table as follows;

3.1 A long position in instrument with coupon rate over 3 percent, maturity of 4 years, in the time-band of 3 – 4 years

3.2 A short position in 6-month zero coupon instrument, in the time-band of 3-6 months

Example 9 A long position in forward foreign exchange position of USD in the amount of USD 1 million, exchanged with Baht in the amount of 43,000 thousands baht, remaining maturity of 3 months.

Position recording (interest rate risk only)

1. Since there is no issuer in case of foreign exchange derivatives, there is no specific risk.

2. For general market risk charge, record 2 positions as follows;

2.1 A long position in a 3-month zero coupon instrument in the USD table, in the time-band of 1-3 months

Assume the 3-month zero rate in USD equals 3.25 percent

The recorded value = USD 1,000,000 / (1 + (0.0325x0.25))

= USD 991,940 or 41,662 thousands baht (42 THB/USD)

2.2 A short position in a 3-month zero coupon instrument in THB table, in the time-band of 1 - 3 months

Assume the 3-month zero rate in THB equals 2.25 percent

The recorded value = THB 43,000,000 / (1 + (0.0225x0.25))

= 42,760 thousand baht

Example 10 A long position in Thai equity A in an amount of 10,000 thousands baht, a short position in Thai equity A in an amount of 15,000 thousands baht; a long position in Thai equity B in an amount of 7,500 thousands baht, a short position in Thai equity B in an amount of 2,000 thousands baht; a long position in Thai equity C in an amount of 8,000 thousands baht, a short position in Thai equity of the amount 10,000 thousands baht.

Positions recording (equity price risk only)

1. Calculate the net position of each equity

   a) Net position in equity A = 10,000 – 15,000 = - 5,000 thousand baht

   b) Net position in equity B = 7,500 – 2,000 = 5,500 thousand baht

   c) Net position in equity C = 8,000 – 10,000 = -2,000 thousand baht

2. Record the total net long position of 5,500 thousand baht, and the total net short positions of 7,000 thousand baht in item 1 of the Thai column.

Example 11 Long positions in 10,000 shares of AAA-rated US equity with baht-equivalent market value of 4,200 thousand baht

Position recording (equity price risk only)

Record baht-equivalent value of 4,200 thousand baht in the equity price risk table, item 1, US column.

Example 12 Long positions in 50,000 shares of BBB-rated Hong Kong equity. The position is hedged with a long position in 25 contracts of put options referencing the same equity (each contract gives the right to sell 1,000 shares of common stocks). The book value of the equity (market value in the book) is equal to 30 baht. The exercise price of all options is equivalent to 33 baht.

Positions recording

1. Record the market value of 25,000 shares which is equivalent to 750,000 baht in the equity price risk table, item 1, Hong Kong column.

2. Record the market value for 25,000 shares hedged with the put options in the options table, with the value of

= (25,000 x 30 THB x 16%) – [25,000 x THB (33-30)] = 45,000 baht

(16 percent is from specific risk and general market risk, 8 percent each, according to the simplified method for options)

Example 13 A short position in Hang Seng index futures with delivery date in 3 months. Currently the index is at 10,000 (assume the exchange rate as at the end of December 2003 is equal to 5 THB/HKD)

Position recording

1. Record the market value for the short position in futures (HKD 50 per index point) of 500,000 HKD or 2,500 thousand baht in the equity price risk table, item 2, HK column.

2. Record the market value of futures (Interest rate derivative) in the amount of 2,500 thousand baht as a long position in a zero coupon instrument, in section 1 of interest rate risk table for HKD, in the time-band of 1 – 3 months.

Example 14 A long position in March S&P 500 future contract in the amount of USD 300,000 and a short position in June S&P 500 future contract in the amount of USD 300,000

Positions recording

1. The recorded value equals 12,600 thousand baht

2. For equity price risk, capital calculation for futures-related arbitrage – the additional 2 percent capital charge for specific risk shall be applied only a position of 12,600 thousands baht, while the opposite position is exempted from a capital charge for both general market risk and specific risk.

3. For interest rate risk

3.1 Long March S&P 500 futures can be treated as a short position in a 3-month zero coupon instrument, which shall be slotted into the USD table, time-band of 1 – 3 months, interest rate derivatives column.

3.2 Short June S&P 500 futures can be treated as a long position in a 6-month zero coupon instrument, which shall be slotted into the USD table, time-band of 3 – 6 months, interest rate derivatives column.

Attachment 5.3

List of accepted credit rating agencies

For all issuers

1. Moody's Investor Services
2. Standard & Poors Corporation
3. Fitch IBCA

For Thai issuers

1. External credit rating agencies as prescribed in the Notification of the Bank of Thailand on the Calculation of Credit Risk-Weight Assets for Commercial Banks under the Standardised Approach (SA)

For issuers who are commercial banks and subsidiaries

1. Thomson Financial Bank Watch

For Canadian issuers

1. Canadian Bond Rating Service
2. Dominion Bond Rating Service

For Japanese issuers

1. Japan Credit Rating Agency, Ltd.
2. Japan Rating and Investment Information Inc
3. Mikuno & Co
4. Fitch Investors Services Inc

For American issuers

1. Duff & Phelps Inc
2. Fitch Investors Services Inc

Attachment 5.4

Guidelines on recording treatment for financial derivatives positions

Derivative transactions shall be recorded by the two legs approach which are long and short positions. This approach will separate the derivative transactions into positions in relevant underlying instruments as follows:

1. Positions in forward contracts and FRAs (both linked to financial instruments and interest rate, excluding foreign exchange) shall be treated as a combination of two legs. The first leg shall be the underlying instrument with a remaining maturity equals to the period until delivery or exercise of the contract, plus - where applicable - the life of the underlying instrument. (if the underlying instrument has a coupon rate, such coupon rate shall be considered when record such transaction)[1]. The other leg shall be treated as a zero coupon bond with remaining maturity equals to the period until delivery or exercise of the contract **(see example 5, 6 and 7 in attachment 5.2)**. For example, a long forward bond position shall be treated as follows; 1) a long position in instrument intended to deliver with remaining maturity equals to the period until delivery according to the forward contract, plus the remaining maturity of the bond. The recorded amount shall be the market price or the mark to model price of selected instruments. 2) a short position in a zero coupon instrument, with remaining maturity equals to the period until delivery according to the forward contract. The recorded amount shall equal to present value of face value.

2. Positions in future contracts shall generally be treated as a combination of a long and a short position. The recorded amount shall be the same as the amount in the case of the forwards with cash settlement, or instruments specified in the future contracts. However, if the exchange market allows other instruments to be delivered in replace with the instruments specified in the future contracts, the conversion factor of the delivered instruments shall be taken into account in the calculation.[2]

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[1] That is, the interest rate risk is correlated with the maturity of the underlying instrument. Therefore, the maturity of the position related to underlying instrument shall also include the maturity of derivative transactions and maturity of underlying instrument (if any).

[2] To record positions in case where other instruments may be delivered in replace with the instruments specified in the future contracts and conversion factor has already been specified, the recorded amounts for both positions shall equal to the face value of the instruments in the future contracts divided by conversion factor, then multiplied by current market price of such instruments. For instance, a long position in bond future shall be treated as 1)

3. Positions in forward foreign exchange shall be treated as two positions in two currencies with a long position (currency expected to receive in the future) and a short position (currency expected to pay in the future), in zero coupon government bonds, in which the remaining maturities are equivalent to maturity of the forward contract. However, the recorded amount may be the value derived from present value method **(see example 9 in attachment 5.2).**

4. Positions in swap contracts shall be treated as two notional positions in relevant financial instruments and remaining maturities. For instance, an interest rate swap, which financial institution is receiving floating interest rate and paying fixed interest rate, will be treated as 1) a long position (receiving leg) in a zero coupon bond with floating yield and remaining maturity is equivalent to the period until the next interest fixing, and 2) a short position (paying leg) in a bond with fixed coupon rate and remaining maturity is equivalent to the residual life of the swap contract **(see example 4 in attachment 5.2).** The recorded amount may be the value derived from present value method. For a swap contract that pays or receives a fixed or floating interest rate against some other reference price e.g. a stock price, the interest rate component shall be slotted into the appropriate remaining maturity according to its fixing date, with the equity component being included in the equity risk table. For cross-currency swaps, their separated legs shall be reported in the relevant maturity ladders for the currencies concerned.

5. Positions in Repo (borrowing of money) or securities lending and a Reverse repo (lending of money) or securities borrowing shall be recorded by market value or price derived from model.

5.1 Repo or securities lending shall be treated as a short position (receive cash and has an obligation to deliver or pay in the future) in the underlying instrument, with remaining maturity equals to the term of the contract, a coupon rate equals to the borrowing rate under Repo (or discount rate of Repo), and the recorded amount should be market price or price derived from model.

5.2 Reverse Repo or securities borrowing agreement shall be treated as a long position (receive cash in the future) in the underlying instrument, with remaining maturity equals to term of the contract, a coupon rate equals to the

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a long position in the instrument to be delivered which conversion factor has been specified, and

2) a short position in a zero coupon instrument, with remaining maturity equals to the delivery date of the future contracts (**see example 3 in attachment 5.2**).

lending rate under the Reverse repo, and the recorded amount should be market price or price derived from model.

5.3 The underlying instrument shall be classified in its existing book and will be calculated for capital charge according to its book.

Attachment 6

Regulations on calculation of capital requirement for equity risk under standardised approach

Financial institutions shall calculate capital requirement for equity risk in trading book which apply to long and short positions in all equity instruments and instruments that exhibit market behaviour similar to equities such as common stocks, whether voting or non-voting, and convertible instruments that behave like equities[1]. The long and short position of the same issuer shall be reported on a net basis. The treatment on recording derivatives linked to equity, stock indices and index arbitrage is described in 4.

1. Guideline on calculation of capital requirement for equity risk

Similar to interest rate risk, equity risk arising from trading book positions of financial institution can be categorised into 2 types; 1) **Specific risk** is a risk arising from a change in value of individual equity issued by a company which may incur loss to financial institutions. However, specific risk can be mitigated through a portfolio diversification, and 2) **General market risk** is a risk arising from a movement in the equity market which may incur loss to financial institutions. Financial institutions shall maintain a minimum capital requirement for both risk categories, by calculating on a market-by-market basis.

2. Guidelines on calculation of capital requirement for specific risk

Financial institutions shall multiply the gross equity position[2] resulting from the sum of long and short positions in equity instruments in the trading book with the capital charge, currently specified at 8 percent. However, for portfolio is both liquid and well-diversified which can reduce specific risk, the capital charge shall be 4 percent under the following conditions;

2.1 Such positions shall have high liquidity that allow the investors to conveniently trade without incurring a loss due to a wide spread. Financial institutions shall refer to the list of security exchanges and security indices considered to be liquid securities as prescribed in **attachment 6.1**; including equity instruments that comprise

[1] In case, financial institutions have any questions about other special instruments that may fall under this condition, financial institutions shall consult with the Bank of Thailand for recording treatment of such instruments.

[2] An equity position for specific risk means the net long and short position of equity of an individual company. Therefore, the assessment of the gross equity position includes the net positions, which may be long or short positions, of all companies.

the security indices listed on such attachment as well (this list may be modified periodically).

2.2 A portfolio of high liquid and well-diversified equity instruments shall be applied under the following conditions;

1) The value of each individual equity shall not exceed 10 percent of the gross value of equity portfolio of a particular country (gross value equals the sum of long and short positions) and

2) When aggregate equity accounted for 5 to 10 percent of total equity's value together, the total value shall not be account for more than 50 percent of the total value of that particular country.

3) If a portfolio of a particular country does not meet the above conditions, financial institutions may divide the portfolio into 2 sub-portfolios; 1) the qualified group shall apply the capital charge of 4 percent, and 2) the unqualified group shall apply the capital charge of 8 percent. Financial institutions shall clearly report the positions in each sub-portfolio in order to calculate capital requirement.

3. Procedures on calculation of capital requirement for general market risk

3.1 Since the general market risk depends on the net value of equity held by the financial institutions, the difference of the sum of long positions and the sum of short positions in equity shall be multiplied by capital charge of 8 percent. The calculation shall be separated for each national market.

3.2 In case financial institutions hold instruments that are treated as the capital fund of another financial institution, those positions are excluded from the calculation of market risk capital requirement. This is because the fair value of those positions have already been deducted from the capital fund of the financial institution that holds such positions in accordance with the Notification of the Bank of Thailand on guideline on capital requirements, except the Bank of Thailand specify otherwise.

4. Regulations on calculation of capital requirement for derivatives linked to equity, stock indices and the index arbitrage

Derivatives linked to equity, for instance, futures, forwards, swaps and other off-balance sheet positions with equity or stock indices as an underlying[3], except for

[3] In slotting positions of such derivatives transaction for the calculation of the capital requirement for equity risk, the value of receiving leg and delivering leg of equity shall be slotted only. Meanwhile, if such derivatives transaction is

options (which is prescribed in the regulations on calculation of capital requirement for options), shall be treated according to the following guidelines;

4.1 Guideline on calculation of positions

Derivative positions shall be converted into the value of positions in relevant underlying equity for calculation of specific risk and general market risk under the standardised approach as follows;

1) Futures or forwards contracts linked to individual equity shall be reported at current market price.

2) Future contracts linked to stock indices shall be reported as the marked-to-market value of the notional underlying equity portfolio on a proportionate basis, or using the indices value according to the calculation of the indices prescribed by the Securities Exchange of a particular country.

3) Equity swaps are treated as 2 notional positions. The receiving leg based on the receiving return calculated from the change in value of a particular equity or stock index, shall be treated as a long position. The paying leg based on the paying return calculated from the change in value of another equity or stock index, shall be treated as a short position.

4.2 Guideline on offsetting the positions

Matched position in identical equity or stock index in the same market can be fully offset, resulting in a net long or net short position in that equity or stock index which will be used in the calculation of capital requirement for specific risk and general market risk. For instance, a futures contract to buy/sell one particular equity in the future can be offset against an opposite position in the same equity.[4]

4.3 Guideline on calculation of capital requirement for index related positions

For index related positions, the capital requirement for specific risk of 2 percent shall be applied, in addition to the capital requirement for general market risk, however, only for the liquid stock indices as prescribed in **attachment 6.1**. For stock

exposed to interest rate risk or foreign exchange risk, financial institutions shall slot the positions related to receiving/paying fixed interest rate or floating interest rate or receiving/paying foreign exchange to calculate the capital requirement with the capital requirement for interest rate risk or foreign exchange risk.

[4] This offsetting is only accounted for equity risk. However, such position still has to be included in the calculation of capital requirement for relevant interest rate risk or foreign exchange risk.

indices not listed in **attachment 6.1**, the following guidelines on calculation of capital requirement for specific risk shall be applied.

1) The components of such index shall be proportionately decomposed into market value of each equity, then, apply the capital requirement for specific risk to each equity[5] or

2) Treat the position as one position which is equal to 1) the sum of the market value of equity proportionate according to the index or 2) the value of that index calculated by the method prescribed by the Securities Exchange of a particular country. Then use the value from 1) or 2) to calculate the capital requirement for specific risk by applying the highest capital requirement for equity comprised in such stock index.

4.4 Guideline on calculation of capital requirement for an index arbitrage[6]

In calculating capital requirement for an index arbitrage position, financial institutions shall comply as follows;

1) In case financial institutions undertake an index arbitrage by using only index futures contract

Financial institutions undertaking an opposite positions in exactly the same index at different delivery date or in different market centres, shall calculate the capital requirement for specific risk at a rate of 2 percent (as prescribed in 4.3) on one position. The opposite position is exempt from the capital requirement calculation for both specific risk and general market risk.

2) In case financial institutions undertake an index arbitrage by using futures contract on a broadly-based index matched with a basket of shares

Financial institutions may proportionately decompose the component of a stock index and a basket of shares into each equity position. Then, record the value of both equities with opposite positions into a portfolio of each country. Each equity position in a basket can be offset with a position of the same equity from a stock index

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[5] After decomposing the components, if the **equity is liquid** (is a component of stock indices as prescribed in the attachment), **and in a well-diversified portfolio** (positions in those stock indices can either be a portfolio whose risk is considered to be well-diversified or not well-diversified.) is allowed to apply 4 percent specific risk capital charge and 8 percent for others.

[6] For arbitrage transactions with the equivalent value between long/short in futures contract and underlying instruments, such transaction shall be consider no general market risk. Therefore, the calculation of general market risk is not required, only specific risk or counterparty risk shall be calculated.

provided that the transaction meets the following conditions;

a) The trade has been deliberately entered into and separately controlled **and**

b) After decomposing into components, equity composition in a basket of shares shall represent at least 90 percent[7] of the index, or has a correlation of at least 0.9 over the minimum period of 1 year.

3) The capital requirement for such transaction is equal to 2 percent of the value of a basket of shares and the values of the opposite futures contract (a total of 4 percent). However, any excess value of equities comprising in a basket of shares compared to the value of futures contract or the excess value of the futures contract compared to the value of a basket of shares is treated as a long or a short position, the guideline on the capital requirement calculation shall be applied as prescribed in 4.

4) In case that the arbitrage strategy does not comply with the conditions in 2) or in case of the long or short position left according to 3), financial institutions shall follow the following guideline for capital requirement calculation; (1) the position related to a stock index should apply the capital calculation for a stock index as prescribed in 4.3 and (2) the part related to a basket of shares should be proportionately decomposed into individual equity and included into the calculation of capital requirement for portfolio of each country according to the guideline in 1. - 3.

Guideline on calculation of capital requirement for equity

Transaction	Specific risk	General market risk
Exchange-traded futures or OTC derivatives		
- Individual equity	✓	✓
- Index	2%	✓
Options		
- Individual equity	✓	- Simplified approach
- Index	2%	- Intermediate approach

[7] The proportionate calculation shall be done by comparing the proportion of share value of the component in the basket of shares with the proportion of the same share in the component of the index. If there is some difference, the sum of such proportions of those transactions, without any offset (use the value with no sign) shall not exceed 10 percent. For instance, stock ABC has its proportion in an index of 5 percent but has its proportion in a basket of 4.5 percent, the difference is therefore equal to 0.5 percent. The total differences of all equities should not exceed 10 percent. In case where such equity is a component of an index but not in a basket of shares, the difference shall be the proportion of such equity in the index.

		- Internal model approach

Attachment 6.1

List of countries and liquid stock indices

Australia	All Ordinaries	Netherlands	EOE 25
Austria	ATX	**Singapore**	**Straight Times**
Belgium	BEL 20	Spain	IBEX 35
Canada	TSE 35	Sweden	OMX
France	CAC 40	Switzerland	SMI
Germany	DAX	Thailand	SET 50
Hong Kong	Hang Seng	UK	FTSE 100
Italy	MIB-30	UK	FTSE mid-250
Japan	Nikkei 225	USA	S&P 500

Attachment 7

Regulations on calculation of capital requirement for foreign exchange risk under standardised approach

1. Financial institutions shall refer to the **Notification of the Bank of Thailand on Foreign Exchange Positions** in order to calculate the aggregate position of all foreign currencies which are denominated in US Dollar (USD). Such foreign exchange positions shall be converted into Thai Baht.

2. Financial institutions shall calculate the capital requirement for foreign exchange risk by multiplying the aggregate position from 1. with the capital charge of 8 percent. **However, for foreign exchange options, financial institutions shall calculate the capital requirement for options risk which will be later prescribed. Financial institutions which do not apply the delta plus method in the calculation of capital requirement for foreign exchange options, financial institutions shall deduct the options positions from individual currency positions and aggregate position before calculating the capital requirement for foreign exchange risk.**

Attachment 8

Regulations on calculation of capital requirement for commodity risk under standardised approach

1. Scope of transactions

1.1 Financial institutions are allowed to hold positions in commodity derivatives as prescribed by **the Notification of the Bank of Thailand on Permission for Commercial Banks to Engage in Market Derivatives.**

1.2 Financial institutions shall calculate and maintain capital requirement for interest rate risk, foreign exchange risk, and commodity risk arising from holding or taking a positions in commodity derivatives.

1.3 Financial institutions, both with the level of trading book positions at and above the threshold and below the threshold, are required to maintain capital for commodity risk for **every position which involves commodity risk**.

2. Guidelines for calculating capital requirement for commodity risk

2.1 Financial institutions may choose either maturity ladder approach or simplified approach in calculating capital requirement for commodity risk. However, when financial institutions choose a particular approach to calculate capital, such approach shall be applied to every commodity derivative.

2.2 In case where financial institutions adopt the internal model approach, which is approved by the Bank of Thailand, for calculation of capital requirement for commodity risk, the Bank of Thailand shall not allow financial institutions to apply maturity ladder approach or simplified approach.

2.3 Positions in different commodities shall be offset only if they are close substitutes against each other and have similar price movement patterns. In addition, a minimum correlation of 0.9 between the price movements shall be satisfied throughout the offsetting period. (In order to calculate the correlation, historical daily data of commodity price at least 250 business days shall be used.)

3. Types of commodity risk

3.1 **Directional risk** is the risk arising from a change in the spot price of the commodity.

3.2 **Forward gap risk** is the risk that the forward price may change for reasons other than a change in interest rates such as warehouse fee, transportation fee, insurance fee, etc.

3.3 **Basis risk** is the risk arising from the case that financial institutions cannot achieve perfect hedging. That means the hedging item is not the same as the hedged item. Therefore, the basis risk is the risk occurring from the imperfect correlation between the price movements of the hedged items and that of the hedging items. This imperfect correlation may be due to transportation fee, location and delivery time, or quality and grade of commodities, etc.

3.4 **Interest rate risk** is the risk arising from changes in interest rates, which affect the cost of carry and in turn affect the forward price.

4. Guideline on perfect offset

Financial institutions, which undertake commodity derivatives and execute back-to-back hedging in which the references are the same commodity, maturity and notional amount, shall be permitted to offset the long and short positions. Thus, the capital requirement for such risk shall be exempted. However, financial institutions shall separately prepare details of the positions that perfectly offset for an examination by the Bank of Thailand.

5. Regulations on calculation of capital requirement for commodity risk under maturity ladder approach

In the calculation of capital requirement for commodity risk under maturity ladder approach, financial institutions shall follow the following steps**;**

Step 1: Financial institutions shall prepare a maturity ladder table for each type of commodity.

Step 2: Financial institutions shall calculate spot positions and forward positions of each commodity by multiplied the notional amounts in term of the standard unit of measurement (e.g. barrels, kilograms, pounds)by market price of such commodity. For spot position, spot price of such commodity shall be used. The position in each commodity shall then be converted into Thai Baht at current spot rates.

Step 3: The calculated long (buy) and short (sell) positions in step 2 shall be slotted into maturity ladder of each commodity according to the relevant time- band. The short positions shall be marked as minus (-) and the capital requirements are calculated

for each time-band by multiplying the matched positions within each time-band with risk charge of that particular time-band as specified in Table 1.

Table 1 7 Time-bands	
Time band	**Risk charge**
1 month or less	3.0%
More than 1-3 months	
More than 3-6 months	
More than 6-12 months	
More than 1-2 years	
More than 2-3 years	
More than 3 years	

The commodity derivative transactions, where the delta plus method is adopted under the calculation of capital requirement for options risk, shall be slotted into maturity ladder as follows;

(a) Commodity futures and commodity forwards shall be reported as long or short positions in the maturity ladder table by using notional amounts in term of the standard unit of measurement multiplied by market price of such commodity. The positions then shall be converted into Thai Baht at current exchange rates and be slotted into the ladder according to their maturity.

(b) Commodity swaps where one leg is a fixed rate price and the other is floating rate price shall be slotted into the maturity ladder table according to the payment period as follows;

- In case where the financial institutions are paying cash flow calculated from the notional amount multiplied by fixed rate price (fixed rate price payer) and receiving cash flow calculated from the notional amount multiplied by floating rate price (floating rate price receiver), the transaction shall be reported as **a long position** using the notional amount in standard unit of measurement multiplied by market price of such commodity and converted into Thai Baht at current exchange rate.

- In case where the financial institution is receiving cash flow calculated from the notional amount multiplied by fixed rate price (fixed rate price receiver) and is paying cash flow calculated from the notional amount multiplied by floating rate price (floating rate price payer), the transaction shall be reported as **a short position**

using the notional amount in standard unit of measurement multiplied by market price of such commodity and converted into Thai Baht at current spot rate.

(c) Commodity options where the delta plus method is adopted for calculation of capital requirement shall be reported as delta-equivalent long and short positions, which equal to the notional amounts in term of the standard unit of measurement of that commodity multiplied by deltas and multiplied by market price. The delta-equivalent amount shall then be converted into Thai Baht at current spot rates.

(d) Commodity options where the simplified method or the contingent loss method is adopted for calculation of capital requirement shall be complied with the regulations on calculation of capital requirement for market risk of options as prescribed in attachment 9.

Step 4: Financial institutions shall be allowed to match the residual position in each time-band with the positions in the next time-band. The additional capital requirement of 0.6 percent of the net position carried forward shall be added in respect of each time-band that the residual position is carried forward. The calculation shall be carried out as prescribed in step 3.

Step 5: When financial institutions obtain an overall net open position of either long or short position (for each commodity), a capital charge of 15 percent shall be applied to such position.

In the calculation process, current market prices of commodity and foreign exchange rates shall be obtained from reliable and standardised publicly available sources. In addition, the current exchange rate on the reporting date shall be used in accordance with **the Notification of the Bank of Thailand on Guidelines on Accounting of Financial Institutions.**

However, financial institutions shall consistently use the commodity market price and exchange rate from the same source.

6. Regulations on calculation of capital requirement for commodity risk under simplified approach

In calculating positions value of each commodity, the same regulations shall be adopted as in the maturity ladder approach.

6.1 Financial institutions shall calculate a net open position of each commodity, which equals to the absolute value of all long positions offset by all short

positions of the same commodity regardless of the maturities. Then a capital charge of 15 percent shall be applied to the overall net position of **each commodity** (in order to accommodate directional risk).

15% of net open position where the net open position = |Long positions – Short positions|

6.2 Financial institutions shall maintain their capital at the rate of 3 percent of the gross position for each commodity. The aggregate position is the sum of long positions and short positions of the same commodity (in order to accommodate the basis risk, interest rate risk and forward gap risk).

3% of aggregate positions where aggregate positions = |Long positions + Short positions|

6.3 Capital requirement = capital fund as in 6.1 + capital fund as in 6.2

Attachment 8.1

Example of calculation of capital requirement for commodity risk under standardised approach

1. An example of calculation of capital requirement under maturity ladder approach

A commercial bank entered into aluminium forwards with maturities and contractual values as prescribed in the following table;

Long position (buy) / Short position (sell)	Maturity	Value (Baht)
Long	4 months	20,000
Short	5 months	25,000
Long	2.5 years	15,000
Short	7 years	15,000

Such positions are linked to identical commodity and are converted into Thai Baht at current exchange rate.

The commercial bank shall calculate the capital requirement as indicated in the table below;

Time-band	Position (baht)	Calculation of capital fund	Capital requirement
1 month or less			
More than 1-3 months			
More than 3-6 months	Long 20,000 Short 25,000	20,000 matched position x 3% = 5,000 carry forward 3 time-bands = 5,000 x 3 x 0.6% =	600 90
More than 6-12 months			
More than 1-2 years			
More than 2-3 years	Long 15,000	5,000 matched position x 3% = 10,000 carry forward x 0.6% =	150 60
More than 3 years	Short 15,000	10,000 matched position x 3% = Net position 5,000: 5,000 x 15% =	300 750
		Total	1,950

Therefore, the total capital requirement equals to 1,950 Baht.

2. **Example of calculation of capital requirement under simplified approach**

Net position = |20,000 – 25,000 + 15,000 – 15,000| = 5,000 Baht

Aggregate position = (20,000 +15,000) + (25,000 + 15,000) = 75,000 Baht

Capital requirement = (15% x 5000) + (3% x 75,000) = 3,000 Baht

Attachment 9

Regulations on calculation of capital requirement for market risk of options

1. Calculation of capital requirement for market risk of options

Financial institutions shall comply as follows;

1.1 Financial institutions which undertake solely purchased options shall be free to use the simplified method for calculation of capital requirement.

1.2 Financial institutions which also write options shall be expected to use one of the intermediate approaches, which are the delta-plus method and the contingent loss method[1], or use a comprehensive internal model approach. The more significant its trading, the more the financial institution shall be expected to use a sophisticated approach. However, **all these 3 approaches shall be prior approved by the Bank of Thailand.**

1.3 Financial institutions which have positions in exotic options shall apply the contingent loss method or the internal model approach for better risk measurement.

1.4 In addition to capital requirement for specific risk and general market risk, a purchase of options from an OTC market shall be required additional capital requirement for counterparty risk which may incur as a result of a counterparty not be able to fulfill its contractual obligations.

1.5 The method applied in calculating capital requirement for options risk shall be in accordance with the regulations prescribed by the Bank of Thailand.

2. Guidelines on calculation of capital requirement for options under the simplified method

2.1 This method is allowed for financial institutions with solely purchased option positions. The purchased option positions include the case where financial institution has written options and fully hedged the position by holding the long position in the identical options in an amount equivalent to or higher. Hence, the hedged portion shall be exempted from capital requirement. However, the residual long position

[1] The calculation of capital requirement for specific risk by using the delta-plus method and contingent loss method are determined by multiplying the delta-equivalent amount of each option with the risk charge, as prescribed in the sections interest rate risk and equity risk.

shall be treated as a purchased option positions, which are allowed to apply the simplified method in calculating capital requirement.

2.2 Under the simplified method, option positions and the associated underlying are not subject to capital requirement for market risk under standardised approach but rather are carved-out and subject to separate capital requirements that incorporate both general market risk and specific risk. In this regard, the capital calculating from this approach will be then added to the capital calculating from standardised approach for the relevant risk categories which are interest rate risk, equity risk, foreign exchange risk and commodity risk in accordance with the regulations on calculation of capital requirement prescribed earlier.

2.3 The net purchased option positions, whether or not financial institutions hold the underlying instruments, shall be required to calculate capital requirement as prescribed in the table below. Thus, the required capital shall be the sum of the capital requirement for each option and the underlying instrument as follows;

Table 6
Summary of calculation of capital requirement for options

Positions	Treatment
Long cash and long put or Short cash and long call	The capital charge will be the market value of the underlying security multiplied by the sum of specific and general market risk charge for the underlying security less the amount the option is in the money (if any) or zero*
Long call or Long put	The capital charge will be the lesser of: (a) the market value of the underlying security multiplied by the sum of specific and general market risk charge for the underlying and (b) the market value of the option **

* For options with remaining maturity of more than 6 months, the strike price shall be compared with forward price, not current market price, for the calculation of in the money amount. In case where financial institutions are not able to follow this rule, the in the money amount shall be zero.

** In case that the market price or the price derived from model cannot be easily calculated due to high complexity or high cost, financial institutions may use the book value instead. For example, certain transactions which are not in the trading book (e.g. options on foreign currency)

2.4 Financial institutions shall refer to the example for calculation of capital for options under simplified method as follows; assuming that a financial institution holds 1,000 shares in ABC Company, which is a company in the S&P 500, at

equivalent market price of 250 baht per share. At the same time, financial institution holds long put option positions in that equity in the same amount, with an equivalent strike price of 260 baht per share. The capital requirement for this options is equivalent to 1,000 x 250 x 16% = 40,000 baht (16% is derived from 8% for specific risk and 8% for general market risk) deducted by the in the money amount of (260 – 250) x 1,000 = 10,000 baht. Therefore, the total capital requirement is equivalent to 40,000 – 10,000 = 30,000 baht. A similar calculation method shall be applied to options with underlying interest rate or debt instruments.

Table 7
Summary of capital requirement for options

Underlying instrument	Specific risk charge	General market risk charge
Debt instruments*		
Government debt instruments	0.00%	Apply risk charge as prescribed in Table 2 by using the remaining maturity in case of fixed interest rate, or remaining term to the next interest fixing date in case of floating interest rate
Qualified debt instruments and		
remaining maturity less than 6 months	0.25%	
remaining maturity more than 6 months, but not exceed 24 months	1.00%	
remaining maturity more than 24 months	1.60%	
Unqualified debt instruments	8.00%	
Other instruments referring interest rate	0.00%	
Equity*	2.00, 4.00, 8.00%	8.00%

* More details in the section on calculation of capital requirement for specific risk

3. <u>Guidelines on calculation of capital requirement for options under delta-plus method</u>

2.1 This method uses the sensitivity parameters or “Greeks” associated with the options to calculate the market risk capital requirement. The capital requirement for options under this method shall equal to the sum of

1) capital requirement for specific risk, which is the delta-equivalent amount of options positions multiplied by the relevant risk charge as prescribed in the section interest rate risk and equity risk, and

2) capital requirement for general market risk, in which the delta-equivalent amount of options positions will be used to calculate the general market risk according to the associated risk, e.g. interest rate risk and equity risk, and

3) additional capital for gamma and vega risk of the options positions.

2.2 Financial institutions shall refer to the following regulations in the calculation of capital requirement for options under the delta-plus method.

1) Financial institutions with a net **written** options position shall **obtain an approval from the Bank of Thailand to apply delta-plus method** in calculating capital requirement for specific and general market risk under the standardised approach. The delta weighted value of underlying instrument, which is equivalent to the market value of the underlying instrument multiplied by the absolute value of delta, shall be used in the calculation of capital requirement for market risk. (**please see attachment 5.2 and 9.1**)

2) Since delta does not sufficiently cover all risks associated with option positions, financial institutions shall also be required to measure gamma (measuring the rate of change of delta) and vega (measuring the sensitivity of the value of options with respect to a change in volatility of the underlying instrument's price) sensitivities in order to calculate the total capital requirement. These sensitivities shall be calculated from 1) a pricing model approved by the authorised exchange market in G10 countries, or 2) financial institution's own option pricing model in accordance with the regulations specified by the Bank of Thailand.

3) In calculating capital requirement for general market risk, the delta-weighted options position with debt instrument or interest rate as the underlying shall be recorded into the corresponding time-band (as prescribed in the section interest rate risk) as follows;

a) Apply the two-legged approach similar to other derivative transactions. The first leg's maturity is equivalent to the month financial institutions enter into a contract until the month the contract matures; the other leg's maturity is equivalent to the month financial institutions enter into a contract until the month the contract takes effect[2]. For instance, in the case of a purchased call option on June three-

[2] In case of options on futures or forwards, the true underlying instrument is the underlying instrument of futures or forwards. For instance, the true underlying instrument of a purchased option on June three-month bill future is a three-month bill.

month bill future in April, the option shall be recorded by the delta-weighted value, separated into a long position in three-month bill with maturity of 5 months and a short position in a zero coupon bond with a maturity of 2 months[3]. In case of a written call options shall be reported with opposite positions; the first leg is a long position in a zero coupon bond with maturity of 2 months and the other leg is a short position in three-month bill with maturity of 5 months.

b) Caps and floors shall be treated as European-style options, whose right can be exercised on the maturity date only. For instance, a buyer of a 2- year cap with semi-annual reset and the cap rate of 15 percent shall be treated as a purchase of 3 call options on a FRA (there will be only 3 resets during 2 years, that is, FRAs [6,12], [12,18], [18,24]) with an interest rate of 15 percent.

4) The calculation of capital for options on equity instruments shall include the calculation of delta-weighted position in calculating capital requirement for equity risk, both specific risk and general market risk as prescribed under the regulations on calculation of capital requirement for equity risk.

5) The calculation of capital for options on foreign exchange shall include calculation of delta-weighted position on all foreign currency positions and shall refer to the regulations on calculation of capital requirement for foreign exchange risk.

6) The calculation of capital requirement for options on commodities shall include delta-weighted position in calculating capital requirement for commodity risk as prescribed under the regulations on calculation of capital requirement of commodity risk.

4. <u>Calculation of capital requirement for gamma and vega risk under delta-plus method</u>

4.1 In addition to the capital requirement arising from delta risk, there shall be further capital requirements for gamma and vega risk. Financial institutions shall be required to calculate capital requirement for gamma and vega risk of each option position separately.

4.2 Financial institutions shall comply with the following guidelines in calculating capital requirement for gamma risk;

[3] The case of 2-month call option on 10 year bond future with delivery date in September, the transaction in shall be recorded in April as a long bond position with a maturity of 10 years and 5 months, and a short position with a maturity of 5 months. Both legs must use the delta-weighted position.

1) Refer to this formula: Gamma impact = ½ x gamma x $(VU)^2$ where VU denotes the variation in the market value of the underlying of the option, calculated as follows;

a) For options on bonds, the market value of the underlying shall be multiplied by the capital charge specified in **Table 2 in attachment 5** under section interest rate risk. Similarly, this method shall be applied to options on interest rate, by using the assumed changes in yield in **Table 2 in attachment 5**.

b) For options on equity instruments or stock indices, the market value of the underlying shall be multiplied by 8 percent.

c) For options on foreign exchange, the market value of the underlying shall be multiplied by 8 percent.

d) For options on commodity price, the market value of the underlying shall be multiplied by 15 percent.

4.3 For calculating the gamma impact, the following regulations shall be used to determine whether the underlying instruments are the same type of instrument.

1) **For interest rate**[4] - instruments in the same time-band as specified in Table 2 under section interest rate risk for financial institution using maturity method, and instruments in the time-band as specified in Table 4 for financial institution using duration method shall be treated as the same underlying instruments.

2) **For equity instruments and stock indices** – equity instruments or stock indices of the same country shall be treated as the same underlying instrument.

3) **For foreign exchange** – each currency pair shall be treated as the same underlying instrument.

4) For commodity price - each commodity under the regulations on calculation of capital for commodity risk as prescribed in attachment 8 shall be treated as the same underlying instruments.

4.4 Each option on the same underlying instrument may have either positive or negative gamma impact. The gamma impact of the same underlying instrument

[4] Position shall be calculated by currency.

can offset each other which results in the net gamma impact of such underlying instrument. The net gamma impact can be either positive or negative but only the negative impact shall be included in the capital calculation.

4.5 The capital requirement for gamma impact is equivalent to the sum of the absolute value of the negative net gamma impacts of each underlying instrument calculated from 4.4.

4.6 Financial institutions shall follow the guideline in calculating the capital requirement for vega risk; the vega of each option shall be multiplied by 25 percent to reflect the increase in the option's current volatility. The results shall be combined under the same underlying instrument and the capital for vega risk is equivalent to sum of the absolute value of vega of all types of underlying instruments.

5. Guidelines on calculation of capital for options under the scenario analysis or the contingent loss method

5.1 The capital requirement for options under the scenario analysis or the contingent loss approach is equivalent to

1) capital requirement for specific risk which is the delta-equivalent of each option multiplied by the relevant risk charge, as prescribed in section interest rate risk and equity risk;

2) capital requirement for general market risk in which the contingent loss matrix analysis will be applied in order to measures the change in the value of options portfolio with respect to the change in the level and volatility[5] of the rates or prices of associated underlying instrument. According to this method, **the capital requirement for general market risk shall be specified by the maximum loss in the scenario matrix** under such analysis.

5.2 Financial institutions may choose this method to calculate capital requirement for options portfolio and the associated hedging positions by using the contingent loss matrix analysis after obtaining an approval from the Bank of Thailand. The guidelines are as follows;

[5] In calculating volatility, financial institutions may choose either 1) estimating from historical data, at least 1 year or 250 business days and 2) implied volatility from option prices by using model derived from iterative search procedure. For the weight applied to historical data, financial institutions may apply weighting scheme as it deems appropriate, for instance, equally or exponentially weight or GARCH (1,1), etc. In this regard, financial institutions shall be able to provide an explanation to the Bank of Thailand's examiner.

1) Explicitly specify a fixed range of changes in the option portfolio's risk factors (e.g. price or rate, and volatility of such price or rate) and calculate the changes in the value of options portfolio according to the changes in risk factors specified in the matrix.

2) For the purpose of calculating the capital requirement, a different matrix will be set up for each individual underlying as prescribed in 4.3. (under gamma calculation part) in order to assess simultaneous changes in the option's underlying rate or price and in the volatility of that rate or price.

3) **The first dimension of the matrix** is specified by a change in price or rate of underlying instrument, which affects the value of options and/or the associated hedging positions. The time-band of changes in interest rates, equity prices, foreign exchange rates, and commodity prices shall, at least, be divided into 7 equal intervals. Changes in price or rate in each time-band are specified as follows;

a) For options on interest rate, the range of changes in interest rates must be consistent with the assumed change in yield in Table 2 in accordance with the regulations on calculation of capital requirement for interest rate risk under standardised approach. Financial institutions which are significant traders in interest rate options shall be permitted to base the calculation on **a minimum of** 6 sets of time-bands. Each set of time-bands shall not have more than 3 time-bands combined and the highest of the assumed changes in yield among those 3 time-bands shall be used.[6]

b) For options on equity instrument, the range of changes in price or rate is ± 8 percent.

c) For options on foreign exchange, the range of changes in price or rate is ± 8 percent.

d) For options on commodity, the range of changes in price or rate is ± 15 percent. (see example in **attachment 9.2**)

4) **The second dimension of the matrix** entails a change in the volatility of the underlying rate or price, which affects the value of options. A single change in the volatility of the underlying rate or price equals to a shift in volatility of + 25 percent and – 25 percent, which is expected to be sufficient in most cases.

[6] Example from Table 2: If financial institution combines the time-band 3 – 4 years, 4 –5 years, and 5 – 7 years into one group, the change on interest rate for the 7 equal intervals will be equal to the highest assumed change in yield among the 3 time-bands, which is equivalent to 0.75.

5) After calculating the effect on option portfolio and the associated hedging positions in various matrices, the results are combined into one summary matrix, in which each cell indicates the net profit or loss of the options portfolio and the associated hedging positions. The capital requirement is equivalent to the highest loss in the summary matrix.

6) Nevertheless, the Bank of Thailand may specify a different rate of change in volatility or may request for an additional calculation at any specific point in a matrix.

5.3 Financial institutions intending to use this method in calculating capital requirement for option risk together with the standardised approach in assessing interest rate risk, equity risk, foreign exchange risk and commodity risk, shall obtain validation from the Bank of Thailand regarding the accuracy of procedure and analysis under this method[7]. In addition, such financial institutions shall also comply with the qualitative standards specified in the market risk supervision policy under internal model approach that is commensurate to the complexity of the business.

5.4 Besides the options risk mentioned above, the BIS is conscious of the other risks associated with options e.g. rho (rate of change in value of the option with respect to the change in interest rate). Although the Bank of Thailand has not yet required financial institutions to maintain capital fund against this type of risk, financial institutions undertaking significant options business shall be able to closely monitor such risk. Additionally, financial institutions may incorporate rho risk into the capital requirement for interest rate risk.

[7] This is because this method is more complicated than the simplified method and the delta-plus method.

Attachment 9.1

Example of calculation of capital requirement for options risk under delta-plus method

Assume 1) THB is a local currency and

2) A financial institution holds portfolio of options on foreign exchange and commodity as follows;

Option	Position	Currency pair	Currency FX rate	Nominal amount (Units)	Delta	Gamma	Vega	Assumed volatility (%)
1	Long call option	THB / USD	40	1000	0.162	0.069	0.1598	15
2	Short call option	THB / EUR	48	800	-0.589	-0.077	-0.1233	12
3	Short call option	THB / USD	40	400	-0.867	-0.054	-0.0987	10
4	Short call option	USD / EUR	1.25	700	-0.730	-0.053	-0.0659	8
Option	Position	Exercise price (THB)	Market value (THB)		Delta	Gamma	Vega	Assumed volatility (%)
5	Commodity Short call option	490	500		-0.721	-0.0034	-1.68	20

Step 1 Calculate capital requirement for delta risk

(1) Calculate capital requirement for delta risk of foreign exchange as follows;

Delta-equivalent (FX) = delta x nominal amount (in each currency)

Option	Currency	Delta	Nominal amount	Delta-equivalent
	FX			
1	USD	0.162	1000	-162.0
2	EUR	-0.589	800	-471.2
3	USD	-0.867	400	-346.8
4	USD	0.730	875	638.8
	EUR	-0.730	700	-511.0

Find net individual currency of each currency in USD as follows:

USD 162 – 346.8 + 638.8 = USD 454

EUR -471.2 – 511.0 = -982.2 x 1.2 = USD 1,178.64

In case there are no other foreign currency positions, financial institution shall calculate capital requirement for delta risk of foreign exchange as follows;

Total aggregate position x 8% = 1,178.64 x 8% = USD 94.29 or 3,771.6 Baht (converted into Thai Baht at the current rate on the reported date)

(2) Calculation of capital requirement for delta risk of commodity price as follows;

Market value x |*Delta*| = 500 x 0.721 = 360.5 (360.5 is delta-equivalent)

Delta-equivalent x 0.15 (0.15 is derived from the maturity ladder method)

= 360.5 x 0.15 = 54.08 Baht

* In case of options on FX forwards, financial institution shall include delta equivalent amount in the calculation of interest rate risk as well.

Step 2 Calculate gamma impact for FX and commodity options denominated in Thai Baht as follows;

From the formula **½ x Gamma x (Market value of underlying (per unit) x VU)^2 * number of units**

Example Calculate gamma impact of FX option 1

Gamma Impact (FX) = ½ x (0.069) x (40 x 0.08)^2 x 1,000 = 353

Gamma Impact (Commod.) = ½ x (-0.0034) x (500 x 0.15)^2 = -9.56

Then, calculate impact value of gamma of all options as presented on the table.

Option	Category Currency Pair	Gamma Impact	Vega (Each FX)	Assumed Volatility (%)	Volatility shift (percentage point)	Change in Value
1	THB/USD	353.3	0.1598	15	3.75	0.60
2	THB/EUR	-454.2	-0.1233	12	2.00	-0.37
3	THB/USD	-110.6	-0.0987	10	2.50	-0.27
4	USD/EUR	-0.17	-0.0659	8	2.00	-0.16
5	Commodity	-9.56	-1.68	20	5.00	-8.40

Impact from gamma is equal to

FX of each currency pair	Commodity
THB/USD + 242.7 THB (242.7 = 353.3 – 110.6)	Commodity – 9.56 THB
THB/EUR – 454.2 THB	
USD/EUR – 6.8 THB (-0.17 x 40)	

Only negative gamma impact shall be included in calculation of capital requirement.

Therefore, the capital requirement for FX and commodity gamma risk equals to 461 Baht (-452.2-6.8 = -461) and 9.56 Baht, respectively.

Step 3 Capital requirement for vega depends on assumed volatilities of each option. First, calculate the assumed price changes on the assumption that volatility shift is equal to 25 percent of assumed volatilities of each option. Then, multiply such value with vega (as prescribed in the table above) and sum up for all options.

Example Calculate vega of FX Option 1

Volatility shift = Assumed volatilities x 25%

= 15 x 0.25 = 3.75

Assumed price changes = Volatility shift x vega (Per 1%) * number of units

= 3.75 x 0.1598 x 1,000 = 599.25

Capital requirement for vega risk is equal to 599.25 Baht

Then, calculate the net amount of each currency pair, resulting in net impact for vega as follows;

FX on each currency pair	Commodity
THB/USD 500.55 THB (500.55 = 599.25 – 98.7)	Commodity 8.40 THB
THB/EUR -295.92 THB	
USD/EUR -3,690.4 THB (converted in to Baht (-92.26)*40)	

To maintain capital for vega risk, vega impact of the same underlying instrument is **allowed** to be combined, however, vega impact of different underlying instrument is not allowed to be offset. Capital requirement shall be equal to the sum of derived value by not taking into account the sign as follows;

(1) Capital requirement for FX vega risk equals to 500.55 + 295.92 + 3,690.4 = 4,486.87 Baht

(2) Capital requirement for commodity vega risk equals to 8.40 Baht

Last step Sum the capital requirement calculated in step 1 – 3, equals to

FX 3,771.6 + 461 + 4,486.87 = 8,719.47 Baht

Commodity 54.08 + 9.56 + 8.40 = 72.04 Baht

Therefore, the amount of capital that financial institution shall maintain for FX and commodity risk of options equals to 8,791.5 Baht (8,719.47 + 72.04)

Attachment 9.2

Example calculation of capital requirement for options risk under scenario analysis or contingent loss approach

Assuming that a financial institution holds portfolio of 2 shares and 2 related options as follows;

Shares	No. of shares	Current price (USD)
Long AAA	100	19.09
Short BBB	50	1.79

Options	No. of options	Type	Maturity (Year)	Exercise price	Volatility (%)
Long AAA	50	Call	0.45	20	0.15
Short BBB	20	Put	0.36	2.25	0.42

Step 1: Calculate the change in value (USD) of the share portfolio by applying the price change under +/- 8% (at least divided into 7 bands) as follows;

	Assumed price change (%)						
	-8.00	-5.33	-2.67	0.00	2.67	5.33	8.00
AAA	-152.72	-101.81	-50.91	0	50.91	101.81	152.72
BBB	7.16	4.77	2.39	0	-2.39	-4.77	-7.16

Step 2: Calculate the price change in AAA call options and BBB put options by using matrix of price change and volatility (The assessment shall refer to the appropriate price model as well) as follows;

AAA call options – change in value (assuming that such value is derived from the option pricing model)

Assumed volatility change (%)	Assumed price change (%)						
	-8.00	**-5.33**	**-2.67**	**0.00**	**2.67**	**5.33**	**8.00**
+25	-8.26	-4.38	0.98	8.02	16.93	27.78	40.58
0	-12.10	-9.63	-5.73	0	7.88	18.13	30.81
-25	-14.30	-13.27	-11.12	-7.20	-0.83	8.52	21.08

BBB put options – change in value (assuming that such value is derived from the option pricing model)

Assumed volatility change (%)	Assumed price change (%)						
	-8.00	**-5.33**	**-2.67**	**0.00**	**2.67**	**5.33**	**8.00**
+25	-2.81	-2.07	-1.36	-0.68	-0.02	0.62	1.22
0	-2.32	-1.52	-0.75	0	0.72	1.41	2.08
-25	-1.88	-0.96	-0.04	0.89	1.81	2.73	3.65

Step 3: Sum the price change in share and option portfolio from step 1 and 2, resulting in the contingent loss matrix as follows;

Assumed volatility change (%)	Assumed price change (%)						
	-8.00	**-5.33**	**-2.67**	**0.00**	**2.67**	**5.33**	**8.00**
+25	-156.62	-103.49	-48.91	7.35	65.43	125.43	187.36
0	-159.98	-108.19	-54.99	0	57.12	116.59	178.45
-25	-161.74	-111.27	-59.68	-6.31	49.50	108.29	170.28

Summary The capital requirement is equivalent to the highest loss in the contingent loss matrix, which in this case equals to 161.74.

Attachment 10

Regulations on calculation of capital requirement for market risk under internal model approach

1. General regulations on market risk supervision under internal model approach

1.1 Financial institutions intending to use an internal model to calculate capital requirement for market risk shall seek for permission from the Bank of Thailand. An application for approval and the required documents specified by the Bank of Thailand shall be submitted (details as prescribed in attachment 10.1) to the Supervision Group, Bank of Thailand. In this respect, additional data or documents may be requested. Moreover, the following minimum requirements shall be considered for approval.

1) Financial institutions shall have an effective risk management system and shall strictly comply with the specified guidelines of such system. In addition, financial institutions shall have sufficient skilled staffs to effectively perform operations relating to sophisticated models which are trading area, risk control, audit, and back office areas.

2) Financial institutions shall prove that the regulations specified in 2.-6. (including 7. in case where the internal model is used to calculate capital requirement for specific risk) are fully complied. In addition, financial institutions shall monitor the process of internal risk management system and the use of the internal model for sufficiently period of time (use test). Thus, the Bank of Thailand's examiners can take such information into consideration for granting an approval.

2. Qualitative standards

An internal model used in calculating market risk capital requirement shall be effectively applicable to the risk management process and shall comply with the following minimum qualitative standards. However, these standards shall be used as a guideline in granting a permission to apply internal model approach in accordance with the result of an on-site examination.

2.1. Financial institutions shall have a risk control unit that is responsible for the design and implementation of the risk management system. The unit shall also produce and analyse daily reports on the output of the risk assessment model. The unit shall be independent from a trading unit or other risk taking units and shall report directly to the board of directors of the financial institutions or other appointed committees.

2.2. The risk control unit shall conduct a regular back-testing program in accordance with the regulations specified by the Bank of Thailand.

2.3. The board of directors and senior management of the financial institutions shall be responsible for the market risk management process as specified in the regulations on internal control for market risk management.

2.4. The internal model shall be closely integrated into the day-to-day risk management process of the financial institutions[1]. Therefore, the output shall accordingly be an integral part of the process of planning, monitoring, and controlling the financial institution's market risk.

2.5. The internal model shall be commensurate to the complexity of the trading book transactions, and the limit specified by financial institutions.

2.6. Stress testing program shall be conducted in accordance with the regulations specified by the Bank of Thailand in order to reflect the risks that may incur from a trading book policy and indicate efficiency of applying the limits. In addition, the results of stress testing shall be routinely reported to the board of directors and senior management of the financial institutions or any other associated committees.

2.7. Financial institutions shall obtain a routine in place for ensuring compliance with a documented set of internal controls policies and procedures concerning the operation of the internal model. The risk measurement system shall be well documented, for instance, through a risk management manual that describes the basic principles and procedures of the risk management system and that provides an explanation of the empirical techniques used to measure market risk. Thus, the parties involved shall be able to use as supplementary documents, for knowledge, and as references in the operations.

2.8. An independent review of the risk measurement system shall be carried out regularly in the internal controls process. The review shall include the operations of trading units and the risk control unit and shall be done by a unit independent from both aforementioned units. The review shall take place at least once a year and shall be conducted in accordance with the regulations on internal controls for market risk management and other additional issues as follows;

[1] Financial institutions may use different data or variables in the calculation of VaR for internal risk management from the quantitative standards specified by the Bank of Thailand due to the difference in purposes.

1) The approval process of valuation systems and pricing model used by front office and back office staffs

2) The validation of any significant change in the internal model

3) The scope of market risks captured by the internal model

4) The integrity of the management information system concerning market risk

5) The accuracy and completeness of positions details, valuation, and implementation on risk assessment and capital requirement calculation by the internal model

6) The verification of the consistency, timeliness, reliability, and independence of the input data sources used in the model

7) The accuracy and appropriateness of volatility and correlations

8) The verification of the model through a backtesting program in accordance with the regulations specified by the Bank of Thailand

3. Specification of market risk factors

3.1 An important part of the internal market risk measurement system is the specification of an appropriate set of market risk factors, for instance the market price which affects the value of trading book positions. Therefore, the market risk assessment system shall incorporate various factors related to a trading portfolio in both on- and off-balance sheet positions. The internal model shall cover at least the following risk factors;

Interest rates

1) The internal model shall cover all risk factors corresponding to interest rates in each currency in which the financial institutions have interest rate sensitive trading book positions both on- or off-balance sheet.

2) The risk assessment system shall be able to model the yield curve using one of a number of generally accepted approaches.The yield curve shall be divided into various maturity segments in order to capture variation in the volatility of interest rates in each maturity segment along the yield curve. For material exposures to

interest rate movements in the major currencies and markets, financial institutions shall model the yield curve using at least 6 maturity segments.

3) The risk management system shall incorporate various risk factors so that it can assess basis risk. A variety of approaches shall be used to capture the basis risk between government bond and other fixed income instruments, such as specifying a completely separate yield curve for non-government fixed-income instruments or estimating the spread over government rates at various points along the yield curve.

Equity prices

1) The internal model shall incorporate various risk factors in equity markets in which financial institutions have invested in a significant proportion.

2) The internal model shall incorporate the minimum risk factors that can capture market-wide movements in equity price (market index) and can assess individual equity risk in the form of beta-equivalent relative to the market index.

3) Financial institutions shall specify the risk factors that capture the change in equity prices of various sectors (sector index). Positions in individual equity within each sector shall be assessed in the form of beta-equivalent relative to that particular sector index.

4) Financial institutions shall have risk factors that correspond to the volatility of individual equity instrument.

5) The sophistication and nature of the modeling technique for a given market shall correspond to financial institution's exposure to the overall market as well as its concentration in individual equity instrument in that market.

Foreign exchange rates

The internal model of the financial institutions shall incorporate various risk factors corresponding to the individual foreign currencies in which the financial institution's positions are denominated.

Commodity prices

The internal model shall incorporate various risk factors corresponding to each of the commodity markets in which the financial institutions hold significant positions. However, the specification of commodity risk factors shall be in accordance with the amount and complexity of position.

4. Quantitative standards

4.1 Financial institutions are allowed to select or develop the internal model to calculate market risk capital requirement, corresponding to the amount and complexity of transactions of each financial institution. However, financial institutions shall comply with the following regulations;

1) VaR shall be computed on a daily basis.

2) In calculating VaR, a 99th percentile, one-tailed confidence interval shall be applied.

3) In calculating VaR, at the minimum, a 10-day-holding period shall be applied. Financial institutions may use VaR calculated from shorter holding periods, such as 1 day, then scale up to 10 days by multiplying with the square root of 10 days (square root of time).

4) In calculating VaR, financial institutions shall use historical data with the minimum observation period of 1 year (or 250 business days). In case where financial institutions apply a weighted scheme to weight the historical period, the weighted average of time shall be at least 6 months (or 125 business days).

5) Financial institutions shall update the correlation data at least every monthy[2] or whenever there is a material change in the market prices. The Bank of Thailand may request the financial institutions to calculate VaR with the updated data over a shorter period, if such action is deemed to better reflect the material change in volatility of prices.

6) The internal model shall compute VaR based on the parametric approach, historical simulations, or Monte Carlo simulations, and shall be able to assess market risk covering all risk factors specified in 3.

7) In calculating VaR, financial institutions shall apply the correlations within risk categories (e.g. interest rate, foreign exchange rate, and equity price, including options related to those risks) and /or the correlations across risk categories.

[2] The data sets that shall be updated at least every month are, for instance, correlation matrix, volatility.

8) The internal model shall be able to accurately capture unique risks associated with options within each of the risk categories. The following criteria shall be applied to the measurement of options risk.

a) The internal model shall be able to capture the non-linear price characteristics of options.

b) The internal model shall be able to employ the application of a full 10 day price shock to options positions or positions that display option-like characteristics.

c) The internal model shall be able to assess various risk factors that reflect the volatilities of the rates and prices of the underlying assets of options e.g. vega risk. However, the calculation of volatility for financial institutions with complex options portfolio and large amount of transactions shall be conducted in more details.

9) Financial institutions shall maintain, on a daily basis of each business day, a capital requirement expressed as the higher of

a) an average of daily VaR over the last 60 days, multiplied by scaling factor, which consists of 1) multiplication factor and 2) plus factor, and

b) VaR of the previous day.

10) **Multiplication factor** ranges between 3 to 4 depending on 1) assessment of the quality of risk management and 2) the stress testing system, while **plus factor** ranges from 0 to 1 depending on the result of backtesting in accordance with the regulations prescribed in 6.

11) Financial institutions shall be subject to additional capital requirement for specific risk of debt instruments and equity instruments positions. The additional details are prescribed in **regulations on calculation of capital requirement for specific risk in 7.**

5. Regulations on stress testing

5.1 Financial institutions that apply the internal model approach for calculating market risk capital requirements shall have in place a rigorous and comprehensive stress testing program. The stress scenarios shall cover a range of factors that may cause extraordinary losses or gains in trading book positions, or make the control of risk in those positions very difficult. These factors include low-probability but high impact events in all

major types of risks. Therefore, the stress scenarios shall reflect the impact of such events on positions that display both linear and non-linear price characteristics (e.g. options and instruments that have option-like characteristics).

5.2 The stress testing program shall be both of a qualitative and quantitative nature, incorporating both market risk and liquidity aspects of market disturbances. Quantitative criteria shall identify plausible stress scenarios that may incur and cause severe adverse impacts to financial institutions, while, qualitative criteria shall emphasise the two major goals of stress testing; that are,

1) to evaluate the capital adequacy of financial institution in absorbing potential large losses and

2) to identify possible measures for financial institutions to reduce such risk so as to conserve capital. These goals shall be incorporated in setting out the risk management strategy and the results of stress testing shall be constantly reported to senior management and periodically reported to the board of directors.

5.3 Financial institutions shall conduct a stress testing program according to the supervisory scenarios, as well as, the stress scenarios developed by financial institutions themselves to reflect their portfolios' specific risk characteristics. As such, the Bank of Thailand requires financial institutions to prepare the data for stress testing in 3 parts as follows;

1) Financial institutions shall prepare the largest actual loss of at least 5 days during the quarterly reporting period.

The Bank of Thailand shall compare such loss to the level of capital calculated from the internal model to consider the capital calculated from VaR in absorbing such losses.

2) Financial institutions shall conduct stress testing under supervisory scenarios, which can be classified into 2 perspectives as follows;

a) Historical perspective: the Bank of Thailand may determine volatilities of various risk factors or specify the past periods of significant disturbance. For instance, the equity crash in 1987, the ERM crises in 1992 and 1993 or the Asian financial crisis in 1997. Hence, financial institutions shall apply various variables such as volatilities and correlations during those periods as an input data in conducting a stress testing for current positions of financial institutions.

b) Forward looking: the Bank of Thailand may require financial institutions to test the impact of changes in a particular risk factor or various risk factors, simultaneously, to the value of financial institution's positions. The Bank of Thailand shall ask financial institutions to prepare and submit the results to the Bank of Thailand from time to time. The Bank of Thailand will inform financial institutions of the details on conducting of a) and b) later and financial institutions shall submit the result to The Bank of Thailand every quarter.

3) Financial institutions shall develop their own stress scenarios for risk assessment. In addition to stress testing described in 1) and 2), financial institutions shall develop their own stress scenario which identify the most adverse based on the characteristics of their portfolio, for instance, a case where financial institutions invests a large proportion in instruments of a country that has a high tendency to face a political and economic crisis, or a case where financial institutions have a large proportion of written options. Financial institutions shall prepare the data, description of the methodology used to identify and carry out various cases and scenarios in stress testing, including an explanation of the results derived from those scenarios. Financial institutions shall have, upon a request, the data available for an examination by the Bank of Thailand.

5.4 The results of the stress testing shall be reviewed periodically by the senior management and shall be reflected in the policies and limits set by management and the board of directors. If there is a case or scenario where the stress testing's result indicates that financial institutions have taken the excessive risk beyond the acceptable limit, the Bank of Thailand may require financial institutions to take an appropriate action to manage those risks. For instance, using of hedging instruments to mitigate the risk from that scenario or any measure to reduce the exposure of that risk.

In this regard, financial institutions shall conduct stress testing under scenario determined by the Bank of Thailand as prescribed on attachment 10.2.

6. <u>Regulations on backtesting and determination of plus factor</u>

6.1. Financial institutions shall conduct a backtesting at least on a monthly basis, using the historical data of the past 250 business days. The daily VaR shall be compared with profit or losses due to the hypothetical change[3] of the portfolio value,

[3] Comparison of VaR from the model with the loss from hypothetical change of the portfolio value shall give a more accurate result than the use of actual losses. This is because actual profits/losses not only result from trading book transactions, but also fees and other income not directly related to trading book transactions. Hence, the Bank of Thailand requires financial institutions to use hypothetical loss (loss due to hypothetical change) for conducting

which is calculated from profit or loss incurred from changes in market prices on that day and the portfolio position of the previous day.

6.2. Determination of integrity of the internal model from a backtesting result depends on the number of exceptions, which is the result of the hypothetical loss exceed VaR computed from previous day portfolio position. Integrity of the model shall be categorised into 3 levels, according to the number of exceptions, as follows;

1) Acceptable level is a level indicating no integrity problem in internal model.

2) Inconclusive level is a level, which cannot be clearly concluded whether the result of the backtesting may relate to integrity of the model or not. Therefore, the Bank of Thailand's examiners shall ask for additional information for considering to issue a corrective order, and

3) Unacceptable level is a level clearly indicating that there is an integrity problem in the internal model. Financial institutions shall clarify and provide additional information immediately.

6.3 In imposing the plus factor, financial institutions shall proceed as follows;

1) Financial institutions shall apply the plus factor according to "number of exceptions" specified in the table, then add it to the multiplication factor to get scaling factor for the calculation of capital requirement of the following month, **except** the Bank of Thailand orders otherwise.

2) Financial institutions shall analyse the causes of each exception and submit all the related data to the Bank of Thailand's examiners to examine.

3) Financial institutions shall submit supporting information or documents to the Bank of Thailand for the consideration on granting a permission to exempt the use of data on a certain day on a case by case basis. In doing so, there shall be a reason to believe that an exception of that day is of temporary nature, a one-time event, or results from an error of an investment unit or an individual staff, or is an insignificant error of the model or from the backtesting process only.

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backtesting to ensure accuracy and satisfy of the same standard.

Table
Backtesting result

	Number of exceptions	Plus factor
Acceptable level	4 or less	0.00
Inconclusive level	5	0.40
	6	0.50
	7	0.65
	8	0.75
	9	0.85
Unacceptable level	10 or more	1.00

7. Regulations on calculation of capital requirement for specific risk under internal model approach

7.1 Definition of specific risk: financial institutions shall refer to the following definitions when applying internal model for calculating capital requirement for specific risk.

1) Specific risk is a risk arising from a change in value of financial instrument due to changes in factors other than general market factors that correlate with an issuer of such instrument, for instance, a change in credibility of an issuer. Such risks can be categorised into 2 risk types as follows;

a) Idiosyncratic risk is a risk incurred as a result of the change in the instrument's price in the direction or magnitude that does not correspond to the change in general market benchmark. Moreover, such change has incurred continuously, not immediately, thus, historical data on the instrument's price will reflect both idiosyncratic risk and general market risk.

b) Event and default risk is a risk incurred as a result of the immediate change in the instrument's price in the direction or magnitude that does not correspond to the change in general market benchmark. This type of risk is hardly occurs and discontinue. It may relate directly to the issuer of such instrument, for instance, the adjustment of the issuer credit rating, etc. Therefore, the historical data of the instrument's price may not clearly reflect this type of risk.

7.2 Additional regulations on calculation of capital requirement for specific risk under internal model approach

The internal model applied in calculating capital requirement for specific risk shall be qualified for general market risk assessment, both quantitative and qualitative as specified by the Bank of Thailand, as well as, addition regulations prescribed in 7.2 and 7.3. For financial institutions whose internal model is not qualified under the additional regulations, they shall calculate capital requirement for specific risk using standardised approach for interest rate risk and equity risk.

1) Financial institutions shall maintain capital for specific risk, both idiosyncratic risk and event and default risk.

2) The internal model which the financial institutions use in assessing idiosyncratic risk of specific risk shall obtain following characteristics;

a) able to explain historical price variation of the portforlio[4]

b) able to capture the concentration of the portfolio both in terms of magnitude and change in its components (financial institutions shall be able to demonstrate that the internal model is sensitive to the change in portfolio construction, that is, the capital maintained for the high concentrated portfolio shall be higher)

c) able to reflect the unfavorable[5] change in the environment, and

d) able to validate through backtesting which can be accurately reflect the effectiveness of idiosyncratic risk assessment.

3) In case where financial institutions are qualified for idiosyncratic risk assessment; however, are not able to accurately assess event and default risk, a surcharge shall be added to the capital requirement calculation. Such surcharge is established to capture the deficiency of the internal model for specific risk from the backtesting result. This surcharge shall be added to the scaling factor and then used in calculation of

[4] A primary measure of model quality is "Goodness-of-fit" which reflects the ability of the model to explain historical variations. Another popular measure is an R-squared measure from a regression. If financial institutions use this measure, the model shall be able to explain the historical price variation in a high percentage, e.g. 90 percent, or there shall be an estimate of the residual variability which is not captured in the factors in the regression in a consideration. Financial institutions intending to use other techniques, which may not be able to calculate a Goodness-of-fit, shall consult with the Bank of Thailand on a case by case basis.

[5] Financial institutions shall demonstrate that the internal model can signal rising risk measures in an adverse environment. This could be achieved by incorporating in the historical estimation period that covers at least one full credit cycle in to ensure that the result from the model is accurate in case of downturn cycle, or by simulating historical or possible worst-case scenarios.

capital requirement until financial institutions can demonstrate that they obtain adequate event and default risk assessment, then this surcharge shall be waived. However, this surcharge does not replace the plus factor which is a result of the backtesting.

4) For a financial institutions which are unable to accurately assess event and default risk, the capital requirement shall be equal to the scaling factor, as prescribed, multiply with **VaR for general market risk and specific risk** derived from the model, plus the **surcharge** which are

a) VaR only on the specific risk assessment in case that the model is able to separately assess specific risk from general market risk, or

b) VaR of the sub-portfolios of positions linked to debt instruments and equity instruments which expose to specific risk.

5) Techniques on separating general market risk and specific risk as prescribed under 4(a) are as follows;

a) In case of the instruments linked to interest rate, general market risk factor shall be determined by associated reference curve, for instance, government bond yield curve, a yield curve of bond with the same rating or swap curve. The reference curve shall be referred from liquid and credible market factor and is acceptable by concerned parties in such market.

b) In case of the equity instruments, general market risk factor shall be determined by a factor which represents the entire market such as the acceptable stock index of that country, for instance, SET Index, S&P 500, etc. For financial institutions that apply factor model, a group of a single linear combination of factors shall be used in the model as a market factor.

6) Recognition techniques in assessing Value at Risk (VaR) for specific risk are as follows;

a) Use the incremental increase in VaR derived from the internal model for specific risk.

b) Use the difference between the VaR from portfolio and VaR calculated by substituting each equity position with a representative index, or

c) Use of an analytic separation between general market risk and specific risk implied by a particular model.

7.3 Backtesting for internal model used for calculating capital requirement for specific risk

1) Financial institutions which apply internal model to calculate specific risk are required to conduct backtesting aimed at assessing whether specific risk is being accurately captured. If financial institutions use sub-portfolios to assess specific risk, the backtesting shall be separately conducted with daily data on sub-portfolios, comprising mostly debt instruments and equity instruments positions in a trading book. However, if financial institutions decompose the trading portfolio into finer sub-categories, for instance, instruments of emerging markets, corporate debt instruments, and others, financial institutions shall maintain this distinctions for sub-portfolio backtesting purposes. If financial institutions intend to change the structure, they shall demonstrate the reasonable reasons to the Bank of Thailand.

2) Financial institutions shall develop a methodology or a process to analyse exceptions identified through the backtesting of specific risk. Such process serves as a fundamental tool to help financial institutions enhance the model in case an error incurred.

3) If the number of exceptions on the sub-portfolio level is considered as unacceptable (Red zone) (in accordance with the regulations on calculation of capital requirement for market risk under internal model approach), the Bank of Thailand will presume that the internal model is not acceptable for calculating specific risk. Financial institutions shall take immediate actions to improve the model and demonstrate to the Bank of Thailand that there is a sufficient capital buffer to absorb the risk that the back test showed had not been adequately captured.

Example of calculation of capital requirement for market risk (in case of using internal model to calculate specific risk) is prescribed in attachment 10.3

Attachment 10.1

List of documents and related information required for obtaining permission to apply internal model approach

Financial institutions shall submit documents and information as specified below, together with a letter to request for an approval to use an internal model to calculate market risk capital requirement. The Bank of Thailand may request for additional information or documents for the consideration.

Qualitative information associated with market risk management and internal control

1. List of committees that involves in market risk management, including the role, responsibility and frequency of a meeting

2. Organisation structure, lines of authority / reporting, role, responsibility, and approving authority of the treasury unit and the risk control unit

3. Trading book policy

4. Management and staffs involved in the internal model development: specify education background and relevant experiences, including the detail of training on the model and the result from the model

5. The detail of the internal model approval process of financial institutions and a process to report any material change in the model to the management

6. Regulations or methods used in setting limits, for instance, limit for the overall market risk of financial institutions, limit by risk factors or by type of instruments, or limit for staffs at each level and for the person with approving authority, including frequency of a review

7. Important statistics or reports, that is, cancelled transactions, corrections, confirmation, exception, and off-hour transactions

8. Internal audit report or external audit report, including a report of special audit report on a trading unit, a risk control unit, and an operation unit

9. Detail of the computer system and the network system used in a trading unit, a risk control unit, and an operation unit

10. Contingency plan and business continuity plan in case of system failure

Details on the internal model

1. The methodologies used to measure the Value at Risk (VaR) of the internal model and the following information;

1.1 Confidence interval

1.2 Holding period

1.3 The period of historical data used in a calculation of volatilities, and the weighting scheme used in the calculation

1.4 Other relevant assumptions

1.5 Scaling factor

2. Detail of other associated models, e.g. CAPM model, option pricing model, and the interface of those models with VaR model

3. Correlation between market risk factors

4. The methodologies used to assess specific risk in the internal model

5. The methodologies used to valuate and assess risks of financial instruments with non-linear characteristic

6. The methodologies used to valuate and assess risks of instruments with no market prices or illiquid instruments

7. Frequency of model calculation and the computation time

Input and use of model output

1. Calculation of various positions, including sources of input, and assumptions used in pricing

2. List of instruments / financial instruments that use the internal model to assess risk

3. Backtesting report

4. Stress test and scenario analysis report

5. Risk assessment report from internal model, report on the associated risk limits, including sample of important reports prepared by the risk control unit, the treasury unit and the operation unit, frequency of reporting and receivers of these reports.

6. Profit/ loss report of each trading desk over the last 12 months.

Attachment 10.2

Guidelines on stress test conducting under stress scenarios prescribed by the Bank of Thailand and examples

1. Financial institutions, applying the internal model in calculating capital requirement for market risk, shall conduct stress test as follows;

1.1 Prepare and report the largest actual loss of trading book position, at least 5 days during each quarterly reporting period which will be compared to the 1-day Value at Risk of the previous day.

1.2 Prepare and report the stress testing result under the supervisory scenario determined by the Bank of Thailand.

1.3 Conduct stress testing using self-developed stress scenarios to be in accordance with specific characteristics of each financial instrument.

2. Scenarios for stress testing determined by the Bank of Thailand

In order to conduct stress testing under supervisory scenario, financial institutions shall apply the following scenarios;

2.1 Trading book positions with domestic interest rate risk (exclude option); financial institutions shall conduct stress testing by referencing change in yield curve as follows;

1) Non-parallel shift in yield curve (Basis point shift from the original yield curve)

	1 month	6 months	1 year	3 years	5 years	7 years	10 years	12 years	15 years
Scenario 1	70	70	80	140	140	140	140	130	130
Scenario 2	-50	-50	-80	-80	-80	-100	-100	-100	-80

2) Parallel shift in yield curve (Basis point shift from the original yield curve)

	1 month	6 months	1 year	3 years	5 years	7 years	10 years	12 years	15 years
Scenario 3	100	100	100	100	100	100	100	100	100

Scenario 4	-100	-100	-100	-100	-100	-100	-100	-100	-100

Example (Scenario 1 and 2)

If financial institution has a long position in debt security with remaining maturity of 1 month, face value of 1,000 baht, market value of 999.10 baht, and the current yield curve that the financial institution uses in assessing the market value of the position as of the stress testing date is

Maturity	1 month	6 months	1 year	3 years	5 years	7 years	10 years	12 years	15 years
Yield	1.08	1.56	1.78	2.85	3.78	4.4	5.14	5.29	5.46

Financial institution shall prepare the non-parallel shift stress testing under scenario 1 and 2 according to the following procedures;

1) Develop a new yield curve by adding and subtracting the basis point change determined by the Bank of Thailand for each maturity of the yield curve as at the stress testing date. For instance, 1 month period will be 1.08 + 0.7 = 1.78. Hence, the new yield curve for stress testing will be

	1 month	6 months	1 year	3 years	5 years	7 years	10 years	12 years	15 years
Scenario 1	1.78	2.26	2.58	4.25	5.18	5.8	6.54	6.59	6.76
Scenario 2	0.58	1.06	0.98	2.05	2.98	3.4	4.14	4.29	4.66

For maturity that the Bank of Thailand does not specify the basis point change, financial institution shall calculate the yield of that maturity by interpolating from the yield of the maturity that the Bank of Thailand has specified in the scenario.

2) Assess the value of the position by using the new yield, which equals 998.51 Baht [1000/ {1+ (0.0178/12)}]

3) Calculate the profit/loss by deducting the new value of the position with the market value before performing stress testing, which is equal to a loss of 0.59 baht (998.51-999.10 baht) and report such loss to the Bank of Thailand.

Example (Scenario 3 and 4)

If financial institution has a long position in debt security with remaining maturity of 1 months, face value 1,000 baht, market value 999.10 baht, and the current yield curve that the financial institution uses in evaluating the market value of the

position as of the stress testing date is

Maturity	1 month	6 months	1 year	3 years	5 years	7 years	10 years	12 years	15 years
Yield	1.08	1.56	1.78	2.85	3.78	4.4	5.14	5.29	5.46

Financial institution shall prepare the parallel shift stress testing under scenario 3 and 4 as determined by the Bank of Thailand by adding and subtracting 100 basis points from the original yield curve as follows;

1) Develop a new yield curve by adding and subtracting 100 basis points from the yield curve as at the stress testing date. Hence, the new yield curve for stress testing will be

	1 month	6 months	1 year	3 years	5 years	7 years	10 years	12 years	15 years
Scenario 3	2.08	2.56	2.78	3.85	4.78	5.4	6.14	6.29	6.46
Scenario 4	0.08	0.56	0.78	1.85	2.78	3.4	4.14	4.29	4.46

2) Assess the value of the position by using the new yield, which is equal to 998.27 Baht [1000/{1+(0.0208/12)}]

3) Calculate the profit/loss by deducting the new value of the position with the market value before performing stress testing, which is equal to a loss of 0.83 baht (998.27-999.10 baht) and report such loss to the Bank of Thailand.

2.2 Trading book position with domestic equity price risk (exclude option); financial institutions shall conduct stress testing by referencing change in equity price as follows;

Scenario	1	2	3	4
Change in equity price (percent)	40	20	-20	-40

Example

If a financial institution holds equity securities with market value of 1,000,000 baht in a trading book, a financial institution shall conduct stress testing under the scenario determined by the Bank of Thailand as follows;

1) Calculate the new value of equity position by multiplying the sum of 1 and the percentage change in the equity price with the aggregate value of the equity positions in the trading book. For example, the scenario 1 will be (1+0.4)*1,000,000 which is 1,400,000.

2) Calculate the profit/loss from stress testing by deducting the new value of the position with the market value of the associated positions before stress testing, which equals a profit of 400,000 baht (1,400,000-1,000,000) and report the profit to the Bank of Thailand.

The new value of such position and its profit/loss from stress testing under scenario 2, 3, and 4 are shown in the table below.

Scenario	1	2	3	4
Change in equity prices (percent)	40	20	-20	-40
New value of position	1,400,000	1,200,000	800,000	600,000
Profit/loss	400,000	200,000	-200,000	-400,000

2.3 Trading book positions with foreign exchange risk for 7 major currencies (exclude option), financial institutions shall conduct stress testing by referencing change in foreign exchange as follows;

Scenario	1	2	3	4
Change in foreign exchange (percent)	25	15	-10	-20

Example

Financial institution has a net foreign exchange position of USD 25,000 and the exchange rate as at the stress testing date is 40 baht per USD 1, the baht equivalent market value of the position is 1,000,000 baht;

Financial institution shall conduct stress testing under the scenario determined by the Bank of Thailand as follows;

1) Calculate the new exchange rate by multiplying the sum of 1 and the percentage change in the exchange rate with the exchange rate on the stress testing date, then, calculate the baht equivalent value of that position with the new calculated exchange rate. For instance, scenario 1 equals (1+0.25)*40 = 50 (50 baht per USD 1), and the baht equivalent value of the position is 1,250,000 baht

2) Calculate the profit/loss from stress testing by deducting the new value of the position with the market value of the position before stress testing, which equals a profit of 250,000 baht (1,250,000-1,000,000) and report the profit to the Bank of Thailand.

The new exchange rates, the new value of such position, and the profit/loss from stress testing under scenario 2, 3, and 4 are shown in the table below.

Scenario	1	2	3	4
Change in foreign exchange (percent)	25	15	-10	-20
New exchange rate	50	46	36	32
New value of position	1,250,000	1,150,000	900,000	800,000
Profit/Loss	250,000	150,000	-100,000	-200,000

Financial institutions shall conduct stress testing only for currencies which are significant to the position of the financial institutions.

For positions in trading book with foreign interest rate risk, foreign equity risk, foreign exchange risk other than positions in the seven major currencies and options position, financial institutions shall take into consideration the significant of those positions and conduct stress testing under self-developed scenario in accordance with the risk level.

In this regard, the Bank of Thailand will continuously monitor the changes in fundamental market risk factors in order to ensure the appropriateness of the supervisory scenarios. The Bank of Thailand will inform, in written, the financial institutions in advance if there are any changes in the scenarios.

3. Preparing of information and report on stress testing

Financial institutions shall report the stress testing result both 1) summary of daily actual highest loss and 2) profit/loss resulting from the supervisory scenario in the form and submission method prescribed by the Bank of Thailand. Moreover, the supporting documents shall be retained for an examination by the Bank of Thailand.

Attachment 10.3

Example of calculation of capital requirement for market risk (In case of using internal model to calculate specific risk)

General specifications

1. 99% confidence level
2. The averaged daily VaR over the last 60 days

Assumptions

1. Multiplication factor from qualitative assessment equals 3.4 (x = 3.4)
2. Plus factor from assessment of backtesting equals 0 (y = 0)
3. Scaling factor equals multiplication factor (3.4)+plus factor (0) = 3.4
4. The model can assess the idiosyncratic risk only
5. Specific risk of each issuer is not correlated and
6. General market risk and specific risk is not correlated.

Case 1: The model can measure VaR of general market risk (GR) **together with** specific risk (SR), only the idiosyncratic risk, **not the event and default risk.** Hence the **surcharge** shall be added. In this case (assessed together) **equals VaR of general market risk and specific risk** according to the regulations on assessing specific risk under internal model approach

Given that

Stock	Market value	Volatility per annual (S.D)	Correlation
A	10,000	38%	0.18262
B	10,000	49%	

Calculation method

	(1)	(2)	(3)	(4)	(5)

Stock	Market Value	Volatility p.a. (S.D)	Volatility per day (S.D)	Correlation	Z-score at 99%
A	10,000	38%	2.403%	0.18262	2.33
B	10,000	49%	3.099%		

Total risk

Stock	Individual VaR = (1)*(3)*(5)	VaR of equity portfolio = VaR $(GR+SR_{Idio})_{portfolio}$
A	559.98 ------- (6)	$\{(6)^2+(7)^2+2[(4)*(6)*(7)]\}^{1/2}$
B	722.07 ------- (7)	= 991.286 -------- (8)

Therefore, market risk capital requirement calculated by the internal model approach is as follows;

[VaR (GR +SR) * Scaling factor] + Surcharge [=VaR (GR+SR)], which equals

[991.286*3.4] + 991.29 = 4,361.658 หรือ [991.286*4.4] = 4,361.65

<u>Case 2</u>**:** The model can measure VaR of general market risk **separate from** VaR of specific risk, only the idiosyncratic risk, **not the event and default risk.** Hence, the **surcharge** shall be added. In this case (assessed separately) equals **VaR of specific risk** only, according to the regulations on assessing specific risk under internal model approach

Given that

	(1)	(2)	(3)	(4)	(5)
Stock	Market Value	β (share/Index)	VolatilitySET p.a.	VolatilitySET p.a.	Z-score at 99%
A	10,000	0.5873	29.70%	1.878%	2.33
B	10,000	1.3822			

The formula used to calculate the residual volatilities of each equity is

$$\delta_{res} = \sqrt{\delta_{Share}^2 - \beta^2 \delta_{Index}^2}$$ (refer to CAPM theory)

Calculation method

(2.1) Use CAPM to calculate general market risk

Stock	(6) = (1)*(2)

A	5,873
B	13,822
Total	19,695 => (7)

Hence, general market risk equals (7)*(4)*(5) = 861.98 ---------- (A)

(2.2) Use residual volatilities to calculate specific risk (only on idiosyncratic risk)

$$\delta_{res} = \sqrt{\delta^2_{Share} - \beta^2 \delta^2_{Index}}$$

	(8)	(9)	(10)	(11)	(12)
Stock	Market Value	Volatility p.a.	Residual Volatility p.a. $=\{(9)^2-(2)^2*(3)^2\}^{1/2}$	Residual Volatility p.a. $= (10)/250^{1/2}$	Idiosyncratic Risk = (8)*(11)*(5)
A	10,000	38%	34%	2.135%	497.50 ---- (13)
B	10,000	49%	27%	1.692%	394.26 ---- (14)

The correlation between equity A and equity B is 0 (by assumption),

So that the total idiosyncratic risk equals $\{(13)^2+(14)^2\}^{1/2}$ = 634.7761 ------- (B)

And the total risk equals $\{(A)^2+(B)^2\}^{1/2}$ = 1,070.492523

Hence, the capital requirement for market risk calculated by internal model approach is as follows;

[[VaR (GR) + VaR (SR)] * Scaling factor] + Surcharge [=VaR(SR)], which equals [1,070.4925*3.4] + 634.7761385 = 4,274.450717

Attachment 11

Regulations on calculation of capital requirement for market risk under mixed approach

Regulations on calculation of capital requirement for market risk under mixed approach between standardised approach and internal model approach,

1. In calculating capital requirement by internal model approach, in the early stage, financial institutions may apply internal model approach to assess and calculate some risk factors. In the long run, financial institutions should develop the system to be able to assess all market risk factors. **Once financial institutions have applied internal model approach to calculate capital for any particular market risk factors, the Bank of Thailand does not permit the financial institutions to revert to apply standardised approach in calculating the capital requirements for those risk factors,** except for the case that the Bank of Thailand has revoked the approval to apply internal model approach in calculating the capital requirement. However, the Bank of Thailand does not specify a timeframe in which financial institutions can apply internal model approach together with standardised approach, in calculating the capital requirement during the development period so that it can capture all market risk factors.

2. Financial institutions intending to apply internal model approach together with standardised approach shall comply with the following regulations;

2.1 Financial institutions shall calculate the capital requirement for each risk factor (e.g. interest rate risk, equity risk, foreign exchange risk, and commodity risk) by one approach only. In principle, the Bank of Thailand does not permit to apply both approaches in assessing the same risk factor or even the same risk factor arising from different business units[1], **except** options, which are permitted to be assessed by the standardised approach or the internal model approach. Such approach may differ from the approach used to calculate the capital requirement for underlying instruments.

2.2 Financial institutions intending to modify mixed approach shall receive a written approval from the Bank of Thailand, and there shall be adequate reasons for such modifications.

[1] In case financial institutions expose to risks from complex positions or positions that are not measurable by the internal model approach, for instance, positions of new instruments, or positions in remote branches or in insignificant business units, such risks may be assessed by the standardised approach or maintain reserve instead, depending on the Bank of Thailand's consideration.

2.3 Financial institutions shall assess all market risk factors, whether by standardised approach or internal model approach.

2.4 The capital requirements for financial institutions are equal to the sum of all market risk factors calculated by standardised approach and internal model approach, without offsetting.

Attachment 12

Regulations on preparation of relevant data and reports

1. Reports for market risk supervision consist of

1.1 Report on trading book positions

1.2 Report on capital requirement for market risk

2. Financial institutions shall prepare and submit the reports, concerning level of trading book positions and capital requirement for market risk, by institution type as follows;

2.1 Financial institutions which obtain **significant** level of trading book positions shall prepare and submit the report form as specified in 1.1 and 1.2.

2.2 Financial institutions which obtain **less significant** level of trading book positions shall prepare and submit the report from specified in 1.1 and the report form specified in 1.2 only on the part related to the commodity risk.

For additional details, financial institutions shall refer to the **relevant report form and reporting instructions.**

3. Financial institutions shall prepare and submit the reports to the Bank of Thailand in accordance with the following **timeframe**;

3.1 The report form specified in 1.1, financial institutions shall prepare on a monthly basis and submit to the Bank of Thailand every 6 months. The report shall be submitted to the Bank of Thailand within 21 days from the end of June and December via the Data Management System (DMS).

3.2 The report form specified in 12, financial institutions shall **prepare on a monthly basis** and **submit to the Bank of Thailand on a monthly basis**. Financial institutions shall submit the report to the Bank of Thailand within 21 days from the end of the reporting month in the format of an excel file.

Report forms for market risk supervision

1. Report on trading book positions (currently reported in the Data set)

2. Report on capital requirement for market risk (currently reported in an excel file format)

Table number

Standardised approach

1. Summary of the capital requirement for specific risk of interest rate risk.
2. Summary of the capital requirement for general market risk of interest rate risk.
3. Summary of the capital requirement for equity risk
4. Summary of the capital requirement for foreign exchange risk
5. Summary of the capital requirement for commodity risk under simplified approach
6. Summary of the capital requirement for commodity risk under maturity ladder approach
7. Summary of the capital requirement for options under simplified method
8. Summary of the capital requirement for options under delta-plus method
9. Summary of the capital requirement for options under contingent loss method

Internal model approach

10. Summary of the capital requirement for market risk
11. Summary of the 5 largest actual losses in a quarter

Stress testing

12. Profit/loss of positions resulting from change in Thai Baht interest rate
13. Profit/loss of positions resulting from change in domestic equity price
14. Profit/loss of Positions resulting from change in foreign exchange
15. Commodity prices

Financial institution name .....

Report on capital requirement for market risk

As at .....

Unit: Baht

	(A)	
Standardised approach		
1. Capital requirement for interest rate risk		
1.1 Capital requirement for specific risk (from Table 1)	0.00	1.1
1.2 Capital requirement for general market risk (from Table 2)	0.00	1.2
1.3 Capital requirement for interest rate options under simplified method (from Table 7)	0.00	1.3
1.4 Capital requirement for interest rate options under delta-plus method (from Table 8)	0.00	1.4
1.5 Capital requirement for interest rate options under contingent loss method (from Table 9)	0.00	1.5
Total capital requirement for interest rate risk	0.00	1.
2. Capital requirement for equity risk		
2.1 Capital requirement for specific risk (from Table 3)	0.00	2.1
2.2 Capital requirement for general market risk (from Table 3)	0.00	2.2
2.3 Capital requirement for equity options under simplified method (from Table 7)	0.00	2.3
2.4 Capital requirement for equity options under delta-plus method (from Table 8)	0.00	2.4
2.5 Capital requirement for equity options under contingent loss method (from Table 9)	0.00	2.5
Total capital requirement for equity risk	0.00	2.
3. Capital requirement for foreign exchange risk		
3.1 Capital requirement for foreign exchange risk (from Table 4)	0.00	3.1
3.2 Capital requirement for foreign exchange options under simplified method (from Table 7)	0.00	3.2
3.3 Capital requirement for foreign exchange options under delta-plus method (from Table 8)	0.00	3.3
3.4 Capital requirement for foreign exchange options under contingent loss method (from Table 9)	0.00	3.4
Total capital requirement for foreign exchange risk	0.00	3.
4. Capital requirement for commodity risk		
4.1 Capital requirement for commodity risk: Simplified method	0.00	4.1
4.2 Capital requirement for commodity risk: Maturity ladder method	0.00	4.2
4.3 Capital requirement for commodity options under simplified method (from Table 7)	0.00	4.3
4.4 Capital requirement for commodity options under delta-plus method (from Table 8)	0.00	4.4
4.5 Capital requirement for commodity options under contingent loss method (from Table 9)	0.00	4.5
Total capital requirement for commodity risk	0.00	4.
Internal model approach		
1. Capital requirement according to VaR (from Table 10)	0.00	5.
Total capital requirement for market risk	0.00	6.
Total credit risk-weighted assets of trading book positions*	0.00	7.

Table 1 Summary of capital requirement for specific risk of interest rate risk under standardised approach

Unit: Baht

Instrument type		Position		Total position	Capital charge	Capital
		Long	Short			
		(A)	(B)	(C)		(D)
1.	Government debt instruments rated AAA to AA-	0.00	0.00	0.00	0.00%	0.00
	Government debt instruments rated A+ to BBB- with remaining maturity 6 months or less	0.00	0.00	0.00	0.25%	0.00
	Government debt instruments rated A+ to BBB- with remaining maturity greater than 6 and up to and including 24 months	0.00	0.00	0.00	1.00%	0.00
	Government debt instruments rated A+ to BBB- with remaining maturity exceeding 24 months	0.00	0.00	0.00	1.60%	0.00
	Government debt instruments rated BB+ to B-	0.00	0.00	0.00	8.00%	0.00
	Government debt instruments rated below B-	0.00	0.00	0.00	12.00%	0.00
	Government debt instruments: Unrated	0.00	0.00	0.00	8.00%	0.00
2.	Qualified debt instruments with remaining maturity 6 months or less	0.00	0.00	0.00	0.25%	0.00
	Qualified debt instruments with remaining maturity greater than 6 and up to and including 24 months	0.00	0.00	0.00	1.00%	0.00
	Qualified debt instruments with remaining maturity exceeding 24 months	0.00	0.00	0.00	1.60%	0.00
3.	Other debt instruments rated BB+ to BB-	0.00	0.00	0.00	8.00%	0.00
	Other debt instruments rated below BB-	0.00	0.00	0.00	12.00%	0.00
	Other debt instruments: Unrated	0.00	0.00	0.00	8.00%	0.00
	Other debt instruments (as prescribed by the Bank of Thailand)	0.00	0.00	0.00	N/A	0.00
Total capital requirement						0.00

Table 2 Summary of capital requirement for general market risk of interest rate risk under standardised approach

Unit: Baht

Time-band		Position (Baht)		Position (Foreign currency)		
Coupon 3% or more	**Coupon less than 3% or applying duration method**	**Long (A)**	**Short (B)**	**Long (C)**	**Short (D)**	**Capital (E)**
1 month or less	1 month or less					
More than 1 - 3 months	More than 1 - 3 months					
More than 3 - 6 months	More than 3 - 6 months					
More than 6 - 12 months	More than 6 - 12 months					
More than 1 - 2 years	More than 1.0 - 1.9 years					
More than 2 - 3 years	More than 1.9 - 2.8 years					
More than 3 - 4 years	More than 2.8 - 3.6 years					
More than 4 - 5 years	More than 3.6 - 4.3 years					
More than 5 - 6 years	More than 4.3 - 5.7 years					
More than 7 - 10 years	More than 5.7 - 7.3 years					
More than 10 - 15 years	More than 7.3 - 9.3 years					
More than 15 - 20 years	More than 9.3 - 10.6 years					
Over 20 years	More than 10.6 - 12 years					
	More than 12 - 20 years					
	Over 20 years					
Total positions						
Total capital requirement						

Table 3 Summary of capital requirement for equity risk under standardised approach

Unit: Baht

Country	Total positions for specific risk			Total capital requirement for specific risk	Net position for general market risk	Total capital requirement for general market risk 8.00%
	Specific risk 8.00% (A)	Specific risk 4.00% (B)	Specific risk 2.00% (C)	(D)	(E)	(F)
Thailand						
United States of America						
Japan						
England						
Germany						
Hong Kong						
Malaysia						
Singapore						
Others						
Total capital requirement						

Table 4 Summary of capital requirement for foreign exchange risk under standardised approach

Unit: Baht

Currency	Sum of all net FX overbought position* (A)	Sum of all net FX oversold position* (B)
US dollar		
Yen		
Pound sterling		
Euro		
Hong Kong dollar		
Ringgit		
Singapore dollar		
Others		
Total		
Total capital requirement (The greater amount, in absolute term, between the sum of all net FX overbought positions of all currencies and the sum of all net FX oversold positions of all currencies, multiplied by the risk charge of 8%)**		

* For financial institutions using the simplified method and the contingent loss method to measure risk of options, the sum of all net overbought positions and the sum of all net oversold positions are excluding the delta equivalent amount of options.

** Sum of the greater amount between the absolute value of

1) sum baht-equivalent of all net FX overbought positions of all currencies and
2) sum baht-equivalent of all net FX oversold positions of all currencies

Table 5 Summary of capital requirement for commodity risk under standardised approach by simplified approach

Unit: Baht

Commodity type	Long position (A)	Short position (B)	Net position (C)	Total positions (D)	Capital (E)
1. Agricultural products					
2. Energy					
3. Precious metals					
4. Other metals					
5. Other commodity					
Total capital requirement					

Table 6 Summary of capital requirement for commodity risk under standardised approach by maturity ladder approach

Unit: Baht

Commodity type	1 month or less		More than 1–3 months		More than 3–6 months		More than 6–12 months		More than 1–2 years		More than 2–3 years		More than 3 years		Capital
	Long position (A)	Short position (B)	Long position (C)	Short position (D)	Long position (E)	Short position (F)	Long position (G)	Short position (H)	Long position (I)	Short position (J)	Long position (K)	Short position (L)	Long position (M)	Short position (N)	(O)
1. Agricultural products	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2. Energy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3. Precious metals	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4. Other metals	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5. Other commodities	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total capital requirement															0.00

Table 7 Summary of capital requirement for options under simplified method

Unit: Baht

Position	Interest rate (A)	Equity (B)	Foreign exchange (C)	Commodity (D)
Purchased put & long underlying				
Purchased call & short underlying				
Purchased put				
Purchase call				
Total capital requirement				

Table 8 Summary of capital requirement for options under delta-plus method

Unit: Baht

Position	Interest rate (A)	Equity (B)	Foreign exchange (C)	Commodity (D)
Gamma impact				
Vega impact				
Total capital requirement				

Table 9 Summary of capital requirement for options under contingent loss method

Unit: Baht

Position	Interest rate (A)	Equity (B)	Foreign exchange (C)	Commodity (D)
Total capital requirement	0.00	0.00	0.00	0.00

Table 10 Summary of capital requirement for market risk under internal model approach

Transaction (Unit: Baht)		VaR at the end of the month (A)	Average VaR of previous 60 days (B)	Backtesting exceptions (C)	Scaling factors		Scaled average VaR (F=B*(D+E))	Surcharge		Capital requirement	
					Multiplication factor (D)	Plus factor (E)		VaR at the end of month (G)	Average VaR of previous 60 days (H)	VaR at the end of the month (A) + Surcharge (G) (I = A+G)	Scaled Average VaR (F) + Surcharge (H) (J = F+H)
1. Interest rate											
In case only GR is assessed or GR & SR are assessed separately											
1.1 General market risk	(GR)										
1.2 Specific risk	(SR)										
1.3 Total	(1.1+1.2)										
In case GR & SR are assessed together											
1.4 GR + SR of total portfolios											
1.5 Sub-portfolios containing SR											
2. Equity											
In case only GR is assessed or GR & SR are assessed separately											
2.1 General market risk											
2.2 Specific risk											
2.3 Total	(2.1 + 2.2)										
In case GR & SR are assessed together											
2.4 GR + SR of total portfolios											
2.5 Sub-portfolios containing SR											
3. Foreign exchange	(GR only)										
4. Commodity	(GR only)										
5. Total market risk	(1+2+3+4)										
6. Market risk qualitative assessment result										0.00	0.00
7. Capital requirement											0.00

Table 11 Summary of the 5 largest actual losses in a quarter

Unit: Baht

Rank	Actual loss	Date	VaR value
1			
2			
3			
4			
5			

Table 12 Stress testing: profit/loss of position resulting from change in Thai Baht interest rate

	Change in yield curve (Basis point)								
	1 month	6 months	1 year	3 years	5 years	7 years	10 years	12 years	15 years
Non-parallel shift (Basis point shift)									
Scenario 1									
Scenario 2									
Parallel shift (Basis point shift)									
Scenario 3									
Scenario 4									

Unit: Baht

Value of interest rate position	Profit/loss of position			
	Scenario 1	Scenario 2	Scenario 3	Scenario 4

Table 13 Stress testing: profit/loss of position resulting from change in domestic equity price

	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Change in equity price (Percentage)				

Unit: Baht

Value of equity position	Profit/loss of position			
	Scenario 1	Scenario 2	Scenario 3	Scenario 4

Table 14 Stress testing: profit/loss of positions resulting from change in foreign exchange

	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Change in foreign exchange (Percentage)				

Unit: Baht

	Value of net position of each foreign currency	Profit/loss of position			
		Scenario 1	Scenario 2	Scenario 3	Scenario 4
US dollar					
Yen					
Pound sterling					
Euro					
Hong Kong dollar					
Ringgit					
Singapore dollar					

Table 15 Stress testing: commodity prices

	Change in volatility (%)		
Commodity type			

Remarks: The Bank of Thailand will further inform the scenarios.

Instruction for reporting

Summary tables for capital requirement for market risk

A. General instruction

1. Summary tables for capital requirement for market risk on both specific risk and general market risk consists of summary table of capital requirement categorised in 3 approaches, which are 1) Standardised approach, 2) Internal model approach and 3) Mixed approach, covering all 4 market risk factors, specifically, interest rate risk, equity risk, foreign exchange risk and commodity risk in accordance with the regulations and procedures set out by the Bank of Thailand. In this regard, financial institutions shall prepare supporting documents for the reports and there should be audit trails to enable the Bank of Thailand to monitor the financial institutions' compliance.

2. This set of summary table comprises 15 tables as follows;

2.1 Table 1 to Table 10 are the summary tables of the capital requirement for market risk (under 3 approaches) which financial institutions shall maintain in accordance with the total capital requirement calculated from Table 1 to Table 10. The Bank of Thailand will, then, prepare the report for overall market risk capital requirement (all risk factors combined) from these summary tables submitted by financial institutions.

2.2 Table 11 to Table 14 are prepared in accordance with the stress testing prescribed in attachment 10.2 which covers the 2 stress testing; 1) the report on the 5 largest actual losses in a quarter and 2) the stress testing under scenarios set out by the Bank of Thailand. Financial institutions which have obtained an approval from the Bank of Thailand to apply internal model approach to calculate the market risk capital requirement shall, on a consolidated basis of all branches/offices, submit the report of summary of the 5 largest actual losses in a quarter and the report of the stress testing under scenarios set out by the Bank of Thailand.

2.3 Table 15 is prepared in accordance with the stress testing on trading book positions with commodity risk. Financial institutions shall prepare a summary table for each commodity type or commodity index and shall specify the rank of the scenarios and conditions under such scenarios, for instance, change in volatility. The Bank of Thailand will further inform the scenarios determined by the Bank of Thailand.

3. Financial institutions shall prepare Table 1 to Table 10 on a monthly basis using consolidated data of all branches/offices and Table 11 to Table 14 on a quarterly basis using the data on the last day of the month. And, if the last day of the month is on

a holiday of financial institutions, the data on the last business day of the month in preparing the report shall be used.

4. Financial institutions shall prepare such report in the excel file format as prescribed by the Bank of Thailand and shall submit such report to the Bank of Thailand via the data management system DMS DA (Extranet) within 21 days from the last day of the reporting month. The amount of capital categorised by calculation approach and risk factor shall be in thousands, with "," after a thousandth and millionth digit.

5. For any further inquiry regarding the report, please contact the Prudential Policy Department, Financial Institutions Policy Group, Bank of Thailand, Tel. 0-2283-6821, 0-2356-7688 and 0-2283-5804

B. Reporting instructions

This report summarises the capital requirement for market risk of financial institutions categorised by capital calculation approaches according to risk factors as follows;

Standardised approach

Item 1. Capital requirement for interest rate risk 2. Capital requirement for equity risk 3. Capital requirement for foreign exchange risk and 4. Capital requirement for commodity risk and sub items of each item refer to the capital requirement for market risk calculated under standardised approach as reported in Table 1 to 9.

Internal model approach

Item 1. Capital requirement according to VaR refers to the capital requirement for market risk calculated under internal model approach as reported in Table 10.

Total capital requirement for market risk means the sum of the capital requirement that financial institutions shall maintain for market risk.

* Total credit risk-weighted assets of trading book positions means the sum of the credit risk-weighted assets of trading book positions [1] calculated in accordance with the regulations on existing credit risk calculation as prescribed in the **Notification of the Bank of Thailand on Calculation of Credit Risk-Weight Assets for Commercial Banks**. However, such position has already incorporated in the calculation of capital requirement for specific risk; it shall be exempt from calculation of credit risk-weighted assets.

[1] Only waived position shall be exempted from calculating credit risk-weighted assets as specified in the supervision of market risk of financial institutions

The credit risk-weighted assets of trading book positions will be taken into account in calculating the ratio of capital to total credit risk-weighted assets and market risk-weighted assets by deducting from the total credit risk-weighted asset prior to adding to the market risk-weighted asset. Therefore, the BIS ratio of a financial institution will equal to capital of a financial institution divided by the sum of {(existing credit risk-weighted assets – exempt items) and (market risk capital requirement * 12.5)}.

Table 1 Summary of capital requirement for specific risk of interest rate risk under standardised approach

This table is the summary of the capital requirement for specific risk of interest rate risk under standardised approach for trading book positions held by financial institutions, including debt instruments, securities that have characteristic similar to debt instruments and derivatives linked to debt instruments or interest rate, but excluding specific risk of options calculated under simplified method. Financial institutions shall report details as follows;

1. Financial institutions shall report trading book positions with specific risk of interest rate risk, of both on and off-balance sheet according to the regulations prescribed by the Bank of Thailand. Positions can be classified as 1) government debt instruments 2) qualified debt instruments and 3) other debt instruments.

2. Financial institutions shall report trading book positions, (both on and off-balance sheet) with specific risk of interest rate risk according to the valuation methodologies prescribed by the Bank of Thailand. The reporting value is the position before multiplying with the capital charge. This shall include the delta equivalent amount, which equals the multiplication of the delta and the value of the underlying instruments from options with specific risk, that the financial institutions have calculated the risk of options using the delta-plus method and contingent loss method. Long positions shall be reported in column A, short positions shall be reported in column B and total positions shall be reported in column C.

3. Financial institutions shall report the amount of capital requirement for specific risk which derived from multiplying the amount of interest rate risk position (column C) with the capital charge (for specific risk); depending on types of the instruments or the underlying instruments according to the regulations prescribed by the Bank of Thailand as 0%, 0.25%, 1.00%, 1.60%, 8.00% and 12.00% or other method specified by the Bank of Thailand. The result, the capital requirement for specific risk of interest rate risk calculated under standardised approach, shall be reported in column D.

4. Total capital requirement means the sum of the capital requirement for specific risk of interest rate risk as a result of a calculation of the specific risk of positions with the interest rate risk under 3.

In case where financial institutions apply multiple tables in calculating the specific risk, the result from all tables shall be summed and reported in Table 1. Financial institutions shall also prepare supporting tables and documents for an examination by the Bank of Thailand.

Table 2 Summary of capital requirement for general market risk of interest rate risk under standardised approach

This table is the summary of the capital requirement for general market risk of interest rate risk calculated under standardised approach by maturity ladder method or duration method for trading book positions held by financial institutions, including debt instruments, securities that have characteristic similar to debt instruments and derivatives linked to debt instruments or interest rate, but excluding general market risk of option positions calculated by simplified method and contingent loss method. Financial institutions shall report details as follows;

1. Financial institutions shall specify the method used in calculating general market risk, such as 1) maturity method or 2) duration method.

2. Financial institutions shall report trading book positions, (both on and off-balance sheet) with general market risk of the interest rate risk according to time-bands, next interest rate fixing date (floating interest rate) or the remaining maturity (fixed interest rate) by the position amount valuated under the valuation methodologies prescribed by the Bank of Thailand. This shall include the delta equivalent amount of options with general market risk that financial institutions have calculated using the delta plus method. The total amount shall be reported by currency as follows;

2.1 Baht position means the total of position, in Baht, with general market risk of interest rate risk. Long and short positions shall be reported in column A and B, respectively.

2.2 Foreign currencies position means the total of position, in foreign currencies, with general market risk of interest rate risk. Long and short positions shall be reported in column C and D, respectively.

3. Financial institutions shall report the total capital requirement for general market risk of interest rate risk in column E which financial institutions calculate in accordance with the regulations prescribed by the Bank of Thailand.

If financial institutions hold instruments or underlying instruments in various foreign currencies, financial institutions shall prepare supporting table for calculating general market risk of interest rate risk separated into 7 major currencies, specifically, US dollar, Yen, Pound sterling, EURO, Hong Kong dollar, Ringgit, Singapore dollar and other currencies (combined all other currencies). The result of the calculation for general market risk of interest rate risk from all supporting tables shall be reported in Table 2. Financial institutions shall also prepare supporting tables and documents for an examination by the Bank of Thailand.

Table 3 Summary of capital requirement for equity risk under standardised approach

This table is the summary of the capital requirement for specific risk and general market risk of equity risk calculated under standardised approach for trading book positions held by financial institutions, including equity instruments, derivatives linked to equity price or stock index and securities that exhibit market behaviour similar to equity instruments, but excluding 1) specific risk and general market risk of options calculated under simplified method and 2) general market risk of options calculated under contingent loss method. Financial institutions shall report details as follows;

1. Financial institutions shall report trading book positions, (both on and off-balance sheet), with equity risk according to country that such instruments are listed, specifically, Thailand, United States of America, Japan, England, German, Hong Kong, Malaysia, Singapore and others (combined all the other countries).

2. In case of total position for specific risk, financial institutions shall report positions with equity risk for both on and off-balance sheet with the gross position, according to the valuation methodologies prescribed by the Bank of Thailand, by the capital charge of 8%, 4% and 2%, in column A, B and C, accordingly, in accordance with the regulations set out by the Bank of Thailand. The reporting value is the gross position before multiplying with the risk weight. This shall include the delta equivalent amount of options with specific risk of equity risk calculated under delta-plus method and the contingent loss method.

3. The total capital requirement for specific risk shall be reported under column D which is calculated from the multiplication between the capital charge of each type of equity or underlying instruments, classified as 8%, 4% and 2%, and the relevant position in accordance with the regulations specified by the Bank of Thailand. The total of capital requirement of 3 classifications shall be reported under the total specific risk capital requirement, meaning; (D) = 0.08(A) + 0.04(B) + 0.02(C). Financial institutions shall report the sum of the total specific risk capital requirement of all countries in the total capital requirement row.

4. For general market risk, financial institutions shall report positions with equity risk for both on and off-balance sheet with net position, according to the valuation methodologies specified by the Bank of Thailand, in column E. The reporting value is the net position before multiplying with the risk weight. This shall include the delta equivalent amount of options with general market risk of equity risk which financial institutions calculate under delta-plus method.

5. Financial institutions shall report the total capital requirement for general market risk of equity risk in column F which is a result of the multiplication between the value in column E and 0.08. The sum of total capital requirement of the general market risk for all countries shall be reported under total capital requirement row.

In case where financial institutions apply multiple tables or separately calculate specific risk and general market risk for equity risk by countries, financial institutions shall combine results from all tables and report the result in Table 3. Financial institutions shall also prepare supporting tables and documents for an examination by the Bank of Thailand.

Table 4 Summary of capital requirement for foreign exchange risk under standardised approach

This table is the summary of the capital requirement for foreign exchange risk calculated under standardised approach for positions which the Bank of Thailand requires financial institutions to maintain capital. This shall include on-balance sheet positions in foreign currency and derivatives linked to foreign exchange, but exclude the general market risk of options calculated under simplified method and contingent loss method. Financial institutions shall report details as follows;

1. Financial institutions shall report foreign currency positions in 7 major currencies, which are US dollar, Yen, Pound sterling, EURO, Hong Kong dollar, Ringgit and Singapore dollar, and the aggregated position in other currencies with the amount as prescribed in the Notification of the Bank of Thailand on Foreign Exchange Positions for Commercial Banks excluding Retail Banks. The net overbought position shall be reported in column A and the net oversold position shall be reported in column B. In case where financial institutions have applied the simplified method or the contingent loss method, financial institutions shall not include the delta equivalent amount of options in the calculation to assess positions in each individual foreign currency.

2. Financial institutions shall calculate the capital requirement for foreign exchange risk which is 8% of the higher value of the absolute number between 1) sum baht-equivalent of all net FX overbought position of all currencies and 2) sum baht-equivalent of all net FX oversold position of all currencies, and report it under the total capital requirement.

In case where financial institutions apply multiple supporting tables in calculating foreign exchange risk in which the risk is calculated by each currency, financial institutions shall combine results from all tables and report the result in Table 4. Financial institutions shall also prepare supporting tables and documents for an examination by the Bank of Thailand.

Table 5 Summary of capital requirement for commodity risk under simplified approach

This table is the summary of the capital requirement for commodity risk calculated using simplified approach for positions that financial institutions hold in trading book. Reporting shall be as follows;

1. Commodity type

Financial institutions shall report trading book positions with commodity risk held by financial institutions and capital requirement that financial institutions maintain for commodity risk by each type of the commodity as follows;

- Agricultural products, defined as the agricultural products that the Office of Agricultural Futures Trading Commission (AFTC) has allowed to trade in the Thai commodity future market or the agricultural products traded in foreign commodity future market; which are soil bean, coffee, sugar palm oil.

- Energy, which are fuel, natural gas.

- Precious metals, which is silver.

- Other metals, which are tin, copper, lead, aluminium, zinc.

- Other commodities, which are product which may later be specified by the Bank of Thailand

2. Reporting long and short positions

2.1 Long position (column A) and short position (column B) reported in this table is the sum of long positions and the sum of short positions of the same commodity type. Financial institutions shall conform as follows;

2.1.1 Financial institutions shall prepare separated table for each commodity type. If the commodities are substitutable and their prices move in the same direction in which the correlation between the price changes of the commodity and those of the substitutable commodity is at least 0.9 (the historical data of at least 250 business days shall be used.), those commodities may be reported in the same table for calculation of capital. The spot and forward positions of each commodity shall be calculated by multiplying the notion amount in term of the standard unit of measurement (e.g. barrels, kilograms, pounds) with the market price of such commodity. Then convert the amount into Thai Baht at the current exchange rates and report as either long or short positions.

2.1.2 For commodity derivatives such as commodity futures, commodity linked swaps, commodity options (only on part which is calculated by delta plus method in accordance with the regulations on calculation of capital requirement for market risk of options as in attachment 9) shall be treated as follows;

(a) Commodity futures and commodity forward shall be reported as long positions or short positions by the result of the multiplication between the notional amount, which is in term of the standard unit of measurement, and the market price of such commodity, then convert the amount into Thai Baht at current exchange rates.

(b) Commodity swaps, where one leg is a fixed rate price and the other is a floating rate price, shall be assigned as follows;

- In case where financial institutions pay a stream of cash flows calculated from the notional amount multiplied by a fixed rate price (fixed rate price payer) and receive a stream of cash flows calculated from the notional amount multiplied by a floating rate price (floating rate price receiver), the transaction shall be reported as **a long position** of the amount equals to the notional amount in the standard unit of measurement multiplied by the market price of such commodity, then converting into Thai Baht at the current exchange rates.

- In case where financial institutions receive a stream of cash flows calculated from the notional amount multiplied by a fixed rate price (fixed rate price received) and pay a stream of cash flows calculated from the notional amount multiplied by a floating rate price (floating rate price payer), the transaction shall be reported as **a short position** of the amount equals to the notional amount in the standard unit of measurement multiplied by the market price of such commodity, then converting into Thai Baht at the current exchange rates.

(c) Commodity options, where the delta plus method is applied, shall be reported as long and short positions of the amount equals to the notional amount in the standard unit of measurement multiplied by the delta and multiply by the market price of such commodity, then converting into Thai Baht at the current exchange rates.

2.2 Net position (column C) means long positions deducted by short positions of each commodity.

2.3 Total positions (column D) mean long positions plus short positions of each commodity.

3. Calculation of capital requirement

3.1 Capital requirement (column E) means the total capital required for each commodity calculated using the following formula:

Capital = 15% of net position + 3% of total positions

3.2 Total capital requirement means the sum of capital required for all commodities which is the sum of capital requirement calculated from 3.1 of each commodity.

4. Other requirements

4.1 For the market price of commodity and current exchange rate used in calculating position, financial institutions shall obtain information from a reliable and publicly available source. The exchange rate shall be the current exchange rate on the reporting date as prescribed in the **Notification of the Bank of Thailand on Guideline on Accounting of Financial Institutions.**

Additionally, financial institutions shall consistently use the commodity market price and the current exchange rate from the same source.

4.2 Financial institutions shall prepare supporting tables (positions and capital requirement for commodity risk of each commodity) and relevant supporting documents for an examination by the Bank of Thailand.

Table 6 Summary of capital requirement for commodity risk under maturity ladder approach

This table is the summary of the capital requirement for commodity risk calculated using the maturity ladder under standardised approach for positions that financial institutions hold in the trading book. The regulations on preparing a report are detailed as follows;

1. Commodity category to be displayed

Financial institutions shall report trading book positions with commodity risk held by financial institutions and capital requirement that financial institutions maintain for commodity risk by each type of the commodity as follows;

- Agricultural products, defined as the agricultural products that the Office of Agricultural Futures Trading Commission (AFTC) has allowed to trade in the Thai commodity future market or the agricultural products traded in foreign commodity future market; which are soil bean, coffee, sugar palm oil.

- Energy, which are fuel, natural gas.

- Precious metals, which is silver.

- Other metals, which are tin, copper, lead, aluminium, zinc.

- Other commodities, which are product which may later be specified by the Bank of Thailand

2. Reporting long and short positions

Long and short positions reported in this table (column (A) – (N)) are the sum of long and short positions of the same commodity type across different time-bands. Financial institutions shall report details as follows;

2.1 Financial institutions shall prepare maturity ladder table for each commodity type. In case where the commodities are substitutable and their prices move in the same direction in which the correlation between the price changes of the commodity and those of the substitutable commodity is at least 0.9 (the historical data of at least 250 business days shall be used.), those commodities may be reported in the same table for calculation of capital.

2.2 Financial institutions shall assess spot positions and forward positions of each commodity by multiplying the notional amount in term of the standard unit of

measurement (e.g. barrels, kilograms, pounds) with the market price of such commodity, then converting into Thai Baht at the current exchange rate.

2.3 Financial institutions shall record long and short positions to the maturity ladder of each commodity according to time-bands. The short positions shall be reported in negative amount.

2.4 Commodity derivatives, such as commodity futures, commodity linked swaps, commodity options (only on part which is calculated by delta plus method in accordance with the regulations on calculation of capital requirement for market risk of options as in attachment 9), shall be reported in maturity ladder table as follows;

2.4.1 Long or short positions of commodity futures and commodity forward shall be reported in the maturity ladder table. The amount to be reported shall be the notional amount, in standard measurement of such commodity, multiply by market price of the commodity, then, converted into Thai Baht with the current exchange rate. Finally, financial institutions shall slot such amount into table according to the maturity.

2.4.2 Commodity swaps, which one leg is a fixed rate price and the other leg is a floating rate price, shall be reported in maturity ladder table according to the instalment payment as

- In case where financial institutions pay a stream of cash flows calculated from the notional amount multiplied by a fixed rate price (fixed rate price payer) and receive a stream of cash flows calculated from the notional amount multiplied by a floating rate price (floating rate price receiver), the transaction shall be reported as **a long position** of the amount equal to the notional amount in the standard unit of measurement multiplied by the market price of such commodity and converted into Thai Baht at the current exchange rates.

- In the case where the financial institutions receive a stream of cash flows calculated from the notional amount multiplied by fixed rate price (fixed rate price receiver) and pay a stream of cash flow calculated from the notional amount multiplied by a floating rate price (floating rate price payer), the transaction shall be reported as **a short position** of the amount equal to the notional amount in the standard unit of measurement multiplied by the market price of such commodity and converted into Thai Baht at the current exchange rates.

2.4.3 Commodity options where the delta plus method is applied shall be reported as long and short positions of the amounts equal to the notional amount in

the standard unit of measurement multiplied by the delta and multiplied by the market price of such commodity, then, converting into Thai Baht at the current exchange rates.

3. Calculation of capital requirement

3.1 Financial institutions shall calculate capital requirement for each time-band by matching long and short positions within the same time-band, then, multiply with 3%, resulting in the capital required for that particular time-band.

3.2 Financial institutions are allowed to match the residual position in each time-band with the positions in the next time-band. However, financial institutions shall maintain additional 0.6% capital for the time-band which the residual positions have been matched. The calculation shall be carried on as same as in 3.1.

3.3 When calculation is done for the last time-band, there shall be only one net open position left for each commodity. Financial institutions shall maintain capital at 15% of such net open position.

3.4 Capital requirement (column (O)) is the sum of capital requirement of the same commodity type calculated according to 3.1 – 3.3.

3.5 Total capital requirement means the total capital requirement for commodity risk of all commodity type which is the sum of commodity risk of each commodity type calculated from 3.4.

4. Other requirements

4.1 For the market price of commodity and current exchange rate used in calculating positions, financial institutions shall obtain information from a reliable and publicly available source. The exchange rate shall be the current exchange rate on the reporting date as prescribed in the **Notification of the Bank of Thailand on Guideline on Accounting of Financial Institutions.**

Additionally, financial institutions shall consistently use the commodity market price and the current exchange rate from the same source.

4.2 Financial institutions shall prepare supporting tables (position and capital requirement for commodity risk of each commodity) and relevant supporting documents for an examination by the Bank of Thailand.

Table 7 Summary of capital requirement for options under simplified method

This table is the summary of the capital requirement for options calculated under simplified method which is a standard method used by financial institutions in assessing risk for certain options related to interest rate risk, equity risk, foreign exchange risk and commodity risk as follows;

1. Purchase put & long underlying means the sum of the capital requirement for put options that financial institutions have purchased and a long position in the underlying instruments calculated under simplified method. Such capital requirement can be calculated from the sum of the underlying instruments value according to the valuation methodologies specified by the Bank of Thailand, multiplies by the risk weights of specific risk (if any) and general market risk of that underlying instruments, less the value of options in excess to intrinsic value (in the money amount) of options (if any) in accordance with the regulations prescribed by the Bank of Thailand.

2. Purchased call & short underlying means the sum of capital requirement for call options that financial institutions have purchased and a short position in the underlying instruments calculated under simplified method. The capital requirement can be calculated in the same manner as described in 1. in accordance with the regulations prescribed by the Bank of Thailand.

3. Purchased put means the sum of the capital requirement for put options that financial institutions have purchased, without holding any position in the underlying instruments, calculated under simplified method. The capital requirement is the lesser amount of 1) the market value of underlying instruments multiplied by the sum of risk weights for specific risk (if any) and general market risk of that underlying instruments, or 2) the market value of options in accordance with the regulations prescribed by the Bank of Thailand.

4. Purchased call means the sum of the capital requirement for call options that financial institutions have purchased, without holding any position in the underlying instruments, calculated under simplified method. The capital requirement can be calculated in the same manner as described in 3. in accordance with the regulations prescribed by the Bank of Thailand.

Financial institutions shall summarise the calculation of capital requirement for option positions calculated under simplified method separated by risk factors which are interest rate risk in column A, equity risk in column B, foreign exchange risk in column C, and commodity risk in column D. The sum of capital requirement for all risk factors shall

be reported in the total capital requirement row.

In case where financial institutions apply multiple tables in calculating risk of options under simplified method, financial institutions shall combine results from all tables and report the results in Table 7. Financial institutions shall also prepare supporting tables and documents for an examination by the Bank of Thailand.

Table 8 Summary of capital requirement for options under delta-plus method

This table is the summary of the capital requirement of options with interest rate risk, equity risk, foreign exchange risk and commodity risk calculated under delta-plus method, only on part which has gamma and vega risk in addition to delta risk; the delta equivalent amount under standardised approach prescribed by the Bank of Thailand which has reported in the same table as those concerning specific risk (if any) and general market risk as prescribed in the aforementioned table.

Financial institutions shall report risks of option positions regarding gamma and vega risks calculated under delta-plus method as follows;

1. Gamma impact means the sum of the capital requirement for gamma risk calculated using the formula, Gamma Impact = ½ x Gamma x $(VU)^2$, where VU is the market price's volatility per unit of the underlying instruments of options. Such calculation shall follow the regulations as prescribed by the Bank of Thailand.

2. Vega impact means the sum of the capital requirement for vega risk calculated by multiplying the vega of each option position with 25% to reflect an increase and decrease of current option's volatility. Then, sum up the result of the positions with the same underlying instruments. Vega risk capital requirement shall equal to the sum of the absolute value of vega of all types of underlying instruments according to the regulations prescribed by the Bank of Thailand.

Financial institutions shall calculate and report of the capital requirement for options under delta-plus method separated by risk factors which are interest rate risk in column A, equity risk in column B, foreign exchange risk in column C and commodity risk in column D. The sum of the capital requirement for all risk factors shall be reported in the total capital requirement row.

In case where financial institutions apply multiple tables in calculating risk of options under delta-plus method, financial institutions shall combine results from all tables and report the results in Table 8. Financial institutions shall also prepare supporting tables and documents for an examination by the Bank of Thailand.

Table 9 Summary of capital requirement for options under contingent loss method

This table is the summary of the capital requirement of options with interest rate risk, equity risk, foreign exchange risk and commodity risk calculated under contingent loss method. Financial institutions shall include option's specific risk (if any) in this table.

Financial institutions shall report general market risk capital requirement under contingent loss method as follows;

1. Total capital requirement for options with interest rate risk calculated under contingent loss method in column A.

2. Total capital requirement for options with equity risk calculated under contingent loss method in column B.

3. Total capital requirement for options with foreign exchange risk calculated under contingent loss method in column C.

4. Total capital requirement for options with commodity risk calculated under contingent loss method in column D.

The capital requirement for risks associated with options shall be derived from the maximum loss of options calculated by assuming changes in price and volatility of price of the underlying instruments, then, assess the impact to the option price. The maximum loss resulted from such calculation shall be used in the calculation of the capital requirement according to the regulations prescribed by the Bank of Thailand.

In case where financial institutions apply multiple tables in calculating risk of options under contingent loss method, financial institutions shall combine results from all tables and report the results in Table 9. Financial institutions shall also prepare supporting tables and documents for an examination by the Bank of Thailand.

Table 10 Summary of capital requirement for market risk under internal model approach

This table is the summary of capital requirement for market calculated under internal model approach or mixed approach for positions, associated with interest rate risk, equity risk, foreign exchange risk and commodity risk, held by financial institutions which have obtained approval from the Bank of Thailand to apply internal model approach in calculating market risk. Financial institutions shall report the capital requirement for market risk under internal model approach as follows;

1. Financial institutions shall report details of the capital requirement for market risk calculated under internal model approach, which have obtained approval from the Bank of Thailand, by dividing risks into 1) interest rate risk; which consisted of specific risk (SR) and general market risk (GR), 2) equity risk; which consisted of SR and GR, 3) foreign exchange risk and 4) commodity risk.

2. Financial institutions choosing to apply internal model approach in calculating capital requirement for more than one type of risk shall report the Value at Risk (VaR) (along with backtesting's result) according to risk factors, even though, the capital requirement has already been calculated from VaR for all risk factors and the diversification benefit has already been taken into consideration.

3. Financial institutions not applying internal model approach in calculating SR shall calculate SR using standardised approach for both interest rate risk and equity risk. Such calculation shall be included in Table 1 for SR of interest rate risk and Table 3 for SR of equity risk.

Reporting according to column

1. **A** means the VaR at the end of the month and B means an average of the VaR measures on each of the preceding 60 days from the end of the month calculated using the VaR model which has obtained approval from the Bank of Thailand.

2. **C** means back testing exceptions. Financial institutions shall report exceptions from comparing hypothetical P&L and VaR.

3. **D** means multiplication factor resulting from the assessment of the Bank of Thailand's examiner in accordance with the qualitative standards and regulations on stress testing. The multiplication factor will range from 3 - 4. Financial institutions shall report the most recent multiplication factor resulting from the most recent assessment result from the examiner.

4. **E** means plus factor which reflects the result of backtesting. Financial institutions shall compare the exception (from C) to Table 1 in attachment 10, regulations on calculation of capital requirement for market risk under internal model approach, on a monthly basis. In this regard, the plus factor will range from 0 – 1 which may change according to actual exceptions from backtesting on a monthly report. Financial institutions shall apply the plus factor to the report of the following month until there is any change in the following month.

5. **F** means scaled average VaR which calculate by multiplying an average of the VaR measures on each of the preceding 60 days with the scaling factor. The scaling factor is the sum of multiplication factor (D) and plus factor (E) and will range from 3 - 5.

6. Surcharge is the additional capital that the financial institutions are required to maintain if the model, which the financial institutions are allowed to use to assess SR, does not cover both idiosyncratic risk and event and default risk as prescribed in attachment 10

6.1 **G** means the surcharge which equals to VaR at the end of the month which is 1) VaR of SR in case the model is able to assess SR and GR separately or 2) VaR of sub-portfolios of positions with SR in case the model is used to assess both SR and GR.

6.2 **H** means the surcharge which equals to an average of the VaR measures on each of the preceding 60 days which is 1) an average of the VaR of SR measures on each of the preceding 60 days in case the model is able to assess SR and GR separately or 2) an average of the VaR measures of sub-portfolios of positions with SR on each of the preceding 60 days in case the model is used to assess both SR and GR.

7. **I** means the sum of VaR at the end of the month (A) and surcharge, in case the surcharge equals to VaR at the end of the month (G). This amount is the capital requirement in the case I > J.

8. **J** means the sum of the scaled average VaR (F) and the surcharge, in case the surcharge equals an average of the VaR measures on each of the preceding 60 days (H). This amount is the capital requirement in the case J > I.

In this regard, financial institutions shall maintain capital requirement equals to the higher amount between (I) and (J).

Reporting according to row

No. 1 Interest rate means financial institutions have applied internal approach

in calculating capital requirement for interest rate risk which comprises GR and SR. Financial institutions may assess only interest rate risk or incorporate other risks in the assessment as well. The assessment may be conducted in 2 different cases as follows;

In case where financial institutions assess only GR or separately assess GR and SR

No.1.1 is for general market risk assessment result.

No.1.2 is for specific risk assessment result.

No.1.3 is for the sum of 1.1 and 1.2 (only for some columns).

In case where financial institutions assess GR and SR altogether

No.1.4 is for the GR and SR assessment result of total portfolios of positions with interest rate risk.

No.1.5 is for the GR and SR assessment result of sub-portfolios of positions with SR.

No. 2 Equity means financial institutions have applied internal approach in calculating capital requirement for equity risk which comprise GR and SR. Financial institutions may assess only equity risk or incorporate other risks in the assessment as well. The assessment may be conducted in 2 different cases as follows;

In case where financial institutions assess only GR or separately assess GR and SR

No.2.1 is for general market risk assessment result.

No.2.2 is for specific risk assessment result.

No.2.3 is for the sum of 2.1 and 2.2 (only for some columns).

In case where financial institutions assess GR and SR altogether

No.2.4 is for the GR and SR assessment result of total portfolios of positions with interest rate risk.

No.2.5 is for the GR and SR assessment result of sub-portfolios of positions with SR.

No. 3 Foreign Exchange means financial institutions have applied internal approach in calculating capital requirement for foreign exchange risk which comprise only GR. Financial institutions may assess only foreign exchange risk or incorporate other risks in the assessment as well.

No. 4 Commodity means financial institutions have applied internal approach in calculating capital requirement for commodity risk which comprise only GR. Financial institutions may assess only commodity risk or incorporate other risks in the assessment as well.

No. 5 Total market risk (simple summation), financial institutions shall report the sum of interest rate risk (No. 1.3 or No. 1.4), equity risk (No. 2.3 or No. 2.4), foreign exchange risk (No. 3) and commodity risk (No. 4)

No. 6 Market risk assessment result is for the result of all market risk assessment under internal model approach which incorporates the effect of the diversification benefit from the relationship among risk factors. Therefore, the sum in No. 6 may not equal No. 5 (except financial institutions use the model to assess only one risk factor).

No. 7 Capital requirement is for the higher value between I and J.

Reporting data in the table

1. Financial institutions may choose to apply internal model approach in calculating market risk as follows;

Case 1: Financial institutions apply internal model approach in assessing GR only.

Case 1.1: assessment of only one risk factor of market risk.

Case 1.2: assessment of multiple risk factors, but not all, of market risk.

Case 1.3: assessment of all risk factors of market risk.

Case 2: Financial institutions apply internal model approach in assessing GR and SR separately.

Case 2.1: assessment of only one risk factor of market risk.

Case 2.2: assessment of multiple risk factors, but not all, of market risk.

Case 2.3: assessment of all risk factors of market risk.

Case 3: Financial institutions apply internal model approach in assessing GR and SR altogether.

Case 3.1: assessment of only one risk factor of market risk.

Case 3.2: assessment of multiple risk factors, but not all, of market risk.

Case 3.3: assessment of all risk factors of market risk.

2. Financial institutions shall determine which cases internal model approach is used for, then, financial institutions may apply Table 10 and supporting table only to relevant cases as follows;

2.1 Table 10: Summary of capital requirement for market risk under internal model approach. The data can be referred to its coordinate by the column and row title which can be used as a reference in other tables, for instance, A1.1 means the VaR at the end of the month for interest rate risk in case of assessing only GR or assessing GR and SR separately. In addition, this table shows how the data in each row or column is derived from, for instance, 1) row 1.3 is derived from the sum of row 1.1 and 1.2, 2) column F is derived from multiplying column B with the sum of column D and E.

2.2 Explanation table 1. is used as a reference in data preparation, in case where financial institutions apply internal model approach for assessing only GR, as the table will identify which rows and columns under the 3 sub-cases that the financial institutions have to fill in.

2.3 Explanation table 2. is used as a reference in data preparation, in case where financial institutions apply internal model approach for assessing both GR and SR separately, as the table will identify which rows and columns under the 3 sub-cases that the financial institutions have to fill in.

2.4 Explanation table 3. is used as a reference in data preparation, in case where financial institutions apply internal model approach for assessing both GR and SR altogether, as the table will identify which rows and columns under the 3 sub-cases that the financial institutions have to fill in.

Remarks: The highlight field may be linked by a formula from other fields.

Example of Table 10: Summary of capital requirement for market risk under internal model approach

Transaction (Unit: thousand Baht)		VaR at the end of the month (A)	Average VaR of previous 60 days (B)	Back Testing exceptions (C)	Scaling factors		Scaled average VaR	Surcharge		Capital requirement	
					Multiplication factor (D)	Plus factor (E)	(F=B*(D+E))	VaR at the end of the month (G)	Average VaR of previous 60 days (H)	VaR at the end of the month (A) + Surcharge (G) (I = A+G)	Scaled average VaR (F) + Surcharge (H) (J = F+H)
1. Interest rate risk											
In case only GR is accessed or GR & SR are assessed separately											
1.1 General market risk	(GR)	A1.1	B1.1								
1.2 Specific risk	(SR)	A1.2	B1.2								
1.3 Total	(1.1+1.2)	A1.3=A1.1+A1.2	B1.3=B1.1+B1.2	C1.3							
In case GR & SR are assessed altogether											
1.4 GR + SR of total portfolios		A1.4	B1.4	C1.4							
1.5 Sub-portfolios containing SR		A1.5	B1.5	C1.5							
2. Equity risk											
In case only GR is accessed or GR & SR are assessed separately											
2.1 General Market Risk		A2.1	B2.1								
2.2 Specific Risk		A2.2	B2.2								
2.3 Total	(2.1-2.2)	A2.3=A2.1-A2.2	B2.3=B2.1+B2.2	C2.3							
In case GR & SR are assessed together											
2.4 GR + SR of total portfolios		A2.4	B2.4	C2.4							
2.5 Sub-portfolios containing SR		A2.5	B2.5	C2.5							
3. Foreign exchange risk	(GR only)	A3	B3	C3							
4. Commodity risk	(GR only)	A4	B4	C4							
5. Total market risk	(1+2+3+4)	A5=A1.3+A1.4+A2.3+A2.4+A3+A4	B5=B1.3-B1.4+B2.3+B2.4+B3+B4								
6. Market risk assessment result		A6	B6	C6	D6	E6	F6=B6*(D6+E6)	G6	H6	I6=A6+G6	J6=F6+H6
7. Capital requirement											J7=Max(I6 or J6)

Example of Table 10

Table for explanation of Case 1. shall be used if financial institutions apply internal model for only GR assessment

Case	VaR at the end of the month (A)	Average VaR of preceding 60 days (B)	Backtesting exceptions (C)	Scaling factors		Scaled average VaR (F=B*(D+E))	Surcharge		Capital requirement	
				Multiplication Factor (D)	Plus factor (E)		VaR at the end of the month (G)	Average VaR of previous 60 days (H)	VaR at the end of the month(A) + Surcharge (G) (I = A+G)	Scaled average VaR (F) + Surcharge (H) (J = F+H)
Case 1.1 (Only one risk factor)	(A1.1, A1.3) (or) (A2.1, A2.3) (or) A3 (or) A4	(B1.1, B1.3)(or) (B2.1, B2.3)(or) B3 (or) B4	C1.3 (or) C2.3 (or) C3 (or) C4	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	A5, A6	B5, B6	C6	D6	E6	F6	0	0	I6	J6, J7
Case 1.2 (Multiple risk factors, but not all)	(A1.1, A1.3) (and/or) (A2.1, A2.3) (and/or) A3 (and/or) A4	(B1.1, B1.3) (and/or) (B2.1,B2.3) (and/or) B3 (and/or) B4	C1.3 (and/or) C2.3 (and/or) C3 (and/or) C4	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	A5, A6	B5, B6	C6	D6	E6	F6	0	0	I6	J6, J7
Case 1.3 (All risk factors)	A1.1, A1.3 A2.1, A2.3 A3, A4	B1.1, B1.3, B2.1 B2.3, B3, B4	C1.3,C2.3,C3,C4	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	A5, A6	B5, B6	C6	D6	E6	F6	0	0	I6	J6, J7

Example of Table 10

Table for explanation of Case 2. shall be used if financial institutions apply internal model for assessing GR and SR separately

Case	VaR at the end of the month (A)	Average VaR of preceding 60 days (B)	Backtesting exceptions (C)	Scaling factors		Scaled average VaR (F=B*(D+E))	Surcharge		Capital requirement	
				Multiplication factor (D)	Plus factor (E)		VaR at the end of the month (G)	Average VaR of previous 60 days (H)	VaR at the end of the month (A) + Surcharge (G) (I = A+G)	Scaled average VaR (F) + Surcharge (H) (J = F+H)
Case 2.1 (Only one risk factor)	(A1.1, A1.2, A1.3) (or) (A2.1, A2.2, A2.3) (or), A3 (or), A4	(B1.1,B1.2,B1.3) (or), (B2.1, B2.2, B2.3) (or) B3 (or) B4	C1.3 (or) C2.3 (or) C3 (or) C4	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	A5, A6	B5, B6	C6	D6	E6	F6	G6	H6	I6	J6, J7
Case 2.2 (Multiple risk factors, but not all)	(A1.1, A1.2, A1.3) (and/or) (A2.1, A2.2, A2.3) (and/or) A3 (and/or) A4	(B1.1, B1.2, B1.3) (and/or) (B2.1, B2.2, B2.3) (and/or) B3 (and/or) B4	C1.3 (and/or) C2.3 (and/or) C3 (and/or) C4	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	A5, A6	B5, B6	C6	D6	E6	F6	G6	H6	I6	J6, J7
Case 2.3 (All risk factors)	(A1.1, A1.2, A1.3), (A2.1, A2.2, A2.3), A3, A4	(B1.1, B1.2, B1.3) (B2.1, B2.2, B2.3) B3, B4	C1.3, C2.3, C3,C4	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	A5, A6	B5, B6	C6	D6	E6	F6	G6	H6	I6	J6, J7

Example of Table 10

Table for explanation of Case 3. shall be used if financial institutions apply internal model for assessing both GR and SR.

Case	VaR at the end of the month (A)	Average VaR of preceding 60 days (B)	Backtesting exceptions (C)	Scaling factors		Scaled average VaR (F=B*(D+E))	Surcharge		Capital requirement	
				Multiplication factor (D)	Plus factor (E)		VaR at the end of the month (G)	Average VaR of previous 60 days (H)	VaR at the end of the month (A) + Surcharge (G) (I = A+G)	Scaled average VaR (F) + Surcharge (H) (J = F+H)
Case 3.1 (Only one risk factor)	(A1.4, A1.5) (or) (A2.4, A2.5) (or) A3 (or) A4	(B1.4,B1.5) (or) (B2.4, B2.5) (or) B3 (or) B4	(C1.4, C1.5) (or) (C2.4, C2.5) (or) C3 (or) C4	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	A5, A6	B5, B6	C6	D6	E6	F6	G6	H6	I6	J6, J7
Case 3.2 (Multiple risk factors, but not all)	(A1.4, A1.5) (and/or) (A2.4, A2.5) (and/or) A3 (and/or) A4	(B1.4, B1.5) (and/or) (B2.4, B2.5) (and/or) B3 (and/or) B4	(C1.4, C1.5) (and/or) (C2.4, C2.5) (and/or) C3 (and/or) C4	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	A5, A6	B5, B6	C6	D6	E6	F6	G6	H6	I6	J6, J7
Case 3.3 (All risk factors)	(A1.4, A1.5), (A2.4, A2.5), A3, A4	(B1.4, B1.5), (B2.4, B2.5) B3, B4	(C1.4, C1.5), (C2.4, C2.5), C3,C4	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	A5, A6	B5, B6	C6	D6	E6	F6	G6	H6	I6	J6, J7

Table 11 Summary of the 5 largest actual losses in a quarter

Data in this table is the summary of the 5 largest actual daily losses in a quarter. Such loss is calculated from positions in each day deducted by positions of the previous day. Financial institutions shall report data in ranking from the first to the fifth largest actual loss along with the occurrence date and the 1-day VaR of the previous day. The detail shall be reported as follows;

1. Report the first largest actual daily loss for the quarter which is calculated from positions in each day deducted by positions of the previous day. The first largest loss, the date of such loss and the 1-day VaR of the previous day shall be reported.

2. Report the second largest actual daily loss for the quarter which is calculated from positions in each day deducted by positions of the previous day. The second largest loss, the date of such loss and the 1-day VaR of the previous day shall be reported.

3. Report the third largest actual daily loss for the quarter which is calculated from positions in each day deducted by positions of the previous day. The third largest loss, the date of such loss and the 1-day VaR of the previous day shall be reported.

4. Report the fourth largest actual daily loss for the quarter which is calculated from positions in each day deducted by positions of the previous day. The fourth largest loss, the date of such loss and the 1-day VaR of the previous day shall be reported.

5. Report the fifth largest actual daily loss for the quarter which is calculated from positions in each day deducted by positions of the previous day. The fifth largest loss, the date of such loss and the 1-day VaR of the previous day shall be reported.

Table 12 Stress testing: Profit/Loss of positions resulting from change in Thai Baht interest rate

Data prescribed in this table is the summary of profit/loss as a result of the stress testing on trading book positions with Thai Baht interest rate risk (exclude option positions) under the scenario set out by the Bank of Thailand. Financial institutions shall report the following data;

1. Scenario 1 means an upward non-parallel shift of the yield curve where the Bank of Thailand has prescribed the change of the yield curve according to maturity as a basis point shift from the existing yield curve.

2. Scenario 2 means a downward non-parallel shift of the yield curve where the Bank of Thailand has prescribed the change of the yield curve according to maturity as a basis point shift from the existing yield curve.

3. Scenario 3 means an upward parallel shift of the yield curve where the Bank of Thailand has prescribed the change of the yield curve according to maturity as a basis point shift from the existing yield curve.

4. Scenario 4 means a downward parallel shift of the yield curve where the Bank of Thailand has prescribed the change of the yield curve according to maturity as a basis point shift from the existing yield curve.

5. Value of interest rate positions means the market value of trading book position with Thai Baht interest rate risk, before conducting the stress testing (exclude option positions) at the date of the stress testing.

6. Profit/loss of position under scenario 1 means profit/loss resulting from the stress testing of trading book positions (exclude option positions) with Thai Baht interest rate risk. The profit/loss is calculated by deducting the value of positions assessed under scenario 1 by market value of such position before the stress testing.

7. Profit/loss of position under scenario 2 means profit/loss resulting from the stress testing of trading book positions (exclude option positions) with Thai Baht interest rate risk. The profit/loss is calculated by deducting the value of positions assessed under scenario 2 by market value of such position before the stress testing.

8. Profit/loss of position under scenario 3 means profit/loss resulting from the stress testing of trading book positions (exclude option positions) with Thai Baht interest rate risk. The profit/loss is calculated by deducting the value of positions assessed under

scenario 3 by market value of such position before the stress testing.

9. Profit/loss of position under scenario 4 means profit/loss resulting from the stress testing of trading book positions (exclude option positions) with Thai Baht interest rate risk. The profit/loss is calculated by deducting the value of positions assessed under scenario 4 by market value of such position before the stress testing.

Table 13 Stress testing: Profit/loss of positions resulting from change in domestic equity price

Data prescribed in this table is the summary of profit/loss as a result of the stress testing on trading book positions with domestic equity risk (exclude option positions) under the scenario set out by the Bank of Thailand. Financial institutions shall report the following data;

1. Change in equity price under scenario 1 means an increase in a percentage change (in percentage) of the domestic equity price as prescribed by the Bank of Thailand under scenario 1.

2. Change in equity price under scenario 2 means an increase in a percentage change (in percentage) of the domestic equity price as prescribed by the Bank of Thailand under scenario 2.

3. Change in equity price under scenario 3 means a decrease in a percentage change (in percentage) of the domestic equity price as prescribed by the Bank of Thailand under scenario 3.

4. Change in equity price under scenario 4 means a decrease in a percentage change (in percentage) of the domestic equity price as prescribed by the Bank of Thailand under scenario 4.

5. Value of equity positions means market value of trading book positions, associated with equity risk, before conducting stress testing (exclude option positions) at the date of the stress testing.

6. Profit/loss of positions under scenario 1 means profit/loss resulting from the stress testing of trading book positions (exclude option positions) with domestic equity risk. The profit/loss is calculated by deducting the value of positions assessed under scenario 1 by market value of such positions before stress testing

7. Profit/loss of positions under scenario 2 means profit/loss resulting from the stress testing of trading book positions (exclude option positions) with domestic equity risk. The profit/loss is calculated by deducting the value of positions assessed under scenario 2 by market value of such positions before stress testing

8. Profit/loss of positions under scenario 3 means profit/loss resulting from the stress testing of trading book positions (exclude option positions) with domestic equity risk. The profit/loss is calculated by deducting the value of positions assessed

under scenario 3 by market value of such positions before stress testing

9. Profit/loss of positions under scenario 4 means profit/loss resulting from the stress testing of trading book positions (exclude option positions) with domestic equity risk. The profit/loss is calculated by deducting the value of positions assessed under scenario 4 by market value of such positions before stress testing

Table 14 Stress testing: Profit/loss of positions resulting from change in foreign exchange

Data prescribed in this table is the summary of profit/loss incurred as a result of the stress testing on trading book positions (exclude option positions) with foreign exchange risk of 7 major currencies under the scenario prescribed by the Bank of Thailand. Financial institutions shall report the following data.

1. Change in foreign exchange of 7 major currencies under scenario 1 means an increase in a percentage change (in percentage) of 7 major currencies in relative to Thai Baht as prescribed by the Bank of Thailand under scenario 1.

2. Change in foreign exchange of 7 major currencies under scenario 2 means an increase in a percentage change (in percentage) of 7 major currencies in relative to Thai Baht as prescribed by the Bank of Thailand under scenario 2.

3. Change in foreign exchange of 7 major currencies under scenario 3 means a decrease in a percentage change (in percentage) of 7 major currencies in relative to Thai Baht as prescribed by the Bank of Thailand under scenario 3.

4. Change in foreign exchange of 7 major currencies under scenario 4 means a decrease in a percentage change (in percentage) of 7 major currencies in relative to Thai Baht as prescribed by the Bank of Thailand under scenario 4.

5. US dollar means positions related to foreign exchange of US dollar which financial institutions shall report 1) positions of US dollar before conducting the stress testing and 2) profit/loss resulting from the stress testing of positions with US dollar exchange rate risk by deducting the value of positions assessed under scenario 1, 2, 3 and 4 by market value of such position before the stress testing.

6. Yen means positions related to foreign exchange of Yen which financial institutions shall report 1) positions of Yen before conducting the stress testing and 2) profit/loss resulting from the stress testing of positions with Yen exchange rate risk by deducting the value of positions assessed under scenario 1, 2, 3 and 4 by market value of such position before the stress testing.

7. Pound sterling means positions related to foreign exchange of Pound sterling which financial institutions shall report 1) positions of Pound sterling before conducting the stress testing and 2) profit/loss resulting from the stress testing of positions with Pound Sterling exchange rate risk by deducting the value of positions assessed under scenario 1, 2, 3 and 4 by market value of such position before the stress testing.

8. EURO means positions related to foreign exchange of EURO which financial institutions shall report 1) positions of EURO before conducting the stress testing and 2) profit/loss resulting from the stress testing of positions with EURO exchange rate risk by deducting the value of positions assessed under scenario 1, 2, 3 and 4 by market value of such position before the stress testing.

9. Hong Kong dollar means positions related to foreign exchange of Hong Kong dollar which financial institutions shall report 1) positions of Hong Kong dollar before conducting the stress testing and 2) profit/loss resulting from the stress testing of positions with Hong Kong dollar exchange rate risk by deducting the value of positions assessed under scenario 1, 2, 3 and 4 by market value of such position before the stress testing.

10. Ringgit means positions related to foreign exchange of Ringgit which financial institutions shall report 1) positions of Ringgit before conducting the stress testing and 2) profit/loss resulting from the stress testing of positions with Ringgit exchange rate risk by deducting the value of positions assessed under scenario 1, 2, 3 and 4 by market value of such position before the stress testing

11. Singapore dollar means positions related to foreign exchange of Singapore dollar which financial institutions shall report 1) positions of Singapore dollar before conducting the stress testing and 2) profit/loss resulting from the stress testing of positions with Singapore dollar exchange rate risk by deducting the value of positions assessed under scenario 1, 2, 3 and 4 by market value of such position before the stress testing.