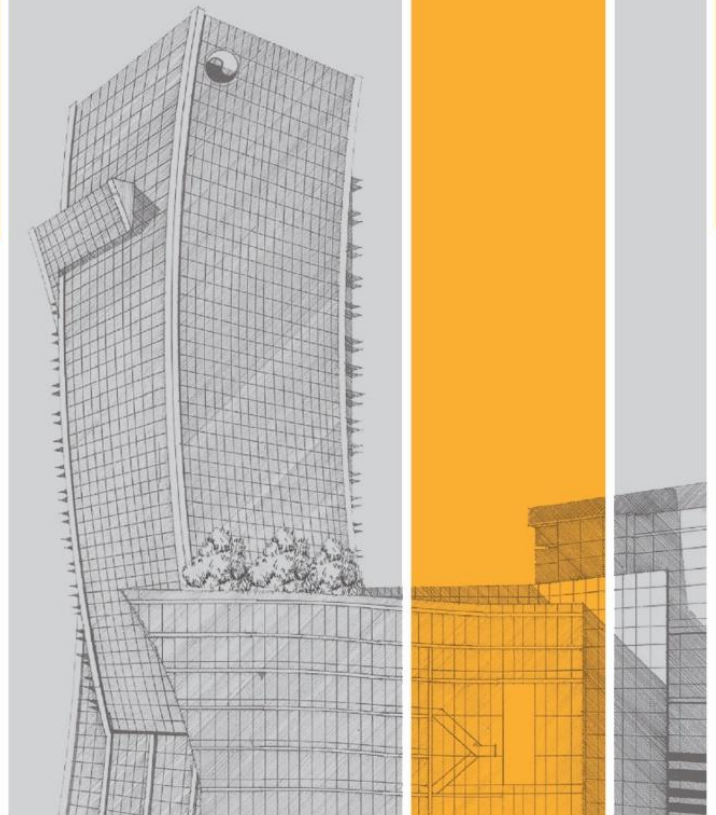




**TCH**

**DISCLOSURE  
DOCUMENT**

FOR THAILAND CLEARING HOUSE





# TCH

Thailand Clearing House

**Responding institution:**

**Thailand Clearing House Co., Ltd. (TCH)**

**Jurisdiction (s) in which the FMI operates:**

**Thailand**

**Authority(ies) regulating, supervising or overseeing the FMI:**

**The Securities and Exchange Commission (SEC) and Bank of Thailand (BOT)**

The date of this disclosure: February, 2023.

This disclosure can also be found at [www.set.or.th/tch](http://www.set.or.th/tch).

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## Executive Summary

# TCH

## Principles for Financial Market Infrastructures (PFMIs)

### *I. Executive summary*

**Thailand Clearing House Co., Ltd. (TCH)** is a primary clearing house in Thailand, providing clearing services for exchange-traded financial products in Thailand. TCH was established under the Stock Exchange of Thailand (SET) group with the purpose to become a central counterparty for all trading activities on SET, Market for Alternative Investment (mai), and Thailand Futures Exchange (TFEX).

As a CCP, TCH provides clearing and settlement services to market participants in Thailand with international standards and employs various risk management practices to prudently manage the risks to which it is exposed, including market, credit, and liquidity risks. TCH risk management framework includes a range of tools and frameworks covering strategic risk, general business risk, operational risk, financial risk (counterparty credit, liquidity, investment risk and custody risk) and compliance risk. TCH also has an effective margining system to cover its current and potential credit exposures arising from its participants for all products traded on both securities and derivatives markets.

TCH has published the principles for financial market infrastructures (PFMI) developed by the Committee on Payments and Market Infrastructures and the Technical Committee of the International Settlements and the International Organization of Securities Commissions for both qualitative and quantitative on the TCH's website since 2014 and revised on 2018.

Thus, this document provides details to demonstrate TCH's compliance with the PFMI, unless otherwise specified, this disclosure is described based on the information as of November 10, 2022.



**Summary of major  
changes since the last  
update of the disclosure**

**TCH**

## *II. Summary of major changes since the last update of the disclosure*

Thailand Clearing House Co., Ltd. (TCH) published its first disclosure in 2014 and revised version in 2018. The disclosure has been updated along with TCH new development, rules amendments, and the suggestions and comments recommended by World Bank experts. Major changes from the previous update on October 2018 are as follows:

### Principle 4: Credit Risk

The stress scenarios comprise the maximum percentage price change over the 10-year lookback period which is adjusted to reflect the current market condition.

### Principle 6: Margin

TCH imposes the minimum variance threshold to stabilize the maintenance margin rate and mitigate the pro-cyclicality effect.

### Principle 10: Physical Delivery

This principle is not applicable to TCH because TCH is not performing the role of a CCP with regard to physical delivery.

### Principle 18: Access and participant requirements

The new concept of member classification - General Clearing Member (GCM) and Direct Clearing Member (DCM) - and Settlement Agent (SA) on securities clearing are introduced, together with TCH's view on direct and indirect participants in CCP service.

### Principle 19: Tiered participation arrangement

TCH clarifies the definition and legal relationship of its direct and indirect participant, including the arrangement of those tiered participation.

### Principle 20: FMI Links

A FMI link with CSD is identified and managed by a well-found legal basis.



**TCH background  
information**

TCH





### III. TCH background information

#### General description of TCH and the markets it serves

Thailand Clearing House Co., Ltd. (TCH) a subsidiary of The Stock Exchange of Thailand (SET) was established on August 9, 2004. During 2004- 2009, TCH acted as a clearing house or a center for clearing only the derivatives traded on Thailand Futures Exchange PCL (TFEX), while the clearing house for the equity market was under Thailand Securities Depository Co., Ltd. (TSD). In order to integrate all clearinghouse functions to TCH, including the risk associated with clearing house from the depository function of TSD, in 2010 the clearinghouse roles for both the derivatives and the equity markets were under TCH. TCH has therefore become the integrated clearing house for all financial products.

Financial instruments currently cleared by TCH include all securities traded on SET and mai, as well as derivatives traded TFEX, as shown in the table below:

Securities in The Stock Exchange of Thailand	Products in Thailand Futures Exchange PCL
<p><b>Securities products</b></p> <ul style="list-style-type: none"> <li>• Common Stock</li> <li>• Preferred Stock</li> <li>• Warrant</li> <li>• Non-Voting Depository Receipt (NVDR)</li> <li>• Derivative Warrants (DW)</li> <li>• Depository Receipt (DR)</li> <li>• Fractional Depository Receipts (DRx)</li> <li>• Exchange-Traded Fund (ETF)</li> <li>• Real Estate Investment Trust (REIT)</li> <li>• Infrastructure Fund</li> </ul>	<p><b>Equity</b></p> <ul style="list-style-type: none"> <li>• SET50 Index Futures</li> <li>• SET50 Index Options</li> <li>• Sector Index Futures</li> <li>• Single Stock Futures</li> </ul> <p><b>Precious metal</b></p> <ul style="list-style-type: none"> <li>• Gold Futures (10 Baht and 50 Baht)</li> <li>• Gold Online Futures</li> <li>• Silver Online Futures</li> </ul> <p><b>Deferred Precious metal</b></p> <ul style="list-style-type: none"> <li>• Gold D</li> </ul> <p><b>Interest rates</b></p> <ul style="list-style-type: none"> <li>• 3 month BIBOR Futures</li> <li>• 5Y Government Bond Futures</li> </ul> <p><b>Currency</b></p> <ul style="list-style-type: none"> <li>• USD Futures</li> <li>• EURUSD Futures</li> <li>• USDJPY Futures</li> </ul> <p><b>Agricultural</b></p> <ul style="list-style-type: none"> <li>• Rubber Futures (RSS3D and RSS3 Futures)</li> <li>• Japanese Rubber Futures</li> </ul>



## General organisation of TCH

TCH board comprises high-level executives from SET, and independent experts from the capital market. TCH is a company under the SET group. The chairman of the board of the company is, by position, the president of The Stock Exchange of Thailand. As part of the SET group, TCH is using the Corporate Governance policy in line with the SET group's policy. SET is a private entity, serving as a center for securities trading of equities, bond and derivatives markets, promoting growth potential of the Thai economy. The SET president will be elected by SET's board of governors. SET's executive management teams are formed to manage all SET's functions including clearing house. The committees related to TCH's activities are Audit Committee and Risk Management Committee. In addition, there are sub-committees related to only TCH activities which are Risk Management Sub-committee, Business Conduct Sub-committee and Appeal Sub-committee. These committees are advisory and monitoring bodies for TCH's operation as a central counterparty with fairness, transparency, conforming to the rules of international standards. All annual reports of Audit Committee and Risk Management Committee are included in SET Annual Report.

### Risk Management Framework

TCH emphasizes the importance of risk management and strictly applies TCH risk management framework, which has been approved by TCH Risk Management Sub-committee and TCH Board of Directors to effectively manage risks. The TCH Board of Directors is responsible for stipulating TCH risk management framework and risk management measures.

Regarding the Risk Management Framework and with CCP role for all securities traded on SET, mai, and derivatives traded on TFEX, TCH sets risk management as a main priorities functions for seamless and resilient operation. As a CCP, TCH faces major risks that can be classified into 4 areas as follows:

#### 1. Strategic Risk:

TCH conducts a SWOT analysis and strategy map to manage this matter of risks. TCH also estimates the opportunity cost of missing the target. TCH also monitors, evaluates, and reports business progress and financial status to the TCH Board of Directors quarterly and also monitors and maintains shareholder's equity consistency with regulations to control its business risk.

## 2. Operational Risk:

TCH performs risk and control self-assessment (RCSA) to identify, assess, control, and mitigate the risk. TCH is also regularly inspected by internal and external auditors, including SEC. Apart from this, TCH has risk management tools for controlling and mitigating risk such as legal risk, business interruption risk, and IT risk, including cyber risk,

## 3. Financial Risk composes of three main risks

- i. Counterparty Credit Risk: TCH sets the financial requirement for TCH membership qualifications by determining the appropriate level of shareholder's equity and the Net Capital (NC) for clearing members. Moreover, members' financial status also is monitored by TCH. TCH also has financial resources that consist of a clearing fund and SET reserve fund to absorb potential loss due to member default.
- ii. Liquidity Risk: TCH manages its liquidity risk through its liquid resources in many forms, including cash on hand and committed bank credit lines. The adequacy of liquid resources is determined by the stress test on daily basis.
- iii. Investment Risk: TCH manages investment risk by investing in low-risk and highly liquid assets and diversifying its investment portfolio into several qualified financial instruments while limiting the proportion given to each financial institution and issuer to minimize the exposure affecting investment results.

## 4. Compliance Risk:

TCH keeps regularly monitoring and reviewing any change in rules and regulations governing TCH and also works closely with the regulators such as BOT and SEC. TCH also collaborates with regulators in regard to any change in legislation and regulations that may impact TCH.

## Legal and regulatory framework

TCH is governed by the Securities and Exchange Act B. E. 2535 (1992) or SEA for equity and bond market, and by the Derivatives Act B. E. 2546 (2003) or DA for derivatives market. It is under the supervision of The Securities and Exchange Commission of Thailand (SEC). As a subsidiary of The Stock Exchange of Thailand (SET), this structure of shareholding conforms to the Securities and

Exchange Act that SET may set up a subsidiary company for the implementation of clearinghouse services. Not only the SEC Act that TCH has to comply, the general laws such as civil and commercial code, bankruptcy law, etc. are also applicable to TCH. In order to be in line with global community standards, TCH has studied various international organizations' standards, such as the Bank for International Settlements' committee on payment and settlement systems, the International Organization of Securities Commissions, International Options Market Organization, World Federation of Exchanges (WFE), etc. All these entities are not directly governing, but indirectly constructing benchmarks, best practices, or standardized schemes for CCP.

## System design and operations

As a clearinghouse for all securities and derivatives traded on the SET, mai and TFEX, TCH's most important role is to serve as the central counterparty to all trading activities on those exchanges. Thus, TCH will guarantee clearing and settlement for a concerned party no matter whether any counterparty may break the commitment or not. This is a crucial mechanism to lessen counterparty risks.

Right after a trading transaction is matched and those exchanges have confirmed the matching transactions with their members, the TCH, as the direct central counterparty (CCP), will become a buyer to every selling member and a seller to every buying member. Therefore, a member who has bought or sold the securities has an obligation not to the party on the other side of the transaction, but to the clearinghouse, just as the clearinghouse has an obligation to the member. This is called a novation process.

As a CCP, TCH guarantees the performance of payment and securities delivery of any trading transactions on the SET, mai and TFEX. This reduces the risks stemming from clearing members who fail to meet their contractual obligations or 'credit risks', thereby strengthening the confidence in and by the involved parties as well as preserving the financial integrity of the clearinghouse and the market as a whole.



# IV.

Disclosure of 24  
principles for FMI

# TCH

## IV. Disclosure of 24 principles for FMI

### Principle 1

#### Legal basis

*Financial Market Infrastructures (FMI) should have a well-founded, clear, transparent and enforceable legal basis for each material aspect of its activities in all relevant jurisdictions.*

#### Key consideration

1.1 The legal basis should provide a high degree of certainty for each material aspect of FMI activities in all relevant jurisdictions.

The legal framework provides a high degree of legal certainty for each material aspect of TCH's clearing activities in all relevant jurisdictions. All transactions in the clearing and settlement system are enforceable according to the principle of Thai law mainly on the Securities and Exchange Act (SEA), Derivatives Act (DA) and the Civil and Commercial code. The SEC regulates the establishment and amendment of TCH's rule. All clearing members operating in Thailand are subject to relevant Thai law. The legal basis for each material aspect is as follows,

##### (a) Customer assets protection

The law and regulation (SEA and DA) requires a clear segregation and application of customer asset from those of intermediaries. TCH is required to segregate its participants' asset from its own and shall prepare and keep records of the asset received or had in possession for each respective member separately from its own assets. In addition, an intermediary is also obliged to separate between its own securities holdings and the assets of its customers.

In addition to the above, such laws also state that when a securities/derivatives business operator becomes a debtor by judgment or a debtor under receivership in the bankruptcy case, the asset deemed to be owned by customer shall not be regarded as asset subject to seizure or attachment in the civil case and shall not be regarded as the bankruptcy estate which may be distributed among creditors of the securities/derivatives business operator in the bankruptcy case. It is also applied in



case of clearinghouse insolvency for the purposes of protecting the asset of its members and members' client.

(b) Novation and netting arrangements

As mentioned by law, TCH shall be bound to rights and obligations with the member under the securities/derivatives trading agreements for which it provides settlement services. As such, TCH becomes a legal counterparty against each of its clearing members. The sum of all buying and selling obligations or positions of each clearing member are bilaterally netted against TCH to create a net settlement obligation for each member.

In short, TCH calculates the bilateral netting obligation of each member. This netting arrangement is enforceable under the Civil and Commercial Code.

(c) Finality of settlement

The finality of settlement is legally enforceable and required by both SEA and SEC regulation. To comply with this, TCH also clearly states the timing of settlement finality and the way finality is achieved both securities and money settlement in its rules and regulations.

Further, the transfer of funds and finality of the payment are also stipulated by both Payment system Act BE 2560 and BOT regulations. Once the settlement is finalized, it is irrevocable.

For securities transactions, besides the clearing members, TCH also has signed contracts with settlement agents, practically the custodian banks, who hold assets of TCH member's foreign or institutional clients in order to facilitate their clients to fulfil the obligations with TCH on behalf of the broker subject to the clients' instruction. In case the custodian banks who act as settlement agent cannot fulfil their obligations related to clearing and settlement, such obligations will be re-processed by the clearing member, who has originally obliged to the transaction. Moreover, as settlement agents are mostly custodian banks, they are all regulated by the Bank of Thailand (BOT).

While, for derivatives side, TCH has also clearly defined rules and procedures for the deposit of margin that the assets deposited as a collateral shall be deemed complete only upon the condition specified by TCH, once it's done, member cannot be able to revoke

(d) Delivery versus payment (DVP)

TCH rule clearly states that all securities transactions must be settled on DVP basis. When the member who entitle to receive payment for Securities has made delivery of Securities under the



methods in accordance with TCH's rule, the clearing house will make payment for Securities to such Member and vice versa.

(e) Collateral arrangement

TCH accepts cash in Thai baht and foreign currency (USD, EUR, JPY), Thai listed stocks, Thai government bonds, and Bank of Thailand bonds as collaterals. The collateral placement is outright transfer so TCH has a full control over such collateral and also has the right to enforce the performance of the member's obligation against the deposited collateral in TCH accounts in case of clearing member's insolvency

All accepted collaterals are subject to mark-to-market and respective haircut rates.

(f) Enforceability of transaction

The contractual arrangement between TCH and the clearing members are fully enforceable under

- (1) SEA
- (2) DA
- (3) Civil and Commercial Code.

Generally, each participant signs a contract with TCH, so they are bound to the TCH rules and regulations which are enforced through legal action.

Regarding the member's insolvency, SEA and DA have also mentioned that TCH shall have the right to set off the obligation incurred from the securities and derivatives transaction of such member's position against TCH's obligation before or on the date of the receivership order, even if the member becomes entitle to the claim after the court has issued a receivership order. The Bankruptcy Act B.E. 2483 (1940) also provides the legal basis for bankruptcy protection for the settlement of obligations under derivatives transaction, including collateral to connect with such member.

Moreover, if the member's assets acquired by or had in possession of the derivatives clearing house are insufficient to cover all indebtedness owed by the member to TCH, the clearing house shall entitle to file a claim for the difference under the bankruptcy proceedings. This legal ground is also applied to securities settlement on a mutatis mutandis basis.





1.2 An FMI should have rules, procedures, and contracts that are clear, understandable, and consistent with relevant laws and regulations.

TCH rules are formulated based on regulated laws, namely the Securities and Exchange Act (SEA) and the Derivatives Act (DA). The clearing rules are developed in a process that takes into consideration any concerns that stakeholders, and the clearing members may have.

The process of market consultation and discussion are one of the necessary procedures to be carried out in order to ensure that all related parties fully understand and their opinions are taken into account. Once the concept is agreeable, the official public hearing will be further conducted. Moreover, TCH carries out the appropriate legal analysis with SET legal Department and relevant authorities to certify that the rules, regulations, and procedures are consistent with relevant laws and can be enforced.

The proposal of the rule and regulation shall come into force upon approval of the Capital Market Supervisory Board which will consider the suitability based on the impact on stakeholders, fairness, and transparency.

Before enforcing, TCH will inform and make clear to all members and related parties the general concept and detailed contents of the rules and regulations before launching rules.

1.3 An FMI should be able to articulate the legal basis for its activities to relevant authorities, participants, and, where relevant, participants' customers, in a clear and understandable way.

Comprehensive information regards to TCH such as company profile, roles and responsibility, laws governing TCH's activities are clearly and publicly described in TCH website. Further, in the website, laws, regulations, rules and procedures governing the operations and the activities of TCH are also provided in rules and regulations section and since all of these materials are publicly available in website, all parties including relevant authorities, members, settlement agents, and their customers are accessible to obtain the information.

From time to time, TCH also releases statements, if necessary, to help public understand the legal basis and also explains it to the relevant regulators, either BOT or SEC in various forms i.e meeting documentation or letter of clarification.

Further, the related public authorities' regulations are also available to the general public on the websites of the Ministry of Commerce (MoC), the Securities and Exchange Commission (SEC) and the Bank of Thailand (BOT).

1.4 An FMI should have rules, procedures, and contracts that are enforceable in all relevant jurisdictions.

There should be a high degree of certainty that actions taken by the FMI under such rules and procedures will not be voided, reversed, or subject to stays.

Clearing and settlement activities in Thailand are governed and regulated by provisions in many legislations and regulations. The main laws and regulations are:

- The Civil and Commercial code
- The Public Company Act B.E. 2535
- The Securities and Exchange ACT B.E. 2559
- The Payment system ACT B.E. 2560
- The derivatives Act B.E. 2546
- The notifications, rules, and regulations issued by (SET), and the TCH
- The agreement between members and the TCH
- BATHNET Rules and Regulations B.E. 2549
- The Bankruptcy Act B.E. 2483

Generally, the contractual arrangements between TCH and its members are fully enforceable under the Civil and Commercial code. In particular, each member, who signs a contract with TCH, is bound to the TCH regulations. So, TCH regulations can be enforced through legal action. In the insolvency event, SEA and DA provide enforceability of the TCH clearing rules to achieve a high degree of certainty that its rules, procedures, and contracts will not be voided, reversed or subject to stays, even in the event of a bankruptcy of members or TCH itself. Thus, the insolvency of TCH's member will therefore not disrupt the clearing and settlement of transactions, including any applicable collateral arrangements.

By these reasons, there are no concerns on conflict of laws. Further, so far, no court case relevant to others jurisdiction has yet occurred.

1.5 An FMI conducting business in multiple jurisdictions should identify and mitigate the risks arising from any potential conflict of laws across jurisdictions.

Presently, TCH has been operating in Thailand only. So, there is only domestic jurisdiction for operating as a CCP. There is no business conducted in other jurisdictions nor with any entity incorporated under foreign jurisdiction.

## Principle 2

### Governance

*FMI should have governance arrangements that are clear and transparent, promoting the safety and efficiency of the FMI, and supporting the stability of broader financial system, other relevant public interest considerations and objectives of relevant stakeholders.*

#### Key consideration

2.1 FMI should have objectives that place high priority on FMI safety and efficiency, and explicitly support financial stability and other relevant public interest considerations.

TCH was established under the SET group, with the purpose to become the sole clearing house for all products traded on SET and TFEX. For such objectives, TCH develops and promotes continuous and seamless CCP services to the market with safe operation, efficient clearing facilities that comply with the SEA and DA, and also the notifications issued by SEC. Thus, TCH is required to taken into account financial stability and public interest;

To move forward, TCH establishes clear strategies and a mission to increase competitiveness and improve capabilities. In addition, TCH regularly reviews its financial strength, operational procedure, and risk management to ensure its commitment to providing highly reliable clearing and settlement services for all members.

2.2 FMI should have documented governance arrangements that provide clear and direct lines of responsibility and accountability. These arrangements should be disclosed to owners, relevant authorities, participants and the public in general.

#### Governance Arrangement of TCH

- Under the umbrella of SET group, the government arrangement is set up into two tiers. The first one is SET Group's governance. TCH as SET's subsidiary must follow and implement the group's key governance policies including, but not limited to, accounting principles, IT security procedure, risk management framework of the SET group ( where applied) , corporate governance policy, the appointment of the external auditor and the protocol of their remuneration and will be under the oversight of the SET Group's related committees as well as being assessed

by SET's internal functions such as Internal Audit and Enterprise Risk management Department. The reporting line of the management is set up and documented as agreed by SET/TCH's board and executive management.

- TCH Board members are comprised of professionals from securities, derivatives, and related businesses including risk management. One-third of the TCH Board members are independent persons which follows the clear definition of independent persons in SEC regulations. Mainly, TCH board is obliged to overlook overall TCH policies and operations including approval of clearing rules and regulations of CCP business conduct.

Be noted that the responsibility and accountability of TCH's board together with the names of all board of directors, Corporate Governance Policy, and Code of Conduct for TCH's directors (Board Charter) are clearly and publicly stated in the website.

Besides, TCH also requires SET's department (Internal Audit and Enterprise Risk Management) to directly report TCH's business performance, monitoring results and material findings directly to TCH board.

- In addition, to preserve the integrity and fairness of clearing procedures, TCH has established sub-committees to consider relevant issues as follows:
  - Risk Management sub-committee shall determine the risk management policy for the clearing and settlement, or in accordance with the type of members, or the type of collateral, in order to promote and develop efficient risk management.
  - Business Conduct sub-committee has responsibility in considering offenses and disciplinary actions of members.
  - Appeal sub-committee has responsibility in considering and appealing decision of members.

### **Accountability**

- SET and its subsidiaries, including TCH, aim to conduct its business with the principles of good corporate governance in accordance with international standards by applying the principles of good corporate governance of the Organization for Economic and Co-operation Development (OECD) as main principles to enhance the confidence in the organization, transparency in the performance of work and capability for competitiveness, and to take a leadership role for other organizations in Thai capital market. Additionally, TCH also applies clearinghouse's related standards such as Principles for Financial Market Infrastructures (PFMI) and European Market Infrastructure Regulation (EMIR), etc.

- For best practice on stakeholders, TCH is committed to conduct business with all stakeholders based on fairness in accordance with relevant laws and standards. TCH will not violate the rights of the stakeholders, and recognize the ownership and rights in intellectual property of others. TCH also provides the channels for stakeholders to express their constructive opinions or suggestions for improvement.
- TCH discloses any information to stakeholders transparently, sufficiently and appropriately. The treatment of all groups of stakeholders is outlined in the Code of Conduct of the TCH and publicized in the website.

2.3 The roles and responsibilities of FMI board of directors (or equivalent) should be clearly specified and there should be documented procedures for its functioning, including procedures to identify, address and manage member's conflicts of interest. The board should review both its overall performance and the performance of its individual board members regularly.

#### **Composition of TCH board**

Apart from SET group management person, they are also comprised of professionals from securities, derivatives, and related businesses including risk management and also independent directors as stipulated by in SEC regulations.

#### **Roles and responsibilities of TCH Board**

- Establish TCH's strategic policies and supervise of its operation as a service center of settlement for SET, mai, and TFEX.
- Stipulate clearing house rules in order to support the business and manage each risk that may have a significant impact on its operations.
- Ensure that there are effective internal control and audit system.
- Prescribe scope of policy for risk management on a regular basis and review its appropriateness as well as defining policy on business continuity management and setting a plan for recovery or orderly wind-down.
- Ensure that there is financial information in according with the accounting standard which can be disclosed and reflects the true operating result of TCH.
- Consider framework for TCH investment policy and asset maintenance by taking into account the financial stability of the settlement system.
- Prepare rules on good business management which covers the prevention and management of conflict of interests.



- Assign and delegate authority to management as appropriate. In case where the prompt judgment or quick actions are required to protect the CCP.

In summary, TCH Board has power and duty to conduct the company's business in order to be aligned with objectives, rules and shareholders' resolutions with duty of care and loyalty, additionally the board must act for the company's best interest. The mentioned role and duty are publicized on the website and is reviewed regularly.

### **Performance review**

TCH's Board of directors perform the assessment of the entire Board work performance at least once a year to promote good corporate governance and to consider the work result, problems and obstacles confronted during the preceding year in order to enhance the effectiveness of the Board and management team's performance.

### **Policy on conflict of interest**

- In carrying out duties independently and in an impartial manner. The SET governors, committee members, experts, and its subsidiaries are required to sign a Letter of Intent on Impartiality every time they are appointed or given a special task, to confirm that they will conduct duties in line with good corporate governance and have no direct or indirect interest in the consideration of the matter. Wherever they have any direct or indirect interest in the consideration of the matter, they are required to notify the parties concerned in advance of each potential conflict of interest, as well as to abstain from participating or voting in the particular matter under consideration.
- SET group expects that all employees will act in the interests of the exchange, without favor or preference based on possible direct or indirect personal gain
- It should be emphasized that TCH, although wholly owned by SET, has committed to operate business with all stakeholders based on fairness and the best interest of CCP in accordance with relevant laws and standards, some evidences are as follow:
- TCH has its own CG Policies and Code of Conduct which applies the principles of good corporate governance of the Organization for Economic and Co-operation Development (OECD) as main principles, and approved by TCH's Board.
- TCH applies clearinghouse's related standards i. e. , Principles for Financial Market Infrastructures (PFMI) and European Market Infrastructure Regulation (EMIR)
- In the process of rules stipulation, TCH shall propose the conceptual view of business model to TCH's Board for approval, then arrange Hearing Forum for gathering members' and related

participants' opinions prior to submitting to the Capital Market Supervisory Board of SEC (Regulatory Authority) ("CMSB") for approval and enforcement. In case that the Hearing result has turned out to the contrary, such conceptual business model shall be re-evaluated and re-proposed to TCH's Board and member hearing for consideration, then submitted to the CMSB

- Under the supervision of the SEC and CMSB, TCH is audited by the SEC on regular basis in order to ensure that TCH operations still fully comply with laws and regulations.

### **Sub-committees**

TCH has established sub-committees to assist TCH board in the relevant issues as follows:

#### **1. Risk Management Sub-committee**

Risk Management Sub-Committee have the following duties,

- (1) to determine the material policy and principles with respect to risk management of TCH, for instance, the qualifications of the TCH members, maintenance of TCH's membership qualifications, collateral or margin requirement, and also the sufficiency of the funding source, etc.
- (2) to consider a proposal, or acknowledge and monitor the result of the risk management
- (3) to provide advice and views in relation to the improvement and resolution of any problems or difficulties in risk management
- (4) Report the operating result of risk management to TCH board

#### **2. Business Conduct sub-committee**

Business Conduct Sub-Committee has responsibilities to consider the offense and impose disciplinary action against any person who commits or involves in the violation of the regulations of TCH;

#### **3. Appeal Sub-committee**

Appeal Sub-committee has responsibility to consider and make decisions on an appeal in order to propose its opinion concerning the appeal to the Board for further consideration and instruction.

The composition of Risk Management Sub-committee Business Conduct sub-committee and Appeal Sub-committee as well as their duties are mentioned in TCH's regulations and provided on the website.

2.4 The board should contain suitable members with appropriate skills and incentives to fulfill its multiple roles. This typically requires the inclusion of non-executive board member(s).

The composition of TCH Board above has been in alliance with the criteria given by SEC rules, as summarized below:

- Chairman of the Board
- Executive directors
- Independent directors, who have knowledge of and experience in the capital market or knowledge and experience useful for the operation of the clearing house. (The number shall be at least one third of the total number of directors, which shall not be less than two.)

The independent board members shall not have any of the followings:

- (1) being an executive, staff, employee, or consultant of the securities clearinghouse or used to hold such positions unless the term has ended for at least two years as of the date of appointment as an independent committee member
- (2) being a committee, executives, staff, or taking part in the management of clearinghouse member
- (3) being a shareholder with controlling power of clearinghouse or central depository
- (4) being unable to provide an independent opinion for the operation of a clearinghouse or central depository.

As TCH's remuneration policy is set in accordance with SET Group, it is subject to the Nomination and Remuneration Committee (NRC) and shall be finally proposed to TCH's company stockholder meeting for formal approval. To avoid conflict of interest, any committees or persons who receive the meeting allowance shall not involve in the determination process of such remuneration.

To incentivize and contain suitable board members with the appropriate skills, the annual performance assessments of the chairman and other are conducted as a whole group to promote good corporate governance and to consider the work result in order to enhance the effectiveness of the Board and management team's performance.

2.5 The roles and responsibilities of management should be clearly specified. FMI's management should have appropriate experiences, a mix of skills and the integrity necessary to carry out their responsibilities for FMI's operation and risk management.

According to The Charter of the Board of Directors of TCH, TCH Board has the power and duty to manage the company's business in accordance with its objectives, Articles of Association and



resolutions of the shareholders' meetings, while exercising duty of care and loyalty and bearing in mind the Company's best interests. Their duty is identified below;

- Prescribe policy and operation plan, and supervise the Clearing House in its operation of service business
- Prescribe clear rules in relation to the provision of service as the Clearing House
- Ensure that there are in place effective internal control system, and effective independent audit system
- Prescribe scope of policy for risk management, business continuity management, recovery or orderly wind-down of the CCP.
- Ensure that there is financial information in place which can be readily disclosed in accordance with the accounting standard
- Prescribe framework for the Company's investment policy and maintain the assets acquired or possessed for the members, considering the liquidity, investment risk and possible impact on the stability of the settlement system.
- Arrange for the preparation of rules on good business management, which covers policy on conflict of interests, fraud, and misconduct, as well as confidentiality of information.
- Delegate certain powers of undertaking to the management team as appropriate.

At the management level, TCH executive managements' qualifications have been clearly specified in Job Description together with, roles and responsibilities. TCH appoints executive managements who have knowledge of and experience in the capital market or knowledge and experience useful for the operation of the clearing house. At present, SET's chief operating officer acts as TCH managing director. While, at the operation level, TCH staffs are outsourced from SET to be fully dedicated for CCP. TCH clearly evaluates the performance of the executives and staffs according to CCP's KPI where the financial integrity and efficiency is critical.

In order to manage conflict of interest, there is a ground of legal basis and enforceability on TCH's managements and staffs in order to guarantee that they will balance their performance even though they are delegated or outsourced from SET to ensure that they will serve the best for the interest and integrity of CCP. Moreover, TCH is audited by SET's internal audit (IA) at least once a year and the audit result is required to be reported to the SET's Audit Committee, TCH's Board, and the SEC to ensure an efficient and transparent manner of TCH operation.

2.6 The board should establish a clear, documented risk-management framework that includes the FMI's risk-tolerance policy, assigns responsibilities and accountability for risk decisions, and addresses decision making in crises and emergencies. Governance arrangements should ensure that the risk-management and internal control functions have sufficient authority, independence, resources, and access to the board.

#### **The governance structure of risk management**

- Regarding the governance structure, comprehensive risk management framework of the whole SET Group and appropriate scope of risk management are determined by The Board of Governors of the SET, SET Risk Management Committee (RMC), and SET risk management department.
- As a SET group's subsidiary, TCH must comply with risk management framework of the whole SET Group, including risk appetite and risk tolerance policy addressed by Risk Management Committee (RMC). Risk management department of SET is responsible for facilitating enterprise risk management of TCH to ensure that key risks are monitored and managed at acceptable level and risk management procedures are performed according to the policy and framework. In addition, to assess the appropriation of the risk management of CCP model, SET risk management department, which is an independent entity from TCH, will review and perform full validation of CCP risk models at least annually.
- For TCH itself, to accommodate risks posed from CCP operation. TCH additionally has its own governance structure of risk management which is consisted of TCH Board, TCH Risk Management sub-committee, and TCH risk operation development department (RODD).
- As a CCP, TCH has TCH Risk Management sub-committee to determine and provide views on the material policy with respect to risk management of CCP as well as reporting the operating result of risk management to TCH board. TCH also has the RODD to formulate risk models according to the predefined risk framework. Apart from this, TCH has designated clearing operation departments, both derivative and equity, to monitor the risk exposure according to the predefined models.
- In order to make sure of independence on CCP's risk management, TCH risk management sub-committee is separately set apart from the regular SET's and TCH's operation line of command. TCH's Risk Operation Development department (RODD), reported directly to TCH managing director, acts as the secretariat of TCH risk sub-committee

## Management on CCP Risks

- The TCH risk management framework has been established and approved by TCH Risk Management sub-committee and TCH Board. The framework includes key risk components such as strategy risk, operational risk, financial risk and compliance risk etc., risk management policy, corporate risk appetite and risk tolerance, roles and responsibilities for risk management in every level, process of enterprise risk management, as well as examples of risk management measure.
- Regarding SEC regulation, it requires TCH to conduct regular reviews of such framework and measures to ensure that they are appropriate. Thus, TCH risk framework is reviewed at least on annual basis and approved by TCH board of directors.
- Besides, TCH also has Business Continuity Management (BCM) policy to cover emergency response, decision-making person, designated team, crisis management plan. Moreover, Disaster Recovery Plan (DRP) and recovery plan are also accommodated for handling systems, financial and operational risk. To ensure the efficiency of continuity, BCP and DRP are tested regularly, or at least once a year.
- In addition, TCH has prepared “CCP Offline”, the offline procedure for the extreme circumstance when no system available including all back-up sites, such procedure will enable TCH and clearing members to complete their clearing and settlement obligations with minimization of business impacts.

## Audit and Control

Apart from this, TCH risk management is also evaluated and audited by both internal auditor (two internal departments of SET) and external auditor, who is independent from TCH.

Internal units comprise of

- (1) SET Risk Management is responsible for evaluating the overall risk exposure of SET and its subsidiaries by formulating corporate risk profile and monitoring its compliance with the acceptable level of risk appetites, determined per the opinion of SET risk management committee. The results will be submitted to SET risk management committee, SET board, TCH Board and respectively.
- (2) SET Internal Audit consists of two teams
  - IT Audit is responsible for auditing in the area of technology risk, IT governance and the impact from new project development. The head of internal audits reports the audit results

to project steering committee, where is needed, before submitting the report to the audit committee.

- General audit undertakes the audit at least once a year in operational risk according to the corporate risk profile and previous comments from the audit report. The primary results of the assessment will be notified to executives and submitted to the audit committee. Furthermore, the general audit team also monitors whether the business units have taken any actions following their recommendations by checking the business units over every quarter.

All the updates and performances of the audit committee either tasks in process or accomplishments are subjected to be reported to the audit-committee, SET Board, and TCH Board respectively.

#### The external audit

The external audit is an independent auditor that performs the audit annually on operation guidelines and procedures of TCH. The report will be submitted to the audit committee (AC), TCH Board, and TCH's company stockholder respectively.

In addition, SEC also audit TCH regularly to ensure that TCH comply with risk management policy and rule, regulation, procedure that are approved by the SEC.

2.7 The board should ensure that the FMI's design, rules, overall strategy, and major decisions reflect appropriately the legitimate interests of its direct and indirect participants and other relevant stakeholders. Major decisions should be clearly disclosed to relevant stakeholders and, where there is a broad market impact, the public.

All TCH regulations are approved by the SEC under either the SEC Securities or Derivatives Act, rules or regulations of TCH shall come into force upon approval of the Capital Market Supervisory Board.

It should be noted that, before submitting for approval of rule amendment which may affect some stakeholders, TCH generally set-up focus groups with members or related parties to seek opinions/consultations.

In case that such design/rules amendments are risk related matters, TCH will propose to TCH risk-subcommittee which has clearing member representative, for consideration.

Once the concept of new development or operation amendment is reachable, it will be presented to TCH board for approval. If endorsed, TCH will perform a member hearing in a wider scope with

all relevant parties to gather all stakeholders' opinions and concerns before implementation. All new and amended rules must be submitted to SEC for approval. After SEC approval, TCH will circulate the rules to all parties in advance before the effective date.

## Principle 3

### Framework for the comprehensive management of risks

*An FMI should have a sound risk-management framework for comprehensively managing legal, credit, liquidity, operational and other risks.*

#### Key consideration

3.1 An FMI should have risk-management policies, procedures and systems that enable it to identify, measure, monitor, and manage the range of risks that arise in or are borne by FMI. Risk-management frameworks should be subject to periodic review.

#### Risks that arise in or are borne as a CCP of TCH

Being a CCP for all securities and derivatives traded on SET Group, TCH faces the major risks that can be classified into 4 areas as follows:

1. Strategic Risk which arises from making unsuccessful business decision making or from a failure to respond to changes in a business environment including disruptive technology. This risk also includes the general business risk.
2. Operational Risk which incurs from inadequate or improperly designed processes in operations that may hamper TCH from achieving the business objectives, e.g., data management, IT security, cyber-attack, and system failure.
3. Financial Risk composes of three major risks as follows,
  - i. Counterparty Credit Risk which arises from the failure of clearing members which are TCH's counterparties to meet their contractual obligations
  - ii. Liquidity Risk which arises from lack of liquidity when settlement due but may be able to fulfill the obligations in near future and also from liquidity pressure when liquidating collateral or position.
  - iii. Investment Risk which arises from the movement of financial assets' price that may affect TCH's investment portfolio value. It also includes custody risk which is the risk of loss on assets held in the custodian.
4. Compliance Risk arises from unintentionally non-compliance with regulations and from changing global regulation landscapes.

As described in Principle 2, TCH Board emphasizes the importance of risk management and has approved risk policies in accordance with SET group's risk management framework, including but not limited to COSO and ISO31000 to strengthen the confidence among involved parties as well as preserving the financial integrity of the clearing house and the whole market. Therefore, TCH set up the procedural operations to manage those risks as follows,

1. Strategic risk

- a. Strategic Risk: TCH conducts a SWOT analysis and strategy map to manage risks and also estimates the opportunity cost of missing the target.
- b. General Business Risk: TCH monitors, evaluates, and reports business progress together with financial status to the Board of Directors quarterly and also monitors and maintains shareholder's equity consistency with regulations.

TCH annually reviews and also projects budget in advance regarding future business plan to determine sufficient equity covering general business risk. Moreover, the plan to cover equity shortfall is concerned either with under TCH Board of Directors approval.

2. Operational risk

TCH performs risk and control self-assessment (RCSA) to identify, assess, control and mitigate the operational risk. TCH is also regularly inspected by internal and external auditors, including SEC. Moreover, TCH applies risk management tools to control and mitigate risks such as legal risks, business interruption risks, and IT risks, including cyber risks.

The procedures of formulating rules and regulations are reviewed by the legal department. To ensure consistency and enforceability under the relevant Thai laws, the appointed legal sub-committee shall provide independent legal advice and interpretation to the legal department if necessary. Moreover, prior to enacting the rules and regulations, a hearing session will be arranged to take account of interest of all related parties to ensure that all stakeholders fully understand it and are able to evaluate such rules and regulations' impacts. Along with the implementation, rules, and regulations will be disclosed to the public on the website.

For the operation procedures, there are operation manuals with the standard operating procedure (SOP) to mitigate the operational risk from human errors. Furthermore, the four-eye principle, segregation of duties, and reconciliation are applied to manage the risk of personnel and fraud either. TCH set out Business Continuity Plan (BCP) and Disaster Recovery Plan (DRP) with regular system testing to ensure that the business can continue during emergency or disaster

time. The BCP test also involve related parties such as broker, clearing member, depository participants, settlement banks, Bank of Thailand and TSD as a Central Securities Depository at least once a year.

For IT and cyber risks, data classification and restricted areas are in place to ensure that only relevant persons can access the working area and confidential data. To ensure no leakage of confidential data, data leakage monitoring is implemented with daily backed up in a secure off-site location. IT security policies are implemented for the clearing system of TCH to conform with the global best practice in terms of information security (ISO 27001). Currently, cybersecurity drills is scheduled to test annually, at least. Moreover, the clearing system has conducted penetration tests every year in spite of three-year requirement from SEC.

### 3. Financial risk

#### a. Counterparty Credit risk

TCH sets minimum shareholder's equity and the Net Capital (NC) as the financial requirement for clearing house member qualifications. Member's financial statements are required to submit regularly to let TCH closely monitor member's financial strength via its internal system compared to the early warning level.

TCH calculates member's risk exposures and collateral requirement in accordance with the portfolio risk-based margining system. Moreover, the clearing house provides financial resources consisting of clearing funds and SET reserve funds to absorb the potential loss in case of member default. The adequacy of financial resources is reviewed on daily basis regarding to stress testing to support in case of an extreme market scenario. Furthermore, TCH also performs reverse stress testing to evaluate the situation that may cause the deficiency of financial resources on daily basis either.

#### b. Liquidity risk

TCH estimates liquidity requirements and compares them with its liquidity resources which include, cash on hand and committed bank credit lines on a daily basis. The bank credit lines are estimated and reviewed regularly. TCH balances the appropriateness of liquid resources by performing and reviewing stress tests and applying reverse stress tests on a daily basis. In addition, TCH accepts only highly liquid and low-risk assets as collateral. The daily mark to market after the haircut is applied to collateral placed in the clearing system. TCH regularly revises haircut rates based on the volatility approach to cover extreme price movement.



c. Investment risk

TCH's investment policy is set out by TCH Board of Directors to manage investment risk by investing in low-risk and highly liquid assets and diversifying its portfolio into several qualified financial instruments. The investment proportion is limited to each financial institution and issuer to minimize the exposure affecting investment results. TCH also realizes and manages custody risk by diversifying custodians and keeping assets in TCH own account at the depository, TSD. TCH also regularly monitors the performance of the custodian and regularly conducts due diligence with fund management companies and custodian banks.

4. Compliance risk

TCH works closely with the regulators such as BOT and SEC and keeps regularly monitoring and reviewing any change in rules and regulations that regulated the clearing business. TCH also collaborates with regulators in regard to any change in legislation and regulations that may impact the CCP business. To prevent human error that may cause compliance risk, TCH employs Straight-Through-Process (STP) to generate and submit periodic reports to the regulators periodically as prescribed in the regulations. SET compliance department always monitors TCH's observance with regulated rules.

## **Risk management Framework of TCH**

### **Risk management policies, procedures and systems**

The Board of Governors of the SET stipulates appropriate enterprise risk management policy and risk management framework of the SET Group and follows up on the effectiveness of risk management on a regular basis. The SET Risk Management Committee (SET-RMC) considers and provides opinions on the enterprise risk management policy and enterprise risk management framework of the SET Group for proposal to the SET Board for approval. The SET Risk Management Department reports the risk management performance of SET Group to SET-RMC including the enterprise risk management of SET's subsidiary, TCH, while the TCH Risk Operation Development Department is designated to develop the risk model especially credit and liquidity risk and margin methodology to conform to international standards. Moreover, TCH Risk Operation Development Department also follows up and reports the risk management measures to the TCH Risk Management Sub-committee and the TCH Board of Directors on a regular basis.

The TCH Board of Directors is responsible for stipulating TCH risk management framework and risk management measures. TCH Board of Directors appoints TCH Risk Management Sub-committee to advise, supervise and recommend the risk management policy and framework focusing on procedures and models of clearing risks. The Risk Management Sub-committee also determines the material policy and principles with respect to risk management of TCH and also follows up on operations related to risk management to ensure compliance with the stipulated policy and principle. Furthermore, TCH risk framework is reviewed annually and must be approved by TCH Board of Directors.

3.2 An FMI should provide incentives to participants and, where relevant, their customers to manage and contain the risks they pose to the FMI.

TCH stipulates all margin types and methodologies used in calculating margin requirements in the regulations of TCH. The concept is summarized and published in TCH website. When there is a change in the calculation methodology, TCH will conduct member hearing prior they become effective. Since TCH applies SPAN methodology in calculating margin requirements, TCH provides all required data to enable member's replication and reconciliation such as Risk Parameter File "RPF", position in each instrument, and also SPAN related information. Members are able to retrieve the data through a system connected to TCH in a timely manner to facilitate the clearing member to manage its risks. According to TCH rules, clearing members are required to formulate and maintain their risk management procedures soundly and efficiently. They must evaluate and monitor their financial strength as well as their risk exposure on a daily basis.

As mentioned above, TCH provides the following information/reports to the clearing members;

- The securities clearing data- net clearing gross clearing settlement transaction;
- Securities list that are subject to fail delivery;
- The cumulative pending settlement obligations;
- Collateral call;
- Potential collateral call;
- Collateral valuation after haircut deduction;
- Derivatives positions and amendment transactions;
- Positions;
- Margin requirement;

- Asset Balances;
- Margin call;
- Clearing fund contribution;
- SPAN Risk parameters file “RPF” for margin requirement calculation. Members can simulate or calculate its portfolio’s margin requirement using RPF together with the SPAN application, called PC SPAN, powered by CME group for free-of-charge;

If the clearing members fail to fulfill its obligations towards TCH, TCH may take the following actions such as suspension of clearing right, closing out the position, more collateral requirements or liquidation of collateral, and enforcement of the payment from collateral. Fines will be imposed in cases where there are late payments by members to meet their settlement and margining obligations.

In the event that a member shall be deemed to be in default, TCH may use the financial resources to pay for the transaction under default in the following order:

- Margin/Collateral of defaulting member
- Security deposit of defaulting member (only applicable to derivatives market)
- Clearing fund contributed by defaulting member
- Clearing fund contributed by SET (first tier)
- Clearing fund contributed by non-defaulting members
- Clearing fund contributed by SET (second tier)
- Additional contribution (as an assessment or replenishment) (only applicable to the derivatives market)
- SET Reserve Fund (the contribution proportion of CCP, which is similar to the clearing fund contribution of other CCPs)

In addition, TCH also regularly conducts the inspection at member’s premises in order to ensure that they comply with TCH rules and regulations. Should the member not comply, TCH may take some disciplinary actions against such member.

3.3 An FMI should regularly review the material risks it bears from and poses to other entities (such as other FMIs, settlement banks, liquidity providers, and service providers) as a result of interdependencies and develop appropriate risk management tools to address these risks.

TCH regularly reviews the material risks with other respective entities, as follows

**Settlement bank:**

Settlement banks who provide the money settlement service for TCH also are the automatic liquidity providers. To prevent the risk associated with settlement banks, TCH sets stringent selection criteria for being settlement banks and requires settlement banks to submit financial statements to TCH. TCH regularly evaluates and monitors the financial strength and credit rating of the settlement banks semi-annually. The settlement banks' evaluation results are reported to TCH Board annually.

TCH adopts a net settlement model (BIS model 3) for both securities and fund settlement in order to reduce the risks that might pose to or from TCH. TCH has an access to the central bank system, called BAHTNET system, in order to ease the settlement of funds among settlement banks and custodian banks. The balance of netting among commercial banks, who are settlement agents, is carried out by the central bank's facilities. This process reduces a tremendous risk and provides the most efficient way of fund settlement. Please find detail in Principle 9 Money settlement.

**Custodian:**

TCH keeps assets in both TCH accounts at the Central Securities Depository, TSD and also at several custodians to diversify risks. The custodian bank's qualification is set up by the investment committee and approved by TCH Board of Directors. On regular basis, the custodian banks' qualifications will be reviewed and due diligence will be conducted. Please find detail in Principle 16 Custody and investment risks.

**Service provider:**

The main system of clearing and settlement process is developed by a well-known international software provider. As a SET group subsidiary, TCH shares IT resources that dedicate sufficient and qualified IT staff to operate the day-to-day operation. System performance is monitored in a real-time manner, and performance and capacity report is submitted to the executives monthly. The overall system review is conducted via meeting between IT and TCH executives on a quarterly basis. Should there is a software problem or incident, both business users and IT staff shall cooperate to discuss with the software provider to resolve problems. Moreover, such incident shall be reported to TCH Board of Directors on a quarterly basis. Please find detail in Principle 17 Operational risk.

3.4 An FMI should identify scenarios that may potentially prevent it from being able to provide its critical operations and services as a going concern and assess the effectiveness of a full range of options for recovery or orderly wind-down. An FMI should prepare appropriate plans for its recovery or orderly wind-down based on the results of that assessment. Where applicable, an FMI should also provide relevant authorities with the information needed for purposes of resolution planning.

TCH assesses the risk profile annually to identify which should be the critical scenario and identify a risk mitigation plan. The assessment covers 4 dimensions which are Strategic risk (e.g., Disruptive technology, General Business Risk, Systemic risk), Financial risk (e.g., Counterparty credit risk and Liquidity risk), Operational risk (e.g., Fraud, Cyber attack) and Compliance risk and several scenarios. Mostly, the critical scenario for TCH are default loss (Counterparty credit risk and Liquidity risk) and Strategic Risk.

To ensure smooth continuity of the critical functions when operational problems happen, the Business Continuity Plan (BCP) and Disaster Recovery Plan (DRP) are tested at least once a year. All scenarios for routine operations are given to be tested, as well as surprised incidents for every BCP test in order to make all concerned parties realize and know how to tackle the problems. In addition, in the extreme circumstance when no system is available including back-up and third site, TCH prepares an offline procedure called “CCP Offline”. Such procedures will enable TCH and clearing members to complete their clearing and settlement obligations with minimization of business impacts.

In order to make BCP test more realistic, TCH uses potential incidents or plausible critical events that may arise in operations and they may affect the end of the operation process or impede the successful operation process. Those plausible scenarios are critically reviewed by operation staff, risk management team, and top executives, to make BCP test very efficient. The executives also determine the recovery of all necessary crucial functions for the least recovery time and disaster.

In case TCH is seemed to be no longer viable as a result of the failure of plan implementation or disruption arising from other sources of risk, the recovery plan shall be triggered.

#### **Recovery or an orderly wind-down plan**

In the recovery plan, TCH has defined the specific tools serving different purposes. For example, obtaining liquidity from participants via contingent liabilities, using SET reserve fund, lessening dividend payout ratio, capital increase by shareholders, and change of risk management procedures are aimed to solve uncovered liquidity shortfalls and re-establish matched book. If the shortfall cannot be resolved, full contract tear down plan may be activated by the decision of TCH Board of Directors and the authority

## Principle 4

### Credit risk

*An FMI should effectively measure, monitor, and manage its credit exposures to participants and those arising from its payment, clearing and settlement processes. An FMI should maintain sufficient financial resources to cover its credit exposure to each participant fully with a high degree of confidence. In addition, a CCP that is involved in activities with a more complex risk profile or that is systemically important in multiple jurisdictions should maintain additional financial resources sufficient to cover a wide range of potential stress scenarios that should include, but not be limited to, the default of the two participants and their affiliates that would potentially cause the largest aggregate credit exposure to the CCP in extreme but plausible market conditions. All other CCPs should maintain additional financial resources sufficient to cover a wide range of potential stress scenarios that should include, but not be limited to, the default of the participant and its affiliates that would potentially cause the largest aggregate credit exposure to the CCP in extreme but plausible market conditions.*

#### Key consideration

4.1 An FMI should establish a robust framework to manage its credit exposures to its participants and the credit risks arising from its payment, clearing and settlement processes. Credit exposure may arise from current exposures, potential future exposures, or both.

The TCH has a robust risk framework to manage its credit risks outlined in the Rules and Procedures, which include, 3 following preventive measures applied to manage the credit risk of clearing members:

#### 1. Membership Qualification Standards and Financial Monitoring

To reduce the risk that a member will be unable to fulfill its obligations to TCH, or credit risk, TCH has established rigorous membership standards to ensure the creditworthiness of its clearing members and enforced each member's compliance with TCH's financial requirements continuously.

TCH's financial requirements are about shareholder's equity and net capital that members must maintain during the membership. The monitoring activities also include on-site inspection at the members' premises. In order to monitor, TCH also requires members to submit their financial statement including the net capital report to TCH on a monthly basis or on a daily basis if applicable for evaluating the creditworthiness of each clearing member. Please find detail in Principle 18 Access and participation requirements.

Regarding the financial status submission, TCH applies those financial data to monitor and analyze to ensure the members' financial strength in both the current stage and the possibility of insolvency. Moreover, the financial status is also reported to TCH executives and TCH board of directors on a monthly basis and a quarterly basis, respectively. In addition, the member is also required to submit internal audit and compliance reports that prescribe compliance in the member's back office system or operations or regulations and a report of an inspection result by the SEC once a year.

## **2. Collateralization and Margining**

TCH require members to place collateral in accordance with their credit exposure in each market to ensure that the clearing member honors its obligation and to safeguard against member's risk exposure.

In the securities market (SET and mai), TCH applies the cumulative pending settlement obligations of each member as a major source of exposure for evaluating current and potential losses occurred from the price movement of accumulated pending settlement securities, through the portfolio-based models, Value at Risk (VaR). Should the exposure exceed the threshold, the member must place the collateral to TCH.

For the derivatives market (TFEX), TCH calculates member exposures and requires that all members place maintenance margins in accordance with the SPAN margining system in order to cover potential losses that may be incurred within a certain period while the variation margin has been collected to cover actual losses based on daily mark-to-market outstanding positions at the end of the day. Furthermore, in a very volatile market, an intra-day margin may be collected from the member for further protection while TCH announces a super margin if necessary to prevent extreme events.

TCH only accepts assets which are highly liquid, low credit risk as collateral. Several types of assets are accepted as collateral:

- Cash (Thai baht and foreign currencies, US dollar, Yen, and Euro)



- Listed securities
- Domestic Government bonds and BOT bonds

### 3. Financial Resources

TCH established the clearing fund and other financial backing resources, SET Reserve Fund to manage the risks of the TCH and to strengthen confidence in the Thai capital market. Furthermore, to assure the integrity of the system, TCH assesses and monitors the sufficiency of such financial resources on a daily basis to ensure that the financial resource is sufficient to cover the credit exposures once a default of the two largest exposures clearing members has occurred under the stress scenarios. The back-testing is conducted to ensure the sufficiency of financial resources.

Besides, the SET has also set up the SET Reserve Fund to back up the potential exposures which may exceed the clearing fund, in the event of default. TCH reviews the suitable clearing fund contribution on monthly basis of both markets. TCH also reviews the risk framework annually which is approved by the TCH Board.

4.2 An FMI should identify sources of credit risk, routinely measure and monitor credit exposures, and use appropriate risk-management tools to control these risks.

TCH monitors its members' credit exposure intraday by applying the real time trading data directly received from exchanges' trading engine. At the end of the day, TCH also evaluates and monitors credit risks of members in each market to determine clearing members' exposure in both securities and derivatives market,

In securities market, TCH monitors members' exposure and requires collateral by using the portfolio-based model, Value at Risk. Moreover, each member's accumulated pending settlement obligation against its own net capital is also monitored. If the pending obligations exceed the threshold, TCH will call the margin from such members. This parameter is periodically revised on an annual basis. In terms of collateral, TCH accepts high liquidity such as cash, listed securities, and government bonds under the concentration limit for each instrument to limit credit exposure. TCH regularly monitors members' financial statements on monthly basis and their net capital on daily basis. In addition, if the member whose financial status is lower than the requirement, TCH will limit its clearing exposure as specified in rule and procedures.





For derivatives market, TCH calculates member's exposure and requires that all members place a margin in accordance with the SPAN margining system. Furthermore, TCH applies an intra-day margin call to further protect the clearing system. Real-time futures prices and positions are used to assess margin requirements and members must meet margin obligations. At present, TCH performs intraday margin, monitoring on an hourly basis. For intra-day margin placement, members are required to maintain the margin amount as specified by TCH within a specific time, currently, TCH sets at 2 hours after the margin is called. Like securities market procedure, the concentration limit for each instrument is applied to limit the credit exposure.

4.3 A payment system or SSS should cover its current and, where they exist, potential future exposures to each participant fully with a high degree of confidence using collateral and other equivalent financial resources (see Principle 5 on collateral). In the case of a DNS payment system or DNS SSS in which there is no settlement guarantee but where its participants face credit exposures arising from its payment, clearing, and settlement processes, such an FMI should maintain, at a minimum, sufficient resources to cover the exposures of the two participants and their affiliates that would create the largest aggregate credit exposure in the system.

This Key Consideration is not applicable to TCH because it is not a payment system or securities settlement system.

4.4 A CCP should cover its current and potential future exposures to each participant fully with a high degree of confidence using margin and other prefunded financial resources (see Principle 5 on collateral and Principle 6 on margin). In addition, a CCP that is involved in activities with a more-complex risk profile or that is systemically important in multiple jurisdictions should maintain additional financial resources to cover a wide range of potential stress scenarios that should include, but not be limited to, the default of the two participants and their affiliates that would potentially cause the largest aggregate credit exposure for the CCP in extreme but plausible market conditions. All other CCPs should maintain additional financial resources sufficient to cover a wide range of potential stress scenarios that should include, but not be limited to, the default of the participant and its affiliates that would potentially cause the largest aggregate credit exposure for the CCP in extreme but plausible market conditions. In all cases, a CCP should document its supporting rationale for, and should have appropriate governance arrangements relating to, the amount of total financial resources it maintains.



## I. Margining System

### Securities market

TCH has developed the Early Warning System as a risk management tool for clearing and settlement by establishing the model to calculate the current and potential loss arising from price fluctuation. TCH uses the cumulative pending settlement obligations of each member as the major source of exposure for evaluating current and potential loss occurred from price movement of accumulated pending settlement securities, through the portfolio-based models, Value at Risk (VaR) under a single-tailed 99% confidence level over a historical sampling period of 250 days, and three to five days liquidation period assumption depending on products. This margining system also allows for cross-margining between types of securities, it is related to the correlation between securities of a member's portfolio. The securities margin model is also subjected to approval by the SEC.

In addition, TCH evaluates risk exposure intra-day and end-of-day. During intra-day all outstanding pending settlements (including newly executed up to that point in time) will be subject to risk exposure. A margin call will be made to members if their risk exposure exceeds the specified threshold once a day. Member must complete collateral placement by time specified by TCH.

Moreover, TCH also limit members' total credit exposure compared to each member capital level. It is called "Settlement Cap" or its capability to settle which apply the netting pending settlement at no more than 8 time of its Net Capital level. If the accumulated pending settlement value exceed the Settlement Cap, such member must place the collateral or reduce its pending settlement value.

TCH accepts all listed securities, Thai government bond, BOT bond and cash in Thai Baht as a collateral. TCH also apply appropriate haircut rate for each type of asset to protect the price fluctuation of the collateral.

### Derivatives market

TCH calculates member exposures and requires that all members place collateral in accordance with the margining system. TCH applies the SPAN models to determine the margin requirement. TCH performs a margin call for both intraday and end of day. TCH also monitors volatility and movement of market and announces its revised margin rate on a regular basis. On top of that, TCH also reviews parameters for the robustness of the model regularly. The derivatives margin model is also subjected to approval by the SEC.



The derivatives margin model is risk-based and comprises maintenance, variation, and additional margin. The maintenance margin is used to cover potential losses that may arise within a certain period while the variation margin has been collected to cover daily mark-to-market losses. The required margin amount will be collected from members on the next business day before the market opens. Additional margins which are super margin, concentration margin and uncovered margin have also been imposed to cover any other potential losses.

The objectives for each margin type are as follows;

Margin types	Objectives
1. Maintenance margin	To cover potential losses that may be incurred by daily volatility of derivatives prices with 99% confidence level. TCH also set the minimum variance threshold to stabilize the maintenance margin rate.
2. Variation margin	To mark-to-market the margin in each account by using actual price changes to realize profit or loss on a daily basis, thus avoiding the accumulation of losses based on outstanding positions.
3. Additional margin	
3.1 Super margin	To cover price volatility of the world commodity products i.e., foreign currency, rubber, and gold that might be incurred during the period that TFEX's holidays for a certain consecutive period, currently more than 2 business days.
3.2 Concentration margin	To cover market liquidity risks due to the concentration of position by a particular member. Member will be margin called when its required maintenance margin is higher than prescribed level.
3.3 Uncovered risk margin	To cover potential losses that may arise when a single member or the top two highest stress members larger than the designated amount.

TCH collects intra-day margin calls during the trading session which calculated only maintenance margin and variation margin are calculated. At any cycle, margin calls will be made to the member whose collateral is insufficient to meet their margin requirements. The TCH rules require the member to make and complete payments of margin within 2 hours after getting a notification from TCH. In the case where the collateral is called by the end of the day, the member must deposit its collateral before the market opens or by 9.00 am of the next business day.



## II. Financial resources

To manage the risks of TCH and to strengthen confidence in the Thai capital market, TCH has also established a clearing fund for derivatives clearing and securities clearing separately, to cover potential losses that could arise from a member's default that may surpass the margin collateral that TCH has collected from the member. Clearing members are required to pay initial and monthly contributions to the clearing fund at rates that depend on the potential risk of each member. TCH reviews each member's exposure and revises each member's contribution amount on a monthly basis.

SET also contributes to the clearing funds and, in addition, has solely contributes to the SET reserve fund to back up TCH for clearing and settlement purposes in the event that the exposure of defaulting members may exceed the clearing fund.

TCH evaluates its financial resources (both clearing fund and SET reserve fund), to assure that those resources are able cover the two largest exposures of defaulters under extreme but plausible market conditions. TCH evaluates the appropriateness of total financial resources on quarterly basis. Furthermore, to assure the integrity of the system, TCH conducts stress testing of each clearing members' outstanding positions and obligation on a daily basis to verify that the financial resources are adequate to cover the two largest exposures defaulting members in potential stress situations.

- 4.5 A CCP should determine the amount and regularly test the sufficiency of its total financial resources available in the event of a default or multiple defaults in extreme but plausible market conditions through rigorous stress testing. A CCP should have clear procedures to report the results of its stress tests to appropriate decision makers at the CCP and to use these results to evaluate the adequacy of and adjust its total financial resources. Stress tests should be performed daily using standard and predetermined parameters and assumptions. On at least a monthly basis, a CCP should perform a comprehensive and thorough analysis of stress testing scenarios, models, and underlying parameters and assumptions used to ensure they are appropriate for determining the CCP's required level of default protection in light of current and evolving market conditions. A CCP should perform this analysis of stress testing more frequently when the products cleared or markets served display high volatility, become less liquid, or when the size or concentration of positions held by a CCP's participants increases significantly. A full validation of a CCP's risk-management model should be performed at least annually.



## I. Stress testing

To ensure sufficient financial resources when there is a default from members, TCH performs stress tests for the securities market and derivatives market separately on a daily basis. The stress scenario of each market is based on the extreme but plausible market movement. These stress scenarios comprise both historical price changes and hypothetical scenarios. The plausible market conditions to make stress scenarios have included the peak historical movements in percentage price changes, interest rate movement and volatility over the specific period of time. The exposure from stress testing will be compared with TCH's financial resource. If the exposure is greater than the TCH financial resources, the additional collateral will be called from the member to cover such risk. In addition, the stress test result is regularly reported to TCH management. TCH also reports stress test and reverse stress test result to the risk sub-committee, TCH board and the SEC on a quarterly basis.

## II. Review and Validation

To ensure the appropriation of TCH risk management model, SET's risk management department, which is an independent entity from TCH, will review and perform full validation at least annually. SET's risk management department estimates probability of default and expected loss of each member to validate risk model. The loss distribution under the probability bucketing approach is applied to validate the model. The validation result will be reported to TCH board of director. TCH also reports highlighted clearing and settlement statistics and key risk exposures to the TCH's Risk Management Sub-Committee, TCH board of directors and also SET board of directors on a quarterly basis.

- 4.6 In conducting stress testing, a CCP should consider the effect of a wide range of relevant stress scenarios in terms of both defaulters' positions and possible price changes in liquidation periods. Scenarios should include relevant peak historic price volatilities, shifts in other market factors such as price determinants and yield curves, multiple defaults over various time horizons, simultaneous pressures in funding and asset markets, and a spectrum of forward-looking stress scenarios in a variety of extreme but plausible market conditions.

## I. Stress testing

### Securities market:

TCH conducts stress testing in two scenarios:

1. Forward-Looking and Hypothetical Scenario: Conditional Value at Risk (Expected Shortfall) with 99% confidence is applied. This technique will help to estimate the losses observed outside the confidence interval, in the tail of the distribution or it is an average of tail loss that exceed 99%.
2. Peak Historical Scenario: The maximum SET index movement in one day. Currently, it is set at 15% as an extreme price move for each securities which is the peak historical movements since establishment. In order to performing stress test, TCH will apply the stress test scenario into each securities.

### Derivatives market:

The stress scenarios comprise both historical price change and hypothetical scenarios. The plausible market conditions in stress scenarios have included the peak historical price, interest rate movement, and volatility movement. These stress tests are set out to 8 scenarios according to the change of 3 following factors:

1. Price Change – the maximum percentage price change over the 10-year lookback period which is adjusted to reflect the current market condition. The maximum price change which is adjusted by the current market condition is reviewed on daily basis. The maximum price change is different in each product base on their historical data.
2. Market volatility - the projection of possible market volatility is estimated base on 99.99% confidence level.
3. Change of yield - the highest change of interest rate within a day. Currently, TCH has set this parameter at  $\pm 1\%$  per year.

The following table illustrates all stress scenarios for the derivatives market

Scenario	Price Change	Market Volatility	Yield Change
Scenario 1	Up	Up	Up
Scenario 2	Up	Up	Down
Scenario 3	Up	Down	Up
Scenario 4	Up	Down	Down
Scenario 5	Down	Up	Up



Scenario	Price Change	Market Volatility	Yield Change
Scenario 6	Down	Up	Down
Scenario 7	Down	Down	Up
Scenario 8	Down	Down	Down

Stress testing is conducted on a daily basis. Not only does TCH evaluate stress test separately for securities and derivatives, but TCH also calculates stress test based on net positions of client accounts and proprietary account separately and it is also performed under product level. Then the stress loss is the highest stress exposures from those eight scenarios. The two highest stress loss will be selected to compare with the financial resource. Should the exposure be greater than the TCH financial resource, such member is required to place the additional collateral to cover such risk by a specific time set by TCH.

## II. Reverse stress testing

TCH performs a reverse stress test on a daily basis to evaluate the situation that may cause the deficiency of financial resource. The reverse stress test scenarios for credit risk are described below

	Securities Market	Derivatives Market
Scenario 1: Price	Maximum price change that financial resources can cover.	The additional maximum price change from the stress scenario that financial resources can cover.
Scenario 2: the number of members	Maximum number of defaulting members that financial resources can cover.	

- 4.7 An FMI should establish explicit rules and procedures that address fully any credit losses it may face as a result of any individual or combined default among its participants with respect to any of their obligations to the FMI. These rules and procedures should address how potentially uncovered credit losses would be allocated, including the repayment of any funds an FMI may borrow from liquidity providers. These rules and procedures should also indicate the FMI's process to replenish any financial resources that the FMI may employ during a stress event, so that the FMI can continue to operate in a safe and sound manner.



### **Allocation of credit losses**

Currently, the default waterfalls of both securities and derivatives are able to cover the stress loss of the two largest members. TCH rules and regulations clearly state the procedures and process when there is member fails to fulfill its obligation. The rules also determine that if the collateral or margin from the defaulting member is insufficient to cover credit loss, the clearing fund will be drawn in part from defaulting member. After that, the SET Clearing Fund is used as skin in the game. The utilization of the financial resources (default waterfall) is clearly specified by each market as follows:

#### The default waterfalls in Securities market

1. Collateral of defaulting member
2. Clearing fund contributed by defaulting member
3. Clearing fund contributed by SET (first tier)
4. Clearing fund contributed by non-defaulting members
5. Clearing fund contributed by SET (second tier)
6. SET Reserve fund

#### The default waterfalls in Derivatives market

1. Margin of defaulting member
2. Securities deposit of defaulting member
3. Clearing fund contributed by defaulting member
4. Clearing fund contributed by SET (first tier)
5. Clearing fund contributed by non-defaulting members
6. Clearing fund contributed by SET (second tier)
7. Additional contribution (assessment and replenishment)
8. SET Reserve fund

Currently, for derivatives market, TCH can make an additional call from members to cover loss or replenish the depleted financial resources used in the default event. The cash call is capped at one time of each member's clearing fund contributions.

### **Returns of financial resources**

As specified in TCH's rule, the defaulting members are obliged to return TCH financial resources. TCH may charge interest or penalties arising from utilization of these assets to the defaulting member. After the default member's repayment is received, these funds shall be allocated in the following order:





Securities market

1. SET Reserve fund
2. Clearing fund contributed by SET (second tier)
3. Clearing fund contributed by non-defaulting members
4. Clearing fund contributed by SET (first tier)
5. Clearing fund contributed by defaulting member

Derivatives market

1. SET Reserve fund
2. Additional contribution (assessment)
3. Clearing fund contributed by SET (second tier)
4. Clearing fund contributed by non-defaulting members
5. Clearing fund contributed by SET (first tier)
6. Clearing fund contributed by defaulting member
7. Securities deposit of defaulting member

## Principle 5

### Collateral

*An FMI that requires collateral to manage its or its participants' credit exposure should accept collateral with low credit, liquidity, and market risks. An FMI should also set and enforce appropriately conservative haircuts and concentration limits.*

#### Key consideration

5.1 An FMI should generally limit the assets it (routinely) accepts as collateral to those with low credit, liquidity, and market risks.

TCH accepts assets that are highly liquid and low risk as collateral. Moreover, the assets shall not be subject to the derogation of rights by any person. In the rules and regulations, TCH specifies various types of acceptable collaterals, such as cash both THB and specific foreign currencies, government bond, and listed securities. However, in securities market, TCH allows cash in terms of THB only, while derivative market accepts US Dollar, Euro and Japanese Yen in addition to THB.

To manage the market risk on some types of allowed collateral, TCH sets the concentration limits for each instrument of securities and bonds as the highest amount of accepted collateral for Securities and Bonds with respect to their daily average trading volume or the issued size. This concentration limit is reviewed on quarterly basis and announced in advance to all members the specific quantity per instrument. Once the announcement takes effect, the deposited quantity will be real-time monitored which means there is no chance to breach the limit at all times.

During the period before the new limit takes effect, it is possible that the securities/bonds deposited as collateral in both markets exceed the upcoming thresholds. In this case, TCH shall notify all members who deposit such securities to withdraw or change the collateral within the pre-defined period in advance of effective date. If the members don't take any action by the effective date, TCH will force the members to lower the deposit quantity to the prescribed threshold by randomly selecting member to withdraw such exceeding quantity.

To mitigate possible specific wrong-way risk and limit potential adverse price effects at liquidation, TCH has the rule to not accept the securities from clearing members who also are the issuer or related company of that securities.

5.2 An FMI should establish prudent valuation practices and develop haircuts that are regularly tested and take into account stressed market conditions.

### **I. Valuation practices**

TCH evaluates the value of collateral by marking-to-market on daily basis but not limit to only once a day. The mark-to-market price of each collateral type is mainly derived from publicly disclosed price as follow:

- Foreign currency; i.e. US Dollar, Euro and JP Yen; are marked to market by official exchange rate announced by the Bank of Thailand
- Listed securities are marked to market by closing price of securities on SET. In case, there is no trading of such securities on the date of calculation, TCH will use the best bid price as a market price
- Government bonds and the Bank of Thailand bonds are marked to market by using reference price of fair value of bonds, issued and disseminated by Thai Bond Market Association (ThaiBMA)

In the case that the securities have been suspended from trading by its trading venue, TCH shall not value the asset or set the value of that securities to zero. This mechanism conservatively helps TCH from overvaluing such asset that is unable to liquidate.

Since all of the accepted collateral are valuation using price information from the reliable sources, TCH does not use its discretion to value the asset. Unless there is no price delivered from the source on a specific day due to some problems e.g. technical issue, the previous day price shall be used instead.

For those financial assets except cash in terms of THB, TCH also applies the rate of haircut in evaluating the total amount placed collaterals.

## II. Haircutting Practices

TCH determines haircuts rate based on the volatility approach. The rates are divided into three groups of assets.

1. Foreign currency haircut (USD, EUR, JPY)
2. Listed Securities haircut (Stock Listed in SET and mai)
3. Bond haircut (Government Bond and the Central bank Bond)

The haircut rates are calculated based on the Value at Risk (VaR) methodology which can be undertaken in two ways depending on the distribution of each asset return:

- Value at Risk with Normality;
- Value at Risk with Extreme Value Theory- to cover extreme price movement over the sampling period.

Due to the VaR calculations are conducted on individual stock, to determine representative haircut rate in each group, TCH will select the representative VaR value that ensure it can cover the majority of risk. The determination applies a long look back period that can capture the tail risk which may be considered sufficient in stressed conditions. Moreover, for holding period or liquidation period that might affect the asset prices in risk model, TCH uses a three-day holding period for foreign currency, a three or five-day holding period for listed securities depending on the group of securities, and a ten-day holding period for bonds.

Furthermore, TCH also performs backtesting. If the specified rates are insufficient to cover price movements, TCH will, therefore, apply a buffer to the haircut rate depending on the market conditions.

The haircut rates for all types of collateral are reviewed on a quarterly basis. Nevertheless, the review can be conducted more frequently to align with the current market situation.

To mitigate possible specific wrong-way risk and limit potential adverse price effects during the collateral liquidation period, TCH may not accept the securities from clearing members who also are the issuer or related company of that securities. In addition, for securities market, if the selling member wants to deliver traded securities or its obligation before the settlement cycle which is T+2, TCH may accept and value it based on market price without applying a haircut as it will be treated as early delivery and TCH will automated deliver such securities to the buying member at settlement time on T+2. TCH will not expose any market risk on such securities because the securities that

the selling member is obligated to deliver are already in the TCH account at TSD prior to the settlement time.

5.3 In order to reduce the need for procyclical adjustments, an FMI should establish stable and conservative haircuts that are calibrated to include periods of stressed market conditions, to the extent practicable and prudent.

The collateral haircut calibration is regularly determined to be appropriate to its characteristics of assets or collateral. In order to reduce or avoid the procyclical adjustments for haircut rate, TCH has already incorporated the stress market condition.

In practice, TCH estimates the haircuts to cover extreme price movement and also perform back testing. If the specified rates are insufficient to cover price movements, haircut rates will be adjusted. Thus, the establishment of haircut rate calibration has been stable and conservatively considered. Please find details in Key Consideration 2.

5.4 An FMI should avoid concentrated holdings of certain assets where this would significantly impair the ability to liquidate such assets quickly without significant adverse price effects.

TCH put in place many prudent norms to ensure that there is no concentration of holdings in few assets. Most of acceptable assets are highly liquid and low risk. However, TCH also sets the concentration limits for each securities and bonds to avoid concentrated holding, as below;

- Securities: not exceed 20% of its daily average trading volume in the last quarter
- Bond: not exceed 20% of its issued size value and do not exceed THB 500 million per issue

5.5 An FMI that accepts cross-border collateral should mitigate the risks associated with its use and ensure that the collateral can be used in a timely manner.

In both markets, TCH accepts THB denominated assets issue by domestic entities as a collateral. Thus, there is no cross-border collateral directly involved in the CCP business. However, TCH accepts foreign currencies as collateral in the derivative market. The clearing house sets some procedures to mitigate the associated risk to handle the case clearing members want to place foreign currencies for their clients. Firstly, they must deposit such foreign currency in a bank account opened in Thailand. TCH will keep such currencies in the Thai bank accounts and follow the Bank of Thailand (BOT) regulations regarding foreign currencies which includes,

- Foreign currency collateral must be placed by non-residences only.



- Members and TCH must place foreign currencies in the bank account opened in Thailand and the name of the account must follow the BOT rule.
- Foreign currencies can be converted to Thai Baht for only specified purposes i.e. payment of taxes, management fee, and default management.
- Report the transaction of both deposit and withdraw such foreign currency to BOT on a monthly basis.

Once the foreign currency is placed in TCH's account, it is final and irrevocable. It is an outright transfer so TCH has full control over such foreign currency collateral. Therefore, TCH has the right to enforce the performance of the member's obligation including the obligation resulting from closing out the member's and client's positions against the deposited collateral in TCH accounts in case of clearing the member's insolvency.

TCH shall evaluate the collateral value daily using reliable sources of price and haircutting so TCH applies the exchange rate announced by the BOT on a daily basis.

#### 5.6 An FMI should use a collateral management system that is well-designed and operationally flexible.

TCH has a Collateral Management System which manages entry, valuation, and withdraw the collateral after ensuring sufficiency to continue meeting margin requirements. The system is well-designed, flexible and ensures that the norms for collateral acceptance, valuation, and withdraw are met. In addition, the collateral management functions in a clearing system are able to facilitate members and TCH to monitor and control the usage of collateral. The collateral management system supports the features below.

- accommodate the monitoring of all collaterals placed in TCH
- show both cash and the value of collateralized securities after applying the appropriate haircut
- allows members to deposit, withdraw or exchange cash, securities, and bonds
- allocate benefits or return from investment to members.

For cash, the member is able to make a request for a cash deposit or withdraw the excess collateral via the system to automatically generate and send banking instructions to the relevant settlement bank. Then the bank shall deposit or withdraw cash from the member's or TCH's account as instructed. The transaction shall be considered complete as soon as TCH receives confirmation from the settlement bank. In addition, If TCH requires additional collateral resulting from the deterioration of collateral value or the higher risk exposure, the system will automatically generate the banking



instruction to transfer money from the member's account to TCH's account, similar to the above process.

For securities/ bonds, after the member completely makes a deposit request, the system will automatically send the instruction to CSD system to transfer securities from the member's account to TCH's account. The transaction shall be considered complete when TCH receives securities into the account. The deposit request will be rejected if the transfer of securities is unsuccessful. This mechanism shall ensure that the deposited securities are valid.

Since the collateral system resides in the clearing system, which is the core system of TCH, thus the system will always be monitored by IT Department, be applied to Business Continuity Plan, and must be recovered in a short time.

## Principle 6

### Margin

*A CCP should cover its credit exposures to its participants for all products through an effective margin system that is risk-based and regularly reviewed.*

#### Key consideration

6.1 A CCP should have a margin system that establishes margin levels commensurate / in proportion with the risks and particular attributes of each product, portfolio and market it serves.

As prescribed in TCH's Risk Management Framework, the margin methodologies are designed to require a margin commensurate with the risks of each product and portfolio, including other associated risks such as market, liquidity, and concentration risks. TCH applies a risk-based margining system for Securities market and Derivatives markets separately.

#### Securities market

The margin system is decided to cover the exposure arising from each clearing member's net pending settlement position from all trading products in the exchanges such as common stock, ETF, bonds, warrant and derivatives warrant, etc. The portfolio-based margining system allows for a cross margining under the same type of securities resulting in a reduction in margin requirement. This system is applied to identify the potential exposure of clearing members by determining those exposures at single-tailed confidence level of at least 99% over a historical sampling period of 250 days, and 3-5 days liquidation period depending on products.

TCH also controls the concentration risk resulting from clearing huge pending positions of individual member relative to its net capital, TCH monitors member's settlement obligations against each members' net capital and call collateral if the member's clearing obligation exceeds pre-determined threshold. Moreover, TCH marks every outstanding position to the market with the latest available market prices in order to monitor current risk exposure as well as estimates the potential loss on an hourly basis. The risk exposure is determined by maximum loss value arising from those risk exposures types. TCH also reviews related parameters on annual basis.





## **Derivatives market**

TCH calculates member exposures and requires that all members place maintenance margin in accordance with the SPAN margining methodology. The margin rate is calculated based on dynamic volatility model namely Exponentially Weighted Moving Average “EWMA” with minimum variance to mitigate the pro-cyclicality effect. This will ensure the maintenance margin requirements are not lower than the amount that calculated from minimum variance. TCH uses VaR technique to estimate the potential loss in a day and determine the appropriate margin rate accordingly. In order to set the appropriate margin rate, back testing with 99 percent confidence level is used.

TCH reviews margin rates at least once a month and disseminates to members directly and also publishes on the website. In addition, TCH daily monitors the appropriateness of margin rate against the aforementioned risk value. Should there be significant higher or lower volatilities of some products exceeded the threshold levels or tremendously changes due to external shocks, TCH might change the margin rates of those particular products before monthly revision period and notifies all members and public in advance of effective date.

Currently, TCH has 3 types of margins to mitigate the different types of risk exposure in derivatives market. Margin types include Maintenance margin, Variation margin, and Additional margin. A more detailed overview of the margin methodologies TCH Clearing employs is provided in TCH Clearing’s disclosures for Key Consideration 3 of this Principle.

6.2 A CCP should have a reliable source of timely price data for its margin system. A CCP should also have procedures and sound valuation models for addressing circumstances in which pricing data are not readily available or reliable.

TCH’s primary sources of price data are derived from trades gathered from transaction activity on the SET Group Exchanges, SET, mai, and TFEX to reflect the true market valuation. TCH uses last traded prices or settlement prices to calculate risk exposures or margin rates. These prices are directly sent from the trading system of the exchanges on real time basis. Therefore, the sources of price data sent to the margin system are reliable, transparent, and always timely.

## **Securities market**

TCH will use the closing prices for determining risk exposure but when such prices are not available, TCH will use the best bid price or latest closing price instead.



## Derivatives Market

The settlement prices, received directly from the exchange will be used for calculating margin rate and margin requirements. The exchange, TFEX has the rule to define appropriate settlement prices such as last traded price, best bid, best offer or theoretical price. The theoretical price shall be used once there is no market price available such as on the first trading date of that tradeable instrument. Pricing models, as defined by TFEX, are different among products.

In case, the settlement prices are unavailable, TCH and the exchange have setup back-up plan for problem solving, for example, if the API connection between exchange and TCH is unavailable, the settlement prices file will be uploaded or manually and directly entered into the clearing system. In some cases, if the exchange cannot provide settlement prices on time, the announcement for delay of broadcasting settlement prices will be announced to the member for their own preparation. In such case, if the cut-off time is reached and the settlement prices are still unavailable, TCH may use the latest intra-day settlement price which is the latest available market price instead and calculate the variation margin at the prescribed time as normal.

6.3 A CCP should adopt initial margin models and parameters that are risk-based and generate margin requirements sufficient to cover its potential future exposure to participants in the interval between the last margin collection and the close out of positions following a participant default. Initial margin should meet an established single-tailed confidence level of at least 99 percent with respect to the estimated distribution of future exposure. For a CCP that calculates margin at the portfolio level, this requirement applies to each portfolio's distribution of future exposure. For a CCP that calculates margin at more-granular levels, such as at the subportfolio level or by product, the requirement must be met for the corresponding distributions of future exposure. The model should (a) use a conservative estimate of the time horizons for the effective hedging or close out of the particular types of products cleared by the CCP (including in stressed market conditions), (b) have an appropriate method for measuring credit exposure that accounts for relevant product risk factors and portfolio effects across products, and (c) to the extent practicable and prudent, limit the need for destabilising, procyclical changes.

To ensure that the clearing members honor their obligation and to safeguard against member's risk exposure, TCH requires members to place collateral in accordance with their risk exposure in each market.



## Securities market

TCH has developed the Early Warning System (EWS) as a risk management tool for clearing and settlement by establishing the model to calculate the current and potential losses arising from price fluctuation. This model is a portfolio-based margin model and determines collateral requirement at a single-tailed confidence level of 99% over a historical sampling period of 250 days, and the liquidation period is also applied in the model.

TCH considers the clearing obligations of each member as the major source of exposure for evaluating current and potential losses that occur from the change in price, through the portfolio-based model, Value at Risk (VaR). Should the exposure exceed the threshold, the member must place collateral to TCH. The threshold level is announced on TCH's website and reviewed annually. Moreover, TCH will use both the sectoral index and the newly listed securities price pattern in the past to determine the appropriate volatility in the case that there is insufficient data for estimating the volatility i.e. new product.

## Derivatives market

TCH calculates member exposures and requires that all members place maintenance margin in accordance with the SPAN margining system in order to cover the potential loss that may be incurred within a certain period. TCH has designed its maintenance margin (MM) to be able to cover the price volatility within one day. This calculation is based on Value at risk (VaR) with 99% confidence level by using the dynamic volatility, EWMA, with minimum value. Therefore, it can be ensured that the maintenance margin requirements are not lower than the amount calculated from minimum variance. This caution buffer can help to reduce fluctuation or pro-cyclicality effect in maintenance margin. The lookback period of calculation is 250-day period. Moreover, TCH performs backtesting by comparing maintenance margin with mark-to-market exposure. The maintenance margin should cover the actual mark-to-market exposure with at least 99% confidence level. The margin model has been approved by TCH risk sub-committee, and then TCH Board of Directors. Apart from maintenance margin, a variation margin is also collected on daily basis to cover actual loss based on daily mark-to-market. Furthermore, in a very volatile market, an intra-day margin may be collected from the member for further protection.

In addition to the above margin types, TCH also employs additional margins to handle liquidation issues such as concentration and stress scenarios as followings.

- Concentration margin: the member, who holds the concentrated position, may create a longer period to liquidate its position. Currently, to cover market liquidity risks due to the concentration



of position by a particular member, TCH has set the trigger as a ratio of the total margin requirement of the market. Thus, the member shall be called the concentration margin if its maintenance margin exceeds this ratio. The concentrated position of a member is defined by the maintenance margin value of that particular member.

- Uncovered risk margin: TCH calculates the members' potential highest loss to cover extreme price fluctuation during stress scenario. If a single member or the top two highest stress members have potential loss larger than the designated amount, such members shall bear additional margin charge called uncovered risk margin.
- Super margin: TCH will revise the maintenance margin rate for global commodity underlying products to protect potential price fluctuation during Thailand holiday but global market still open. Currently, if TFEX closes for 2 or more trading days, TCH shall increase liquidation period used to calculate the maintenance margin rate. The liquidation period relates to number of holiday periods to prevent a risk which may arise from fluctuations in the prices during holiday period and resulting in price or liquidity fluctuation of those products after the Thai market re-open.

The lookback period for determining volatility is 250 days, which represents a recent year of price change. It is also suitable with the volatility calculation model which emphasizes the recent market movement than the long-dated data. To stabilize the margin rate and to mitigate the pro-cyclicality effect, TCH set a minimum volatility (500 days look-back period) when estimates the variance and also adds buffer to margin rate. TCH monitors the coverage of margin against the current exposure, mark-to-market, on daily basis.

6.4 A CCP should mark participant positions to market and collect variation margin at least daily to limit the build-up of current exposures. A CCP should have the authority and operational capacity to make intraday margin calls and payments, both scheduled and unscheduled, to participants.

TCH performs daily mark-to-market of clearing members' obligations and evaluates risk exposure both intra-day and end-of-day. During the trading day, all outstanding clearing positions will be subject to risk exposure. Current risk exposure appraisals are designed to simultaneously evaluate each member exposures in securities and derivatives markets to derive the overall and comprehensive current risk exposures that a member obligated and posed to TCH.



Collateral call will be made to members, whose collateral are insufficient to cover their risk exposures. TCH rule states that member has to make and complete placement of collateral within the prescribed timeline. A settlement failure by the member may be deemed as an event of delayed settlement or default then TCH will take actions against such member following relevant procedures.

### **Securities market**

TCH marks every outstanding clearing position including newly executed up to that point in time to the market with the latest available market prices. The rule of using market price for marking-to-market is publicly disclosed on the website which can be summarized as follow;

1. Last traded price
2. If the last traded price is not available the best bid price shall be used.

Once member exposures at the end of the day in securities market exceed the specified threshold, members are required to place the collateral to TCH by a specific time. The intraday and end-of-day evaluations measure not only the current exposure but also the potential exposure.

### **Derivatives market**

TCH evaluates risk exposure and collects margin both intraday and an end-of-day. TCH has the right to make intra-day margin calls through the powers as prescribed in its clearing rules which require the member who has a duty to deposit margin to fulfill its obligation. In total, TCH assesses and collects margins at most 5 times a day, four times for intraday margin and one time for end-of-day margin. At the end-of-day margin evaluation, all types of margins are calculated but for the intraday margin, only maintenance and variation margin requirements are calculated. In principle, margin calls will be made to members whose collateral is insufficient to meet their margin requirements. The TCH rules require the member to make and complete payments of margin calls within the prescribed time. A payment failure by the member may be deemed as an event of delayed settlement or default then TCH will take actions against such member following relevant procedures.

6.5 In calculating margin requirements, a CCP may allow offsets or reductions in required margin across products that it clears or between products that it and another CCP clear, if the risk of one product is significantly and reliably correlated with the risk of the other product. Where two or more CCPs are authorised to offer cross-margining, they must have appropriate safeguards and harmonised overall risk-management systems.

## I. Margin required calculation

### Securities market

TCH uses portfolio-based margining approach in securities market. This approach only allows reduction in margin requirement under the same type of securities. The amount of reduction is dependent on the significant of price correlation. TCH calculates volatility and correlation on daily basis by using 250 days lookback period.

### Derivatives market

TCH also applies Portfolio Margining to allow reduction in margin requirement between products for the same asset class, but not across different asset classes. This reduction is called Inter-commodity spread credit. The margin reduction between products will be allowed only if there is a significant and economics meaning price correlation. There is also a reduction of margin within same product but different maturity date so called Inter-month Spread (calendar spread). The price correlation and spread margin are revised monthly together with margin rate reviewing.

TCH will monthly review and test the significant of correlation across products in multi sampling periods. The correlation of each time period is calculated under EWMA model. The lowest value of correlation, whose direction and relationship of all periods must be consistent and must be statistically significant at least 99% confidence level, is used for margin reduction. However, if TCH observes any inconsistent correlation result in any time window, which means an instability of the correlation, TCH will not give any margin reduction between them. Moreover, the significant correlation must have a meaningful economics relationship for offsetting in required margin.

## II. Cross Margining for two or more CCP

Currently, there is no cross-margining arrangement with another CCP.

6.6 A CCP should analyse and monitor its model performance and overall margin coverage by conducting rigorous daily backtesting and at least monthly, and more frequent where appropriate, sensitivity analysis. A CCP should regularly conduct an assessment of the theoretical and empirical properties of its margin model for all products it clears. In conducting sensitivity analysis of the model's coverage, a CCP should take into account a wide range of parameters and assumptions that reflect possible market conditions, including the most-volatile periods that have been experienced by the markets it serves and extreme changes in the correlations between prices.

## **I. Backtesting and sensitivity analysis**

TCH monitors the validity of the model by performing a daily backtesting by comparing maintenance margin with mark-to-market exposure to ensure the robustness of margining model. The maintenance margin should cover the actual mark-to-market exposure with 99% confidence level. With daily monitoring, if TCH observes any insufficiency of maintenance margin, TCH will keep closely monitor and subsequently revise the margin rate to cope with market conditions.

The daily backtesting result is also reported to executives on a daily basis. Moreover, the sufficiency of margin rate relative to price movement is also reported to the TCH Board of Directors on a quarterly basis. Furthermore, if there is a significant event that may affect the market such as the COVID-19 pandemic, or any rapid price change of underlying assets, TCH also performs sensitivity analysis to evaluate the suitability of margin rate in that situation. The analysis result will be reported to the relevant executives for further consideration.

## **II. Margin model performance**

### **Securities market**

TCH uses the portfolio-based margin (VaR) model that evaluates volatility of each securities and combines into one portfolio volatility, to evaluate the risk exposure of the members in securities market. Therefore, the model will incorporate individually stock volatility and update on daily basis. The margin requirement will reflect the most recent situation.

### **Derivatives market**

In terms of volatility calculation, TCH assigns more weight on recent data than long dated one and impose minimum volatility value. So, the margin model will highly reflect the most recent volatility relative to long dated historical information. Introducing the minimum volatility will stabilize the margin rate and mitigate the pro-cyclicality effect. Apart from monthly revision of margin rate, TCH also monitors the adequacy of margin rate on daily basis. Once there is any indicator of insufficiency of margin rate to cover the risk exposure, TCH will adjust the margin rate accordingly.

6.7 A CCP should regularly review and validate its margin system.

SET's Risk Management Department, which is independent of TCH, will review the appropriateness of variables and robustness of the model on annual basis. The validation result of the margin model will be reported to the TCH Board of Directors. Should the validation show that the model is improper, this will trigger the revision of the margin model methodology. TCH also discloses basic assumptions of the margin method and the key data inputs on PMFI disclosure and PFMI quantitative disclosure on TCH's

## Principle 7

### Liquidity risk

*An FMI should effectively measure, monitor, and manage its liquidity risk. An FMI should maintain sufficient liquid resources in all relevant currencies to effect same-day and, where appropriate, intraday and multiday settlement of payment obligations with a high degree of confidence under a wide range of potential stress scenarios that should include, but not be limited to, the default of the participant and its affiliates that would generate the largest aggregate liquidity obligation for the FMI in extreme but plausible market conditions.*

#### Key consideration

7.1 An FMI should have a robust framework to manage its liquidity risks from its participants, settlement banks, nostro agents, custodian banks, liquidity providers, and other entities.

The policies and practices for managing liquidity risk are prescribed in TCH Risk Management Framework. TCH estimates liquidity requirements and compares with liquidity resources on a daily basis and manages its liquidity risk through its liquidity resources, including cash on hand and committed bank credit lines which are estimated and reviewed regularly.

In order to balance the appropriateness of liquid resources, TCH performs stress testing to determine the adequacy of liquid resources to support liquidity requirements in the extreme market scenario on a daily basis. TCH also applies reverse stress testing on a daily basis to evaluate the situation that may cause the deficiency of liquid resources.

In addition, TCH set the acceptable assets for collateral based on their liquidity and risk profile. TCH evaluates the value of collateral by applying mark to the market together with haircuts at least once a day. Moreover, TCH determines different haircut rates for each group of securities based on their liquidity. Furthermore, the rates are based on volatility which covers extreme price movement. In addition, TCH has established the concentration limits for each instrument of securities and bonds that members can place as collateral with TCH.





## Securities market

TCH has adopted a net settlement model (BIS model 3) to the securities clearing and settlement in order to reduce the liquidity needed. This process reduces huge amount of risk and provides the most efficient way of fund settlement. In case of a clearing member not fulfilling its payment obligation within the settlement cycle, TCH will use overdraft loan from settlement banks to settle the payment obligation of the defaulting member. Furthermore, TCH will act one or all of the following procedures in case the member fails to make a payment or deliver securities:

1. Suspend the transfer of securities to be received by the defaulting member, and sell the suspended securities in order to use the proceeds thereof to pay for the securities in default and damage;
2. Suspend the payment that the defaulting member is entitled to receive and to use such money to pay for the securities in default and damage. In the case that clearing member defaults in securities delivery, the clearing house may use such money to buy the defaulting securities;
3. Require the defaulting member to place additional collateral
4. Liquidate collateral that the member in default has placed in accordance with the risk management schemes in order to use for payment due. In the case of securities delivery default, the proceeds will be used for buying defaulted securities;
5. Utilize the clearing fund as prescribed by the clearing fund's rules;

In the event that the member fails to deliver the securities that may result in higher liquidity requirements due to the market risk, TCH requires defaulting member place collateral in the amount equal to 130 percent of the defaulted securities value to incorporate the change in securities price. Finally, TCH may uses this collateral for buy-in defaulted securities.

In addition, TCH may suspend the clearing and settlement services to the member who is in default until the payment that are subject to the default, delivery of the securities in default and compensation for damages are made in full.

## Derivatives market

TCH has set the procedure for clearing member to request for margin withdrawal within the In this way, TCH can ensure that it can manage the liquidity .specific time frame set by TCH requirement in derivatives .market

In both markets, TCH manages its liquidity risk through its liquid resources in many forms, including cash on hand, committed bank credit lines and repo facility. TCH monitors liquidity requirement and compares with liquidity resource on a daily basis and also forecast potentially liquidity needed



exposure. TCH regularly reviews its own liquidity need by assessing the different scenarios to determine the sufficiency of liquid resources or committed line facility from settlement banks.

On the clearing member side, they are also required to have the credit line from their settlement banks in order to manage their own liquidity shortfall. TCH also monitors a clearing member for its liquidity risk through net capital on daily basis.

### **Settlement bank**

Regarding to the settlement banks, TCH also sets selection criteria for settlement banks and requires settlement banks to submit financial statement to TCH. TCH has regularly evaluate and monitor the financial strength and also credit rating of settlement banks semi-annually. At present, TCH appoints 5 settlement banks for securities market and 3 settlement banks for derivatives market. Thus, the liquidity resources are diversified among these banks and cover liquidity risk in respective markets, securities market and derivatives market. In addition, TCH also has Repo funding arrangement with three commercial banks for additional resources.

Furthermore, TCH implements many tools to handle with the liquidity risks arising from transactions of entities and their affiliates that have multiple roles such as clearing members, settlement banks and custodian. Currently, clearing member and settlement bank are different entity. TCH closely monitor financial strength and daily settlement transactions of clearing members and settlement banks. TCH also requires the clearing members to have credit line which commensurate with their trading transactions. In addition, TCH closely collaborate and communicate with regulators, both SEC and Bank of Thailand, to exchange information regarding risk exposure and enforcement.

7.2 An FMI should have effective operational and analytical tools to identify, measure, and monitor its settlement and funding flows on an ongoing and timely basis, including its use of intraday liquidity.

TCH develops a real-time monitoring system that allows TCH's staff to monitor all member's settlement obligations, settlement transaction activity, settlement results from settlement banks, collateral deposit/withdraw request of members and also a collateral balance of each account of TCH on real-time basis.

Before settlement time, TCH provide the settlement amount information to clearing members so that the members can monitor the sufficiency of their fund in settlement banks. Once the settlement instructions are sent to banks system, TCH has procedure for monitoring the settlement instructions in the bank system and be able to monitor the settlement status on real-time basis. When the settlement instructions are completed within the agreed time, the bank response message will be



automatically updated into the clearing system either. And then at the end of the day, TCH has automated procedure to reconcile cash balance between TCH collateral system and bank system. Furthermore, the system also automatically reconciles collateral balance in the system against the balance in settlement banks and custodian. Should there is any discrepancy between the systems, it may indicate that intraday line is used. Therefore, TCH can timely and effectively manage fund to return the intra-day line.

- 7.3 A payment system or SSS, including one employing a DNS mechanism, should maintain sufficient liquid resources in all relevant currencies to effect same-day settlement, and where appropriate intraday or multiday settlement, of payment obligations with a high degree of confidence under a wide range of potential stress scenarios that should include, but not be limited to, the default of the participant and its affiliates that would generate the largest aggregate payment obligation in extreme but plausible market conditions.

This Key Consideration is not applicable to TCH.

- 7.4 A CCP should maintain sufficient liquid resources in all relevant currencies to settle securities-related payments, make required variation margin payments, and meet other payment obligations on time with a high degree of confidence under a wide range of potential stress scenarios that should include, but not be limited to, the default of the participant and its affiliates that would generate the largest aggregate payment obligation to the CCP in extreme but plausible market conditions. In addition, a CCP that is involved in activities with a more-complex risk profile or that is systemically important in multiple jurisdictions should consider maintaining additional liquidity resources sufficient to cover a wider range of potential stress scenarios that should include, but not be limited to, the default of the two participants and their affiliates that would generate the largest aggregate payment obligation to the CCP in extreme but plausible market conditions.

TCH Board of directors approved the evaluation principle of liquidity risk and also the stress scenario for testing the adequacy of liquid resources. TCH performs a liquidity stress test on a daily basis to ensure adequacy under stress conditions. Currently, TCH neither conducts clearing for complex risk profile instruments nor performs in multiple jurisdictions. TCH evaluates its liquid resources to assure that those resources are able to cover the defaulting of two members that would generate the largest liquidity risk exposures under extreme but plausible market conditions. TCH evaluates the appropriateness of total liquid resources on quarterly basis. The detail for each market practices as follows,



## Securities market

The value of net payment is chosen as a risk indicator that member may pose to TCH when it defaults. In this regard, TCH is necessary to maintain the liquidity resource that covers the net payment obligation from two members with largest stress loss.

Scenario 1: The default value per day from peak historical data since inception

Scenario 2: The potential default value of two members having the largest net payment obligation, using historical VaR at 99% confidence level over 250-day period

## Derivatives market

TCH uses the amount of excess margin to evaluate the adequacy of its liquid resources in case where member would like to withdraw their margin. However, in the event that a member closes position to reduce exposures resulting in an increase in the excess margin that the member can withdraw, TCH has established a procedure for notifying TCH in advance to request the withdrawal of the excess margin that exceeds the specified amount.

Scenario 1: The withdrawal amount of collateral per day from peak historical data since inception

Scenario 2: The potential withdrawal amount of collateral of two members having the highest excess margin, using historical VaR at 99% confidence level over 250-day period

7.5 For the purpose of meeting its minimum liquid resource requirement, an FMI's qualifying liquid resources in each currency include cash at the central bank of issue and at creditworthy commercial banks, committed lines of credit, committed foreign exchange swaps, and committed repos, as well as highly marketable collateral held in custody and investments that are readily available and convertible into cash with prearranged and highly reliable funding arrangements, even in extreme but plausible market conditions. If an FMI has access to routine credit at the central bank of issue, the FMI may count such access as part of the minimum requirement to the extent it has collateral that is eligible for pledging to (or for conducting other appropriate forms of transactions with) the relevant central bank. All such resources should be available when needed.

### I. Size and composition of qualifying liquid resources

TCH reviews the suitability of size and composition of qualifying liquid resources on quarterly basis.

The fund available for supporting TCH liquidity needs comprises of:

- Committed credit facility from settlement banks, which can be used automatically if TCH needs especially when there is a settlement fail.

- Cash deposited at the commercial bank
  - Collateral and margin from members which is placed to TCH in form of cash
  - Clearing funds contributed in cash by members in each market
  - TCH Clearing Funds and Reserve Funds in the form of cash
- Committed repurchase agreement (Repo) with commercial banks

## II. Availability and coverage of qualifying liquid resources

Practically, TCH will call for collateral and margin from members to cover risk exposure that may occur from clearing and settlement transactions of members. Even TCH accepts cash and non-cash as collateral, but most of the margin and collateral placed by members in both derivatives and securities market are cash. TCH also has an arrangement with every settlement bank for automatic use of the available credit line at time of needed.

Clearing Funds and Reserve Fund in the form of cash are deposited in commercial banks and also invested in government bonds. For government bonds, it is able to promptly transform to cash as TCH has repurchase agreement (Repo) with commercial banks, which substantially reduce liquidity pressure of TCH.

To ensure prompt availability of liquidity from liquidity providers when need, TCH has arranged with related internal and external parties to regularly test on annual basis of expediting overdraft loans and private repo utilization.

7.6 An FMI may supplement its qualifying liquid resources with other forms of liquid resources. If the FMI does so, then these liquid resources should be in the form of assets that are likely to be saleable or acceptable as collateral for lines of credit, swaps, or repos on an ad hoc basis following a default, even if this cannot be reliably prearranged or guaranteed in extreme market conditions. Even if an FMI does not have access to routine central bank credit, it should still take account of what collateral is typically accepted by the relevant central bank, as such assets may be more likely to be liquid in stressed circumstances. An FMI should not assume the availability of emergency central bank credit as a part of its liquidity plan.

Additional liquid resources are comprised of government bond that can be used to acquire more financial resources via repurchase agreement (Repo) with commercial bank. The government bonds can be used to be collateral for additional lines of credit with settlement banks. The sources of



government bond may come from the collateral place by members and TCH's investment (margin, clearing fund and reserve fund).

Furthermore, under the liquidity stress scenario, there is a Standing Lending Facility that the central bank applies as a mechanism to inject money into the system at the end of the day. Thus, the commercial banks can borrow funds and facilitate the repo counterparty banks of TCH for more liquidity under the extreme event.

7.7 An FMI should obtain a high degree of confidence, through rigorous due diligence, that each provider of its minimum required qualifying liquid resources, whether a participant of the FMI or an external party, has sufficient information to understand and to manage its associated liquidity risks, and that it has the capacity to perform as required under its commitment. Where relevant to assessing a liquidity provider's performance reliability with respect to a particular currency, a liquidity provider's potential access to credit from the central bank of issue may be taken into account. An FMI should regularly test its procedures for accessing its liquid resources at a liquidity provider.

#### **I. Source of liquidity providers**

In general, the liquidity providers of TCH are settlement banks that provide credit lines for settlement obligations. In addition, TCH also has a repo arrangement with commercial banks for more liquidity.

#### **II. Reliability of liquidity providers**

TCH has established criteria to entitle the commercial banks to be settlement banks. The criteria include maintenance of capital adequacy, credit rating acquired by regulator, reliability of the bank and standard of their services especially that can connect with the TCH systems for the seamless services and high performance. It also includes the amount of fund available to the TCH as well as its terms and conditions of the fund availability. The procedural access to the source of liquidity once needed is also considered as one of the significant criteria for accepting a bank as liquidity provider to TCH.

Moreover, to ensure smooth operations of all settlement banks as the liquidity providers, the settlement banks are subject to testing of delay settlement procedures which is require to conduct annually.

7.8 An FMI with access to central bank accounts, payment services, or securities services should use these services, where practical, to enhance its management of liquidity risk.

TCH makes a settlement in term of Thai Baht via the central bank (BOT) system namely BAHTNET system which facilitates transfer of fund among settlement banks and custodian banks. The balance of netting among commercial banks, who are settlement agents, is carried out by the BOT's facility. This process reduces a huge amount of risk and provides the most efficient way of fund settlement. Although, TCH is a BAHTNET member with BOT, TCH doesn't obtain the credit line from the central bank because juristic person is entitled to do so, pursuant to the BOT regulations, is required to obtain banking license and be regulated by BOT.

7.9 An FMI should determine the amount and regularly test the sufficiency of its liquid resources through rigorous stress testing. An FMI should have clear procedures to report the results of its stress tests to appropriate decision makers at the FMI and to use these results to evaluate the adequacy of and adjust its liquidity risk management framework. In conducting stress testing, an FMI should consider a wide range of relevant scenarios. Scenarios should include relevant peak historic price volatilities, shifts in other market factors such as price determinants and yield curves, multiple defaults over various time horizons, simultaneous pressures in funding and asset markets, and a spectrum of forward-looking stress scenarios in a variety of extreme but plausible market conditions. Scenarios should also take into account the design and operation of the FMI, include all entities that might pose material liquidity risks to the FMI (such as settlement banks, nostro agents, custodian banks, liquidity providers, and linked FMIs), and where appropriate, cover a multiday period. In all cases, an FMI should document its supporting rationale for, and should have appropriate governance arrangements relating to, the amount and form of total liquid resources it maintains.

#### **I. Stress test performing**

To ensure the sufficiency of TCH liquid resources, the liquidity need monitoring for settlement obligations is daily conducted by Clearing Department. Moreover, the stress test of liquidity risk has also been undertaken on a daily basis in order to robust the sufficiency of liquid resources evaluation. TCH also evaluate the situation that may cause the deficiency of liquid resources by performing reverse stress test on daily basis. The result of the stress test and reverse stress test will be regularly reported to the TCH executives, TCH risk management sub-committee, TCH Board of directors and SEC on a quarterly basis.

## II. Stress test scenarios

### Securities market

The value of net payment is chosen as a risk indicator that member may pose to TCH when it defaults. In this regard, TCH is necessary to maintain the liquidity resource that covers the net payment obligation from two members with largest stress loss.

Scenario 1: The default value per day from peak historical data since inception

Scenario 2: The potential default value of two members having the largest net payment obligation, using historical VaR at 99% confidence level over 250-day period

### Derivatives market

TCH uses the amount of excess margin to evaluate the adequacy of its liquid resources in case where members would like to withdraw their margin. However, in the event that a member closes position to reduce exposures resulting in an increase in the excess margin that the member can withdraw, TCH has established a procedure for notifying TCH in advance to request the withdrawal of the excess margin that exceeds the specified amount.

Scenario 1: the withdrawal amount of collateral per day from peak historical data since inception

Scenario 2: the potential withdrawal amount of collateral of two members having the highest excess margin, using historical VaR at 99% confidence level over 250-day period

### The reverse stress test scenarios

Moreover, TCH performs a reverse stress test on a daily basis to evaluate the situation that may cause the deficiency of liquid resources. The maximum number of members who have net payment obligation that liquid resource can cover is a scenario for securities market while the maximum number of members who can withdraw excess margin that liquid resource can cover is for derivatives market.

## III. Review and validation

TCH has segregated the duty of risk management development and monitoring. The risk models and scenarios are developed by TCH under the supervision and approval of TCH risk management sub-committee and TCH Board of directors. The scenarios, parameters and assumptions are revised regularly to ensure appropriateness for evaluating liquidity needs and resources in light of current and evolving market conditions.



Moreover, SET's risk management department, which is an independent entity from TCH, will review the adequacy of liquid resources including OD and repo utilization processes to ensure that liquid resource is available in a timely manner.

7.10 An FMI should establish explicit rules and procedures that enable the FMI to effect same-day and, where appropriate, intraday and multiday settlement of payment obligations on time following any individual or combined default among its participants. These rules and procedures should address unforeseen and potentially uncovered liquidity shortfalls and should aim to avoid unwinding, revoking, or delaying the same-day settlement of payment obligations. These rules and procedures should also indicate the FMI's process to replenish any liquidity resources it may employ during a stress event, so that it can continue to operate in a safe and sound manner.

#### **I. Same day settlement**

According to the Securities and Exchange Act and Derivative Act, TCH will become the central counterparty through the novation process once the trading transactions are matched in the exchanges. As a CCP, TCH establishes rules to settle both funds and securities obligations within the specified period. If there is payment or securities settlement default, TCH is still obligated as the CCP according to both Acts and shall complete the transaction by using its own liquidity resources as prescribed on rules and regulations withing specified time.

#### **II. Replenishment of liquidity resources**

Once the default occurred, clearing rules empower TCH to cease securities to be received by the defaulted member. Such collateral can be used for replenishment of the debt payment or repayment for and using of clearing fund as prescribed by the rules. In addition, the clearing rules also state the duty of the default member to repay or replenish the fund that TCH has paid on behalf of that particular member in the following order:

##### Securities market

1. SET Reserve fund
2. Clearing fund contributed by SET (second tier)
3. Clearing fund contributed by non-defaulting members
4. Clearing fund contributed by SET (first tier)
5. Clearing fund contributed by defaulting member



Derivatives market

1. SET Reserve fund
2. Additional contribution (assessment)
3. Clearing fund contributed by SET (second tier)
4. Clearing fund contributed by non-defaulting members
5. Clearing fund contributed by SET (first tier)
6. Clearing fund contributed by defaulting member
7. Securities deposit of defaulting member

## **Principle** 8

### **Settlement finality**

*An FMI should provide clear and certain final settlement, at a minimum by the end of the value date. Where necessary or preferable, an FMI should provide final settlement intraday or in real time.*

#### **Key consideration**

8.1 An FMI's rules and procedures should clearly define the point at which settlement is final.

##### **Settlement of Securities Trading Transactions**

Finality of fund transfer has been specified clearly in TCH clearing rules. Fund transfer is deemed complete and becomes final and irrevocable when CCP or its members receive the fund in settlement bank accounts. Similarly, securities settlements are finalized when the depositories, TSD, has completely delivered securities to the member who is entitled to take delivery of securities as per TCH's instruction and in accordance with TCH report. All rules of finality and point of time is clearly specified in the rules and notifications which are posted on TCH website.

##### **Settlement of Derivatives Trading Transactions**

###### 1. Margin and settlement requirement payments

The settlement finality shall be deemed complete when TCH has received the transfer of a full and correct amount into its bank account for cash deposit or to TCH depository account opened with TSD for securities collateral, in accordance with clearing report. The point of time related to settlement finality is clearly stated in TCH regulations published on the website.

###### 2. Physical delivery of commodities

TCH acts as a facilitator in a physical delivery. When the matching for physical delivery between the buyer and seller is undertaken, TCH's obligation as a CCP shall be deemed complete and final. Thus, a binding obligation between the members in the delivery of underlying pursuant to the derivatives will be created instead.

To-date TCH provides service of physical delivery for two commodities; natural rubber ribbed smoked sheet and gold. Settlement finality in respect of natural rubber sheet delivery is stated upon the completion of the exchange of delivery documents between the buyer and seller, following to the delivery of underlying. As soon as receiving the delivery confirmation from both seller and buyer, TCH will transfer delivery amount to the seller. For finality of gold delivery, it is prescribed when the receiving party has received the goods into its possession. Buyer has to pay delivery amount to TCH's account and then TCH will transfer such amount to seller's account. All rules and notifications are posted on TCH website.

8.2 An FMI should complete final settlement no later than the end of the value date, and preferably intraday or in real time, to reduce settlement risk. An LVPS or SSS should consider adopting RTGS or multiple-batch processing during the settlement day.

**TCH specifies time of settlement no later than the end of value date.**

#### **Securities market**

TCH specifies time of settlement 13.30 hrs.– 14.15 hrs. when all securities are delivered and fund are settled. The processing of securities is undertaken on a netting basis and settled at 13.30 hrs. on settlement date (T+2).

The net seller is required to maintain securities in their settlement account at TSD by 13.30 hrs. TSD, as the appointed settlement agent of TCH, will transfer securities from or to the clearing member's accounts and TCH's account via book-entry through the depository system according to the information received from TCH.

For the fund settlement, the settlement banks and the Bank of Thailand will transfer the money to or from TCH account and member accounts within 14.00 hrs. - 14.05 hrs. For buying-in transactions due to shortfall in securities delivery, securities and money settlement will be conducted at 13.25 hrs. and 14.00 hrs. respectively on the buy-in date.

TCH also has additional settlement round, the second round for the fund and securities settlement, to ensure same day settlement. This allows a member, who has a shortfall in securities delivery transactions by 13.30 hrs., to settle for the second time but on the same day.

Moreover, for large value transactions which sizes greater than or equal to THB 50 million, TCH allows members to request for RTGS method. The member can select settlement day to be any day no later than normal settlement day or within T+2. The mechanism of RTGS, that TCH applies,

can ensure same day settlement. Firstly, after TCH allows for RTGS, TSD will earmark the seller's securities in accordance with TCH's instructions. Then funds will be transferred from the buyer's account to TCH's account and seller's account respectively via the Bank of Thailand Payment system, BAHTNET. If the aforementioned steps are successful, the securities will be transferred from the seller's account to TCH's account and the buyer's account as well. This service also aligns settlement on the value date.

### **Derivatives market**

Margin settlement is settled at 9.00 hrs. on T+1 after providing a clearing report. The settlement process is undertaken on a netting basis. For each member, TCH shall settle 2 settlement amounts separated between Clients and Proprietary. The member has the responsibility to post money or collateralized asset in the account at the settlement bank or TSD respective time. Once the settlement time is reached, TCH shall send instructions to Settlement banks or TSD to debit from the member's account and credit to TCH's account. Thus, the settlement is no later than the end of value date for the derivatives transaction.

In addition, in derivatives market, TCH performs intra-day settlement or real-time settlement for the large settlement amount in order to mitigate member default risk. TCH has evaluated intraday margin call to further protect the system. Real-time futures and options prices and real-time positions would be used for margin requirement calculation and members must meet margin obligations. For intra-day margin placement, same as the end-of-day settlement, members are required to maintain fund readily to be debited from their account and credited to TCH bank account at the specified time. Upon receiving the transfer of a full and correct amount of fund to TCH bank account in accordance with its clearing report, final settlement is considered complete.

- 8.3 An FMI should clearly define the point after which unsettled payments, transfer instructions, or other obligations may not be revoked by a participant.

TCH rules and regulations has clearly stated that members are obliged to the clearing report, which depends on trading transactions received from the exchange together with their settlement instructions sent to TCH. Meanwhile, the members and custodians are obliged to Pre-Settlement Matching Transactions, PSMS transactions.

Subject to SEC notifications in both Securities and Derivatives transactions, no unsettled payments or transfer instructions can be revoked once the matched trade is effective in the exchange and TCH becomes a counterparty of such trades. Thus, the settlement obligation is irrevocable and the payment is finality under the Payment System Act B.E. 2560.

## Principle 9

### Money settlements

*An FMI should conduct its money settlements in central bank money where practical and available. If central bank money is not used, an FMI should minimize and strictly control the credit and liquidity risks arising from the use of commercial bank money.*

#### Key consideration

9.1 An FMI should conduct its money settlements in central bank money, where practical and available, to avoid credit and liquidity risks.

Money settlement of the netting obligations of clearing members and custodians are conducted through both settlement banks and the central bank (The Bank of Thailand “BOT”). Clearing members can use one of the designated settlement banks to transfer funds whilst custodians can transfer funds directly via the BAHTNET system across accounts held at BOT. According to BOT’s rule, the juristic person that can perform settlement in the central bank is required to obtain a banking license and be regulated by BOT, or has been permitted by BOT.

#### Securities market

The general clearing members (i.e., brokerage companies) send/receive the payment to/from their settlement banks while custodian banks send/receive the payment through the Bank of Thailand system, BAHTNET. Upon receipt of the TCH report by 13.35 hrs. the custodian and settlement banks who are net payers will ensure sufficiency of funds in their cash accounts maintained with the BOT, by 14.00 hrs. on settlement date.

TCH uses the BOT’s Central Settlement System (CSS) for simultaneously debiting and crediting of accounts at BOT. Under such an arrangement, TCH instructs CSS of the cash netting position and CSS then executes the credit and debit transactions (according to the cash netting position) within the BAHTNET system simultaneously across accounts held by custodians and settlement banks at BOT. The BAHTNET will transfer funds with the process of debiting net payers’ accounts first and crediting net sellers’ accounts almost simultaneously, with the process finishing on the value date.



TCH transfers funds within the bank account by deducting from payer's account and paying into the receiver's account. The funds transfer is undertaken in a controlled manner in real time once the funds are released for transfer.

Currently, for securities trading transactions, TCH conduct money settlement in local currency only. No foreign-currency settlement service has yet provided.

### **Derivatives market**

TCH conducts money settlements through settlement banks because all of the members are not commercial banks. Member can appoint a bank from designated banks as its settlement bank. If a member has a payment obligation or being margin called, TCH shall instruct a settlement bank to debit money from the member's account and credit to TCH's account and vice versa for the excess margin withdrawal request. TCH has a predefined timetable for margin deposit and withdrawal in the rule and published on website. In addition, with the permission from BOT, TCH accepts foreign currencies as collateral for margin requirement in derivatives market, the same payment settlement processes as local currency are applied.

Though, the clearing members have requirement denominated in Thai Baht, they can place foreign currency if they meet conditions required by TCH and Bank of Thailand. If the clearing members want to place foreign currencies for their clients, who have to be non-residences only, they have to have those currencies in their settlement bank account. Then members must request TCH, via clearing system, to place foreign currencies as collateral instead of Thai baht. The system shall automatically calculate equivalent value to Thai baht using the pre-defined exchange rate and haircut rate. At settlement time, the system will debit such foreign currency amount from their bank account and credit to TCH account. According to this practice, time zones do not matter and no conflicts of countries' law because those placed currencies are already placed in Thailand and kept in bank accounts without exchange into Thai baht. Below are detail of foreign currencies placement, according to the Bank of Thailand (BOT) regulation;

- Foreign currencies must be placed by the non-residences only.
- Members and TCH must place foreign currencies in the bank account opened in Thailand and the name of the account must follow the BOT rule.
- Foreign currencies can only be converted to Thai Baht for specified purposes i.e. payment of taxes, management fee and default management.
- Member must report all deposit, withdraw transaction to BOT regularly.

9.2 If central bank money is not used, an FMI should conduct its money settlements using a settlement asset with little or no credit or liquidity risk.

TCH has clearly and deliberately reviewed and assessed the services and reliability of commercial banks, which act as settlement banks. The settlement banks have to fulfill the requirements for becoming the settlement banks. At present, TCH settlement banks consist of global banks (Thailand branch) and local banks in Thailand which all of them are Domestic Systemically Important Banks (D-SIBs). All of the settlement banks are under the Bank of Thailand (BOT) supervision. Especially for D-SIBs, BOT requires more stringent financial strength than other commercial banks. To assess the credit and liquidity risks of the settlement asset, TCH has set out the selection criteria and requirements for settlement banks to comply as follows;

1. maintain the financial strength and qualifications as stipulated by BOT;
2. credit rating higher than AA- ;
3. conduct a daily reconciliation of cash deposit in the bank with TCH;
4. comply with financial strength and operating efficiency requirements which will be evaluated by TCH every 6 months. Such evaluation includes BIS ratio, credit rating and incident handling once the settlement bank system has technical glitch;
5. provide overdraft (O/D) or intraday loan for TCH;
6. has at least 5 clearing members using its services;
7. comply with the procedures, conditions and timing prescribed in TCH clearing rules and regulations stringently;
8. set out the business continuity plan or arrange the procedure in case that the system linkage with TCH fails to function;
9. conduct the test with TCH with respect of money and securities settlement, as well as exercise the emergency response plan, where necessary;
10. has a fair and suitable measure in charging fee with TCH and its members;
11. provide at least one staff to be responsible for the operation and collaboration with TCH.

9.3 If an FMI settles in commercial bank money, it should monitor, manage, and limit its credit and liquidity risks arising from the commercial settlement banks. In particular, an FMI should establish and monitor adherence to strict criteria for its settlement banks that take account of, among other things, their regulation and supervision, creditworthiness, capitalisation, access to liquidity, and operational reliability. An FMI should also monitor and manage the concentration of credit and liquidity exposures to its commercial settlement banks.



Since settlement bank plays mainly two roles; firstly, to provide money settlement facility between TCH and members and secondly, as liquidity provider either by providing overdraft loan or cash deposit, TCH assess the failure of the settlement bank based on their roles.

- 1) As a money settlement facilitator, TCH has regularly review the settlement banks' credit ratings and capital adequacy ratio or BIS ratio once a year. If Settlement Bank's BIS ratio lower than the BOT requirement, TCH will inform clearing members to change settlement bank in order to prevent struggling in money settlement.
- 2) As a liquidity provider, TCH has criteria to evaluate amount of overdraft loan required from each bank and always diversify its cash deposit in each settlement bank equally and not concentrate in any settlement bank. As aforementioned, TCH also has routinely monitor the settlement banks' financial strength and liquidity.

### **Monitoring Settlement bank**

TCH conducts a suitability assessment of settlement banks every year and full scale every five years by classifying the evaluations into two aspects;

#### 1. The financial strength

TCH will appraise financial strength using BIS ratio and financial report as stipulated by BOT. Also, the credit rating must be higher than AA- which is higher than the investment grade.

#### 2. The operation efficiency

In order to pass the assessment, the settlement bank is required to be graded a total score higher than 80% determined by the following criteria;

- Number of critical incidents or damage that occurred to TCH which TCH had issued a warning letter to the bank.
- The efficiency and readiness in operation.
- The quality of the emergency handling plan.
- The ability to enhance its system to support TCH's strategic plan.

### **Risk mitigation to Settlement bank failure**

At present, TCH appoints five settlement banks for the securities market and three banks for derivative market. Thus, the concentration risks from settlement banks are fairly mitigated.

Apart from this, TCH also conducts daily monitoring on concentration and liquidity risk. Due to the variation of settlement value that clearing members will pay/receive in each day, TCH has arranged the procedures to monitor the concentration risk for each settlement banks by assigning its staff to closely monitor. In the case of TCH's net pay balance, the settlement banks temporarily use overdraft they provide to TCH in order to fulfill the payment to the clearing members before receiving money transfer from BAHTNET.

On settlement date, if TCH finds out that the net balance of payments of the settlement bank is higher than usual; typically, higher than the overdraft loan received from the banks, the staff will directly report the management and related parties for liquidity support preparation in case of emergency need and inform such settlement banks to closely monitor and ensure sufficiency of fund. In addition, the adequacy of overdraft loan is assessed regularly on annual basis and therefore the amount being monitored will be changed accordingly.

Moreover, TCH daily reconciles cash or asset deposited at settlement banks or custodian banks against TCH record automatically by the system and report to executives. The asset balance shall be reported to SET investment committee on a monthly basis and TCH Board on a quarterly basis. The SET investment team also regularly monitors the performance of the custodian banks and conducts the inspection and due diligence every two years. The total cash deposit or the concentration limit of a cash deposit in each commercial bank is also in place.

TCH also monitors settlement banks' credit risk routinely using credit ratings from international credit rating agencies and liquidity adequacy indicators published by the central bank, BOT. If either credit rating or liquidity adequacy indicator falls below a specified level, TCH shall transfer cash deposit from that bank to the government guaranteed banks and other commercial banks, in which the accounts have already been opened, and also inform members to mitigate its dependency by shifting its settlement transactions to the other banks. Since the standard level of BIS requirement of BOT has already incorporated 2.5%-3% buffer rates from the minimum requirement. Thus, TCH shall have sufficient time to proceed in advance before the central bank intervenes its operations. Therefore, TCH has neither investment risk nor settlement risk on that bank.

#### **Contingency plan for Settlement bank failure**

If there is a failure of any settlement bank, the members can settle their obligations by transferring money to TCH's account at the other settlement banks or TCH's account at BOT. Moreover, TCH now has the Repurchase Agreement with three banks, which are both settlement bank and non-settlement bank. With this facility, TCH can facilitate the funding need for settlement purpose to

mitigate the risk once there is a failure of any settlement bank. In addition, TCH also explores the appropriate amount of the reserve fund to be set aside for this purpose.

Moreover, TCH set monitoring levels on liquidity adequacy ratio and credit rating, once a monitoring parameter reaches, TCH shall take action by transferring money deposit out from that bank into TCH's bank accounts at the BOT, government guaranteed banks and the other commercial banks as aforementioned procedures. In sum, TCH shall withdraw all cash deposit from settlement banks and commercial banks before regulators step in to suspend their operations and rehabilitate.

In addition, TCH also exercises a liquidity stress test on a daily basis to assess the resilience of TCH financial resource to finance liquidity stresses in case the participants fail to meet its payment obligations, which enable TCH to quantify the potential losses owing to a failure of its settlement bank as well.

These procedures should prevent TCH and members from being impacted if the settlement bank fails and should ensure that there is no heavily relying on a specific settlement bank. However, if there is a failure of any settlement bank, it can be ensured that the impact can be manageable by TCH and members.

9.4 If an FMI conducts money settlements on its own books, it should minimise and strictly control its credit and liquidity risks.

This is not applicable as TCH does not conduct money settlements on its own books

9.5 An FMI's legal agreements with any settlement banks should state clearly when transfers on the books of individual settlement banks are expected to occur, that transfers are to be final when effected, and that funds received should be transferable as soon as possible, at a minimum by the end of the day and ideally intraday, in order to enable the FMI and its participants to manage credit and liquidity risks.

Legal agreement and service agreement have been made upon TCH and settlement banks. The agreement clearly states the procedures and finality of fund transfer which shall occur once the receiving members receive money into their accounts. The settlement time shall be stated in the bank instructions, and the bank shall perform the transfer at the specified time. The duration for a response from the banks is also clearly stated in order to ensure that the settlement process will be handled effectively during TCH settlement period, which is set to be within 10 minutes after the transfer. The banks must also provide a system for TCH to monitor the progress of settlement on real time basis.

## Principle 10

### Physical deliveries

*An FMI should clearly state its obligations with respect to the delivery of physical instruments or commodities and should identify, monitor, and manage the risks associated with such physical deliveries.*

This principle is not applicable to TCH.

#### Key consideration

- 10.1 An FMI's rules should clearly state its obligations with respect to the delivery of physical instruments or commodities.
- 10.2 An FMI should identify, monitor, and manage the risks and costs associated with the storage and delivery of physical instruments or commodities.

## Principle 11

### Central securities depositories

*A CSD should have appropriate rules and procedures to help ensure the integrity of securities issues and minimize and manage the risks associated with the safekeeping and transfer of securities. A CSD should maintain securities in an immobilized or dematerialized form for their transfer by book entry.*

This principle is not applicable to TCH.

#### Key consideration

- 11.1 A CSD should have appropriate rules, procedures, and controls, including robust accounting practices, to safeguard the rights of securities issuers and holders, prevent the unauthorized creation or deletion of securities, and conduct periodic and at least daily reconciliation of securities issues it maintains.
- 11.2 A CSD should prohibit overdrafts and debit balances in securities accounts.
- 11.3 A CSD should maintain securities in an immobilized or dematerialized form for their transfer by book entry. Where appropriate, a CSD should provide incentives to immobilize or dematerialize securities.
- 11.4 A CSD should protect assets against custody risk through appropriate rules and procedures consistent with its legal framework.
- 11.5 A CSD should employ a robust system that ensures segregation between the CSD's own assets and the securities of its participants and segregation among the securities of participants. Where supported by the legal framework, the CSD should also support operationally the segregation of securities belonging to a participant's customers on the participant's books and facilitate the transfer of customer holdings.
- 11.6 A CSD should identify, measure, monitor and manage its risks from other activities that it may perform. Additional tools may be necessary in order to address these risks.

## Principle 12

### Exchange-of-value settlement systems

*If an FMI settles transactions that involve the settlement of two linked obligations (for example, securities or foreign exchange transactions), it should eliminate principal risk by conditioning the final settlement of one obligation upon the final settlement of the other.*

#### Key consideration

12.1 An FMI that is an exchange-of-value settlement system should eliminate principal risk by ensuring that the final settlement of one obligation occurs if and only if the final settlement of the linked obligation also occurs, regardless of whether the FMI settles on a gross or net basis and when finality occurs.

#### Delivery versus payment

TCH applies delivery versus payment (DVP) in the settlement mechanism. The process of eliminating principal risk is undertaken by instructing the TSD to transfer securities from the selling member's settlement account to the TCH's account. Once all securities are completely delivered, the money settlement will be transferred. Thus, a seller can ensure that once securities are delivered, money will be received accordingly. On the other hand, the buyers will receive their securities, only if they have paid the obligation in full amount.

In general, TCH applies settlement model 3, a netting basis for securities and cash transactions. To prevent clearing and settlement failure, securities will be held by TCH before cash is transferred to the seller. The same mechanism is applied, for the buyer; cash must be transferred to TCH account before delivering securities to them.

For securities settled under the net settlement method, the seller must maintain securities in the settlement account by securities settlement time and TCH will instruct TSD to transfer those securities to TCH's settlement account accordingly. Subsequently, TCH shall instruct settlement banks to transfer cash from buyer's account to TCH's account. Settlement banks will transfer cash to seller's account and TSD will deliver securities to the buyer's account according to TCH's

instruction. During the time between delivery of securities from the seller to the buyer, should there is any party be bankrupt or insolvent, TCH shall retain their assets in TCH's account and wait for SEC and the official receiver to claim. However, third parties cannot claim these assets as protected by laws. Moreover, if the buyer fails to make a payment, the TCH would retain access to the securities. While if the seller fail for delivery, the TCH mitigates this risk by requiring collateral to cover securities settlement failures.

### **Linked obligation**

Clearing members are able to delegate clearing and settlement obligations to custodians via the system TCH provides, using Delivery Versus Payment model 3 like clearing members. These settlement obligations will be settled simultaneously at the same time with the clearing members. Once completed, custodians will receive securities or money instead of clearing members. If custodians fail to fulfill their settlement obligations, all transactions will be reversed to be responsible by clearing members to complete those obligations; otherwise, members will fail the settlement with TCH.

Moreover, TCH also provides gross settlement under specific conditions with special procedures. The clearing and settlement are performed via the RTGS-DVP linkage between BAHTNET system, BAHTNET, the Bank of Thailand's Real Time Gross Settlement payment system, and the depository system. Both buying members and selling members have to bilaterally request TCH for gross settlement. Those parties can select settlement day to be any day but no later than the regular settlement day. On settlement date. Upon TCH's instruction, TSD will start gross securities settlement processes by earmarking securities in seller's settlement account. Then the payment instruction will be sent to BAHTNET, the Bank of Thailand's Real Time Gross Settlement payment system. With real-time connection between BAHTNET system, an irrevocable funds transfer system, and the depository system, it ensures Delivery Versus Payment (RTGS-DVP) settlement for large transactions. Once cash settlement complete, upon TCH's instruction, TSD will transfer securities to the buyer's account.

## Principle 13

### Participant-default rules and procedures

*An FMI should have effective and clearly defined rules and procedures to manage a participant default. These rules and procedures should be designed to ensure that the FMI can take timely action to contain losses and liquidity pressures and continue to meet its obligations.*

#### Key consideration

13.1 An FMI should have default rules and procedures that enable the FMI to continue to meet its obligations in the event of a participant default, and that address the replenishment of resources following a default.

TCH defines default events in rules and regulations such that the member shall be deemed to be in default if the following events occur:

- (1) The Member fails to meet the settlement obligations or place margin/collateral.
- (2) The Member fails to place the clearing fund/security deposit.
- (3) The Member fails to pay fees, interests, fines, damages and other expenses.
- (4) A bankruptcy case is instituted against the member and the court issues the receivership order.
- (5) The member fails to pay any other debts in relation to securities/derivatives settlement for which the Member is under the duty to pay to TCH.

In case the member default is declared, TCH shall handle the event according to the Default Management Procedure, which specify steps, role and responsibility of each entity. This procedure has been designed in accordance with laws (SEA and DA), TCH rules and regulations. It has been submitted to the SEC, which is under consideration.

The following default management procedure is designed according to the applicable laws and TCH rules and regulations;

In principle, the member shall be defaulted when the bankruptcy court issues a receivership order or the member fails to pay its obligation to TCH, detailed as below;



### Securities market

TCH will act the one or all of the following procedures :

- Suspend the transfer of securities to be received by the defaulter, and sell that securities in order to use the proceeds thereof to pay for the amount of default and damage to the non-defaulting member, who has obligation to receive money;
  - Suspend the payment that the defaulting member is entitled to receive and use such money to pay for the securities in default and damage. In the case that clearing member defaults in securities delivery, the clearing house may use such money to buy in the defaulting securities and deliver to the non-defaulting member;
  - Require the defaulting member to place collateral as prescribed by TCH;
  - Liquidate collateral that the member in default has placed in accordance with the risk management schemes in order to use for payment due. In the case of securities delivery default, the proceeds will be used for buying defaulted securities;
  - To use fund from the clearing fund as prescribed by the clearing fund's rules;
- In addition, TCH may suspend the clearing and settlement services to the member who is in default until the payment or securities, subject to the default, and compensation for damages, are fully made. For the clients' asset, upon SEC's discretion, the SEC may order TCH to transfer those assets to the other members, as specified in DA and SEA.

### Derivatives market

TCH will act following to the member who is found to be default of payment

- Request the exchange to suspend trading of the defaulting member;
- Transfer the outstanding positions in their clients' accounts and any other relevant assets to another member, as SEC may order;
- Close out clients' positions or member's proprietary positions as procedures described on Rules and Regulations;
- Use margin, security deposit, and clearing fund of defaulting member to reimburse to the TCH;
- Undertake any other action as TCH deems appropriate.

## **The replenishment of resources**

The SEA and DA state that in the event that clearing member is deemed bankrupt, Clearing house should set off the obligation incurred, connected to, or resulted from the clearing member's transactions before or on the date of the receivership order. In addition, Clearing house also should enforce the member's obligation against such member's asset held by clearing house. Thus, clearing house will apply the assets for the clearing system protection, i.e. in the form of security deposit, or a clearing fund to reimburse in order as prescribed in the TCH rules, details as following.

### Securities market

- 1 . Collateral of defaulting member
- 2 . Clearing fund contributed by defaulting member
- 3 . Clearing fund contributed by SET (first tier)
- 4 . Clearing fund contributed by Non-defaulter
- 5 . Clearing fund contributed by SET (second tier)
- 6 . SET Reserve fund

### Derivatives market

- 1 . Margin of defaulting member
- 2 . Security deposit of defaulting member
- 3 . Clearing fund contributed by defaulting member
- 4 . Clearing fund contributed by SET (first tier)
- 5 . Clearing fund contributed by Non-defaulter
- 6 . Clearing fund contributed by SET (second tier)
- 7 . Contingent liability from Non-defaulter (Assessment)
- 8 . SET Reserve fund

After utilizing the TCH financial resources as above, the clearing rules also state the duty of the defaulting member to repay or replenish the fund that TCH has paid on behalf of that particular member. Upon the defaulting member's repayment is received, these monies shall be allocated in reverse order of utilization. Detail as prescribed in principle 4.

In addition, in Derivatives Market, in case where clearing fund is not sufficient to fully cover the damage that may arise from defaulting event, Non-defaulting members are required to replenish to the clearing fund which the amount limit to one time the current value of their contributions.

- 13.2 An FMI should be well prepared to implement its default rules and procedures, including any appropriate discretionary procedures provided for in its rules.

TCH has an ongoing procedure to monitor the member's possibility of default. In daily operation, TCH has a process of timely monitoring the member's financial status, transactions, and risk exposures. The timely and prompt reporting system to the executives, risk management committee, Board of Directors and the SEC is designed. In addition, the operation team monitors the value of settlement obligations of every clearing member on daily basis. If settlement values are higher than their regular transaction, the staff will inform the executives and also alert such member to ensure the settlement. Should the member fail to meet its obligation over a day or the defaulting amount reaches the threshold level, TCH Board of Directors, SET Board of Directors and SEC shall be notified to make a decision promptly. TCH and SEC also arrange communication channel to share member's financial strength and member's obligation to TCH on daily basis.

TCH also has the default process approved by Risk management sub-committee and TCH Board of directors. In case of member default, TCH will notify the defaulting situation to exchange and other members, so that exchange will take the appropriate action against that member i.e., suspend trading. Then TCH will process according to the default rules and inform the exchange, the SEC, the risk management sub-committee and TCH board of directors in a timely manner.

TCH board of directors shall be informed about members' financial strength, the sufficiency of financial resources, stress test results and members' clearing/settlement performance including delay of payment and failure of securities delivery on a quarterly basis. Should there is any concern, the TCH board of director may order special treatment to the concerned member e.g. assigning an in-depth investigation of the member's activities, and managing the financial resources for protecting potential loss that might happen.

- 13.3 An FMI should publicly disclose key aspects of its default rules and procedures.

The process of default rules and procedures are well published in the clearing rules and posted on the TCH website. TCH closely collaborates with SEC to manage the case of member's default in order to clear all obligations effectively. SEA and DA clearly state that the client's asset must be separately kept for each client and also from member's asset. TCH also has an account structure separated for each client's position and separated from the member's position.

Besides TCH rules, SEA and DA also state the procedures in the event of member's default that the official receiver shall give notice to Clearing house and the SEC Office without delay. In the case of default, the Clearing house shall perform as follows;

- Close out the position in the member's proprietary account
- Enforce the performance of member's obligation against such member's assets in the possession of TCH, and
- Set off the obligation incurred from the closing out member's position and clients' position against TCH's obligation which remains unsettled

In view of protection a member's client, investors who have been affected by a defaulting member can claim their loss stemming from member's misconduct from the Securities investor protection fund (SIPF) for Securities market and Derivatives investor protection fund (DIPF) for derivatives market.

13.4 An FMI should involve its participants and other stakeholders in the testing and review of the FMI's default procedures, including any close-out procedures. Such testing and review should be conducted at least annually or following material changes to the rules and procedures to ensure that they are practical and effective.

To ensure the default procedure is practical and appropriate, SEC has set up the working group comprises of TCH, SEC, and clearing member representatives to establish the method to return clients' assets when the member becomes a debtor under receivership. The principle of default procedure has also been raised to have a consultation with the Minister of Justice to ensure that the procedure will have no legal obstacle and be practicable as much as possible.

TCH sets out a test and review of the delay of payment procedure with members and concerned authority via BCP test, which is regularly conducted on a yearly basis with SET group. TCH normally involves the default case test on the delay of payment to perform the overdraft loan activating with settlement banks. The case in BCP test will be the procedure covering communication between TCH, members in concern, and the settlement bank.

SET's Risk Management department will summarize the test result from each business unit and submit the report, where relevant, to SET Risk Management Committee (RMC), audit committee, TCH Board of Directors, SET Board of Directors, TFEX Board of Directors and SEC, so as to develop the BCP plan and remove obstacles in the business functions.

## Principle 14

### Segregation and portability

*A CCP should have rules and procedures that enable the segregation and portability of positions of a participant's customers and the collateral provided to the CCP with respect to those positions.*

#### Key consideration

14.1 A CCP should, at a minimum, have segregation and portability arrangements that effectively protect a participant's customers' positions and related collateral from the default or insolvency of that participant. If the CCP additionally offers protection of such customer positions and collateral against the concurrent default of the participant and a fellow customer, the CCP should take steps to ensure that such protection is effective.

The Securities and Exchange Act (SEA), Derivative Act (DA) and SEC regulations have been clearly stated that CCP and business operator (clearing member) must keep clients' asset separate from their own asset. The DA and SEA prohibit clearing member to use the assets of one client for the benefit of other clients. In addition, to protect each client asset from other clients' default, clearing members are required to record and keep asset of each client separately. Should any client default, the members cannot use client asset for the others.

TCH will not use funds or collaterals from client account to pay any debt of proprietary account, thus the client assets are well protected even when members are bankrupt. Accordingly, TCH rules has prescribed that a member has a duty to segregate its own proprietary assets and positions from their clients' and accurately keep each client's assets and positions at all time.

#### Securities Market

To strive for the segregation from trading until settlement in securities market, the trading order must be identified whether it is proprietary or client. In addition, the members are required by TCH rules to open accounts separately with a central securities depository (TSD) for settling its own and members' clients securities trading transaction. TSD rules also require the members to record and maintain the balance of each client account at all times.

## Derivatives Market

The same segregation process is also applied to derivatives transactions, position keeping and margin requirement of proprietary and clients are clearly separated. In addition to segregation requirement in member side, TCH also records the collateral, positions, obligation and margin assets segregated from client and member's proprietary and clearly segregates those assets from TCH's. Thus, should the member default, TCH will be able to port client's positions and assets to non-defaulting member. (More detail in key consideration 2 in this principle)

In particular, regarding derivatives position, there is no set-off for any two different clients. To ensure that positions will not be offset across clients, TCH has the rule for member to apply gross position keeping and also gross margin requirement for the account they can't ensure same end-beneficiary owner. Therefore, client assets and positions are protected from the default or insolvency regime applicable to the fellow customer.

The clearing member's on-site inspection arrangement has been applied to investigate member's positions and collaterals keeping to ensure that member must maintain each client's assets correctly and one client's assets must not be offset with another client's assets. The member supervision department has responsibility on auditing and will perform on regularly basis. Should there is improperly keeping clients' asset or violation of TCH's rules, TCH shall order member to change its manner and, if any, punishment may be imposed.

In the event of member's default, TCH shall prohibit the defaulting member from accessing the clearing system. Thus, its and client's asset will be frozen. The client, who has account with other members, can request to migrate their assets to such members. According to legislation, the official receiver and the SEC Office shall have the power to segregate and manage asset deemed to be owned by customer in accordance with the rules as specified in the notification of the SEC by consultation with the Minister of Justice or delegate power to TCH in doing so. TCH will collaborate with SEC to manage and transfer the client's positions and asset to other members.

Currently, all clearing members are incorporated in Thailand and are subject to relevant Thai law. Thus, TCH's segregation and portability arrangements are fully enforceable. TCH and SEC also regularly conduct an on-site inspection to ensure that members have complied with mandatory of segregation.

14.2 A CCP should employ an account structure that enables it readily to identify positions of a participant's customers and to segregate related collateral. A CCP should maintain customer positions and collateral in individual customer accounts or in omnibus customer accounts.

TCH rules and regulations enforce members to segregate positions, assets and collaterals of the member and its client in separate account.

### **Securities market**

For securities market transaction, SEA also mentions that member must maintain each clients' assets correctly and one client's assets must not be offset with another client's assets. TCH allows the member to choose to record their clients' securities in TSD either omnibus or individual accounts. If the member chooses the omnibus account for the known individual client, the member must submit the balance of securities holding of each individual client to TSD on daily basis. However, TSD is encouraging the member to change its account structure to be segregated account for the known individual client in order to fully apply the real-time identification of clients' securities.

In the securities settlement process, TCH has received the client account information in trading transaction, according to the information in the order that the member submitted into the trading system, then TCH shall send the client account information including the client's settlement obligation to TSD system for transferring securities from each segregated client account. In cash settlement part, TCH shall calculate all clients' obligations separated from the member's obligation and report to the clearing members but settle together in one bank account.

Regarding to collateral requirement, TCH calculates the requirement based on member's obligations to cover current and potential loss. In securities market, it is calculated based on both client's position and proprietary's position. The collateral requirement covers both current exposure and potential risk exposure as well.

### **Derivatives market**

For derivatives market transactions, TCH has specified and published detail on the position and collateral account structure to the members. Generally, the member's position and collateral must be kept separately from its clients, and each client's position and collateral must be in a separate account. The member's own asset must be in net position while the margin can be either net or gross margin requirement. While for clients, it depends on client type; individual client or institution investors who are end-beneficial owners must be in net position and net or gross margin



requirement, the unknown end-beneficial owner or several beneficiaries or omnibus account must be in gross position and gross margin requirement.

The member has to open and maintain an account for their clients as prescribed in the TCH system free of charge. The accounts have to synchronize with the accounts in the member's back office system in order to update positions in a real-time manner. Thus, TCH shall maintain positions and calculate the margin requirement of members and each client accordingly. In terms of margin requirement settlement of client accounts, though, TCH calculates margin requirement on individual accounts, TCH summarizes all clients' obligations into one single amount. By the same token, the proprietary obligation will be summarized into one single amount. TCH shall compare obligation with collateral if it is a shortage, the member has to additionally place collateral in either cash at settlement bank or securities at TSD which was pre-advised to allow TCH to deduct such assets in the accounts at settlement time. Currently, most of the client accounts in derivatives market are individual segregated accounts.

With respect to segregated account structure, TCH will rely on participant's records containing the sub-accounting for individual clients by using the details of the trading data that the member reported through the trading system of SET/TFEX and clearing system of TCH. The member is fully responsible to open and maintain the accuracy of client's asset, settlement obligation and position in the member's back office system. Especially, for derivatives market, the member is required to maintain positions of each account in TCH system which synchronizes with the member's back office system in real-time manner. Also, the member has responsibility to reconcile the accuracy of each account position between TCH and member's back office system at the end-of-day. Pursuant to TCH rules, member shall be responsible for preparing its clients' asset accounts and keeping accurate and updated data related to the clearing and settlement of its client which is also complied with the omnibus account where the positions of non-segregated clients are commingled.

The collateral supporting member's and clients' position include maintenance margin and variation margin which are calculated by TCH on each account that the member open and maintain in the TCH system. The maintenance margin is aimed to cover potential losses that may be incurred within a certain period, thus will be held and managed by TCH. While the variation margin has been collected to cover actual losses based on daily mark-to-market outstanding positions at the end of the day and it will be paid to member who gains from holding positions.



In case there is a problem in the accuracy of clearing and settlement data, TCH also has the right to request its members to submit reports or provide any information as needed.

- 14.3 A CCP should structure its portability arrangements in a way that makes it highly likely that the positions and collateral of a defaulting participant's customers will be transferred to one or more other participants.

According to TCH rules, the client can request TCH in collaboration with SEC to transfer his/her position and collateral to another member with the evidence that they are the owner of the account.

In the case of member default (or bankruptcy), SEC has the power to transfer client position and margin in the defaulting member to non-defaulting members. This administrative power is also stated clearly in TCH rules. For the client beneficial, SEC and TCH shall endeavor to transfer clients' asset, even for omnibus account which all the end-beneficial clients can't be found. If the clients can prove that a portion in that account is owned by them, those portions can also be transferred to the other members similar to the individual segregated account. Transferring shall be made in the clearing system "SET CLEAR" having an immediate effect once TCH approves the transfer. The procedure and time schedule are published in TCH rules.

Moreover, if some clients of a member could not be found or specified, TCH, by the consent of the SEC, can close out all positions left for the sake of clearing system security and safety. All positions will be forced liquidating into cash.

- 14.4 A CCP should disclose its rules, policies, and procedures relating to the segregation and portability of a participant's customers' positions and related collateral. In particular, the CCP should disclose whether customer collateral is protected on an individual or omnibus basis. In addition, a CCP should disclose any constraints, such as legal or operational constraints, that may impair its ability to segregate or port a participant's customers' positions and related collateral.

The rules and regulations on the segregation and portability of either member or its client positions are well defined and announced on the TCH website.

As the protection from clearing member's bankruptcy, client assets, including their assets in the form of book-entry of securities kept in the TSD, are protected by the SEA and DA from the assets of the member and its clients are segregated from each other. Moreover, the DA and SEC notification have also provided the protection for clients' collateral on an individual basis by



prohibiting the clearing member to use the assets of one client for the benefit of its own or for other clients.

According to legislation, the official receiver and the SEC Office shall have the power to segregate and manage assets deemed to be owned by clients in accordance with the rules as specified in the notification of the SEC by consultation with the Minister of Justice. The laws also clarify the risk pertaining to the portability of client position and collateral in case where some clients of a member could not be found/specified or where a transfer cannot be made, TCH may close out all positions for the sake of clearing system security and safety. All positions will be forced liquidating and remaining collateralized assets (if any) will be released and returned if possible to the respective clients otherwise will be taken care by the SEC and official receiver. In accordance with laws, all the portability and close out are SEC and receiver's power, TCH shall cooperate with the officers in doing so. The TCH rules have already been specified to support this manner.

## Principle 15

### General business risk

*An FMI should identify, monitor, and manage its general business risk and hold sufficient liquid net assets funded by equity to cover potential general business losses so that it can continue operations and services as a going concern if those losses materialize. Further, liquid net assets should at all times be sufficient to ensure a recovery or orderly wind-down of critical operations and services.*

#### Key consideration

15.1 An FMI should have robust management and control systems to identify, monitor, and manage general business risks, including losses from poor execution of business strategy, negative cash flows, or unexpected and excessively large operating expenses.

To ensure that TCH has appropriate risk management, TCH risk management sub-committee and TCH board of directors establish a risk management framework for TCH operation. The risk management framework is also in line with SET Group. In terms of general business risk, before implementing any new business, TCH has to evaluate different scenarios that may impact revenue/expense and also the risk associated with each scenario. Based on the analysis of risk committee, TCH board will make a final examination and decision.

TCH board of directors takes a crucial role to ensure that ongoing operations, strategic direction, and investment are performed and monitored. Thus, business plans as well as the annual budget are approved by TCH board of directors. Then, TCH management monitors, evaluates, and reports business progress and financial status to TCH board of directors quarterly and also monitored and maintained shareholder's equity in consistency with regulations. TCH's financial statement is subject to external audit. Moreover, TCH calculates the adequate appropriate size of shareholder's equity by considering new business plans, business as usual operation and regulations. TCH board of directors has to approve the financial statement which already reflects all business plans and regulations.

TCH management aims to maintain service standards and prevent fraud from daily operation via various tools such as the reporting lines, operational manual, straight-through processing mechanism for payment and settlement, check and balance process as well as asset reconciliation process with settlement banks and central securities depository. The company's financial status has been regularly monitored on both expense and revenue which guides the sufficiency of capital for the future trend. The financial statement is reported to the TCH Board on a quarterly basis. Moreover, SET internal audit department is taking a role in auditing TCH operations by using an auditing program.

15.2 An FMI should hold liquid net assets funded by equity (such as common stock, disclosed reserves, or other retained earnings) so that it can continue operations and services as a going concern if it incurs general business losses. The amount of liquid net assets funded by equity an FMI should hold should be determined by its general business risk profile and the length of time required to achieve a recovery or orderly wind-down, as appropriate, of its critical operations and services if such action is taken.

TCH's shareholder's equity is adequate for the continuity of its operations and services as required by SEC's regulations which is, a sufficient amount to cover the operating expenses more than the minimum periods specified by SEC with a high liquidity.

Currently, TCH maintains its shareholder's equity according to PFMI and EMIR requirements, which is higher. According to PFMI, TCH maintains its liquid net asset funded by equity to cover 9 months of operating expenses. The -9 month period is based on the assumption that TCH can absorb investment loss for 3 months and another 6 months for the winding down process. Based on EMIR requirements, TCH maintains an equity amount consisting of (a) winding down (b) operational and legal risk (c) credit, counterparty, and market risk (d) business risk to ensure that the equity can cover the shock period and wind-down process. Moreover, this equity capital is separated from the default waterfall that is used to cover credit risk.

In case TCH is facing financial difficulties and its recovery plan is triggered, TCH will take measures to rectify the liquidity problems by adjusting its business strategy, business model, or organizational structure in case the matter requires TCH board's approval, the meeting can be set up. Moreover, SET, its major shareholder may inject more capital to remedy the difficulties.

15.3 An FMI should maintain a viable recovery or orderly wind-down plan and should hold sufficient liquid net assets funded by equity to implement this plan. At a minimum, an FMI should hold liquid

net assets funded by equity equal to at least six months of current operating expenses. These assets are in addition to resources held to cover participant defaults or other risks covered under the financial resources principles. However, equity held under international risk-based capital standards can be included where relevant and appropriate to avoid duplicate capital requirements.

#### **Recovery or orderly wind-down plan**

SET and TCH develop the business continuity plan related to the business and technology aspect, as well as the BCP testing plan with the members at least once a year. The plan involves the process for a recovery and orderly wind-down following the framework approved by the TCH Board. Apart from this, the Securities and Exchange Act (SEA) and Derivatives Act (DA) contain the clause for protecting the asset of clearing members and customers regarding the event where the court issues a receivership order to TCH. Thus, if a such event occurred, the SEC may gather and return the asset of clearing members and clients to the owner or transfer those assets to the bridge institution to proceed with clearing and settlement functions. Under SEA, SET can perform the CCP function. Thus, if TCH is in the event of an orderly wind-down, SET will take a role as a clearing house to smooth the clearing and settlement operation in Thailand.

#### **Resources**

Apart from financial resources, clearing fund and SET reserve funds, TCH must maintain its shareholder's equity which complies with SEC rules regarding general business risk. The SEC requires TCH to have sufficient financial resources for the proper performance of its operation. TCH's equity is sufficient to cover more than 9 months of operational expenses and is safely kept in the form of high-quality and sufficient liquid assets. Moreover, as SET subsidiary, any damages arising from TCH's current business has also been covered by SET group's insurance.

15.4 Assets held to cover general business risk should be of high quality and sufficiently liquid in order to allow the FMI to meet its current and projected operating expenses under a range of scenarios, including in adverse market conditions.

TCH's equities are invested in highly liquid assets. Currently, more than 90% of TCH's equities are in Government Bonds. Besides, the rest of the funds are deposited in commercial banks with a minimum credit rating of AA-. In addition, TCH sets the average portfolio time to maturity to not exceed 2 years in order to mitigate the adverse price effect. TCH also monitors their portfolio value and marks to the market on a regular basis.

Furthermore, TCH reviews and also projects its budget in advance on an annual basis. The future business plans are included in the budget review. As a result, TCH applies an estimated budget, to determine a sufficient level of equity to cover the general business risk.

15.5 An FMI should maintain a viable plan for raising additional equity should its equity fall close to or below the amount needed. This plan should be approved by the board of directors and updated regularly.

TCH has reviewed and also projected the budget in advance so a sufficient level of equity is ensured to cover the general business risk. Generally, TCH determines a sufficient level of equity to cover more than 9 months of operational expenses. This plan to cover the equity shortfall will be reviewed and approved by TCH board of directors. However, if there is a tendency for shortfalls, TCH can ask for SET board of director's approval to support additional funds in case that the funding shortfall is considered as a significant amount.

Moreover, TCH board of directors will consider the necessity of raising funds based on TCH's financial status before submitting the request to the SET Board of directors for approval.

## Principle 16

### Custody and investment risks

*An FMI should safeguard its own and its participants' assets and minimize the risk of loss on and delay in access to these assets. An FMI's investments should be in instruments with minimal credit, market, and liquidity risks.*

#### Key consideration

16.1 An FMI should hold its own and its participants' assets at supervised and regulated entities that have robust accounting practices, safekeeping procedures, and internal controls that fully protect these assets.

TCH financial resource consists of TCH's Clearing Fund, Reserve Fund and TCH's equity while the participants' assets comprise the participants' Clearing Fund, Securities Deposit, and margin. TCH invests its own financial resource and participants' asset only in cash in the qualified commercial banks and government bonds held in TCH dedicated account at Central Securities Depository (or TSD) and in regulated custodians.

All commercial banks and custodians are regulated by BOT and must meet credit rating as an investment criterion that is not lower than AA- or being a special bank guaranteed by the government. The custodian banks are selected and reviewed by SET Investment Committee and pre-screened by Procurement Committee, which consists of staff from the SET investment team and TCH. The selected custodian must meet the qualification criteria mainly based on financial strength, and technical and financial aspects.

TCH performs regularly monitoring and inspection of the qualification of the commercial banks, in which TCH deposits money, as well as custodians and asset management companies. On daily basis, TCH shall reconcile asset deposited at commercial banks and custodians against TCH record automatically by the system and report to executives. The asset balance shall be reported to SET Investment Committee on monthly basis and TCH Board on quarterly basis. The SET investment team also regularly monitors the performance of the custodian and asset management companies and conducts the inspection every two years.

16.2 An FMI should have prompt access to its assets and the assets provided by participants, when required.

The SEA and DA provide TCH legal enforcement of the member's margin or collateral in the event of the member's insolvency. In the event when a member or TCH is under receivership order by the court, the customers' and members' assets shall also be protected from being claimed by other creditors of the member or TCH. The SEA also regulates Securities Companies receiving the Fund Management licensing from SEC as the fund manager and the Custodian to record and segregate assets received from asset owners. Thus, in case the custodian went bankrupt and was issued a receivership order, all TCH assets, which are kept in a sub-account at such custodian bank would still be protected and returned to TCH. The details of enforcing such collateral are also disclosed in TCH rules.

For collateral in terms of securities, TCH requires clearing members to outright transfer the securities collateral to TCH account at TSD. Therefore, TCH can withdraw and deposit as well as claim the financial benefit earned from the assets. Furthermore, the collected margins in terms of cash and government bond have been kept with the regulated and well-performed banks to avoid access being denied.

Moreover, according to investment policy, TCH can only invest in highly liquid and low-risk assets. Thus, most of the assets can be accessed immediately while some of the assets can be accessed within 2 days.

16.3 An FMI should evaluate and understand its exposures to its custodian banks, taking into account the full scope of its relationships with each.

TCH's investment will be managed by SET Investment Committee which also evaluates the financial soundness and operation efficiency of the Custodian bank on a regular basis. TCH evaluates custodians in the aspect of the custodian bank, settlement bank, and investment bank by setting the total cash deposit not exceeding 25%, which is the concentration limit of a cash deposit in each commercial bank. In addition, TCH's deposit shall not exceed 5 % of the total deposit of such commercial bank. TCH also conducts in-depth due diligence every two years to evaluate and review whether the custodian's qualifications are met. TCH partially deposits the investing securities (government bonds) in TCH's own account at TSD to enable prompt accessibility and then lowering concentration risk in custodian banks.



16.4 An FMI's investment strategy should be consistent with its overall risk-management strategy and fully disclosed to its participants, and investments should be secured by, or be claims on, high-quality obligors. These investments should allow for quick liquidation with little, if any, adverse price effect.

Investment and risk management policies are set by TCH Board of Directors and specified in Enterprise Risk Management Framework. The SET Investment Committee (SET-IC) has the responsibility for ensuring that the investment and operation framework is in line with the policy approved by TCH Board. The IC consists of SET president as a chairperson, and the committee consists of CFO and division head from the product and market division, the market supervision division, and a representative from the risk management and investment department, also TCH Managing Director.

A current investment policy is structured to ensure that market risk, credit risk concentration risk, and liquidity risk are addressed. The policy only allows investing in high-quality assets, low credit risk, and highly liquid to mitigate the price impact.

Market Risk :Average time to maturity not exceeding 2 years

Credit Risk :Only securities issued or guaranteed by Government / Central Bank are allowed. Cash deposits at commercial banks are allowed with only the banks having a minimum credit rating of AA-.

Concentration Risk :Total deposit exposure; including saving and time deposit to a single bank is not exceeding 25 %of total TCH investment value and deposit at each bank is not exceeding 5 % of the bank's total deposit.

Liquidity Risk :Investing securities must be able to liquidate and return cash to TCH within 2days.

The investment policy allows not investing in risky assets, neither equity instruments nor corporate bonds. Thus, there is no event that TCH invests members' assets in its own securities. TCH discloses investment policy in TCH rules. Should there is any amendment, the member hearing process and SEC approval process must be conducted.

In addition, TCH monitors and measures market risk by calculating the mark to market of the overall portfolio every month and does stress testing based on the BOT criteria. TCH also has a monthly procedure to monitor the financial strength of the commercial banks such as BIS ratio and credit rating from international agencies. If such bank fails to meet those criteria, TCH shall transfer cash

to other commercial banks or central bank and government guarantee bank, which the accounts have already opened.

TCH has set several triggering levels based on the liquidity adequacy indicators, represented by BIS ratio. If a commercial bank triggers the 1st monitoring level, which is the standard level of BOT which is higher than BOT's minimum requirement. For settlement banks, TCH shall gradually transfer cash deposits out and maintain at the required level for member's withdrawal requests. If the minimum requirement level of BIS ratio reaches, TCH shall transfer all cash deposits out from that settlement bank in problem, if the member wants to withdraw cash deposit, they have to inform in advance and TCH shall transfer cash from the other banks or TCH's account at BOT to member's account. While for the other banks which are not settlement banks, TCH shall transfer all cash deposits out to the government-guaranteed bank or BOT since the BIS ratio triggers the 1st level, which is the standard level of BOT.

TCH has considered the combined risk exposure of an entity holding both an investment bank, and settlement bank and being the parent company of the clearing members by monitoring the financial status, BIS ratio, and credit rating of such bank.

## Principle 17

### Operational risk

*An FMI should identify the plausible sources of operational risk, both internal and external, and mitigate their impact through the use of appropriate systems, policies, procedures, and controls. Systems should be designed to ensure a high degree of security and operational reliability and should have adequate, scalable capacity. Business continuity management should aim for timely recovery of operations and fulfilment of the FMI's obligations, including in the event of a wide-scale or major disruption.*

#### Key consideration

17.1 An FMI should establish a robust operational risk-management framework with appropriate systems, policies, procedures, and controls to identify, monitor, and manage operational risks.

TCH establishes the risk management policy framework pursuant to the risk management framework of the Stock Exchange of Thailand (SET) Group relevant to the risk management guideline of COSO and ISO31000:2009 international standards. The risk management system complies with decent international standards and is consistent with the direction of the SET Group.

The Risk Management Framework of TCH comprises risk identification, measurement, and mitigation while establishing decision controls as well as monitoring and reporting policies to ensure effective management of operational risk. TCH utilizes the risk map to analyze the risk level. If a risk is assessed to be relatively high or high, TCH will consider preparing an additional mitigation plan or improving the effectiveness of the current internal control measures as appropriate. The Operational Risk Management Framework, in conjunction with other supporting documents, also addresses the communication procedures and standards of the Clearing House.

In particular, the objective of the Operational Risk Management Framework is to provide overall guidance and a common approach to TCH staff to measure, manage, and control operational risk, within the defined risk appetite and risk tolerance thresholds. The Operational Risk Management Framework identifies core clearing processes, key risks, and risk impact ratings for identified risks.

The Operational Risk Management Framework defines TCH risk impact and likelihood ratings for each core clearing process.

TCH and IT department put a high effort to evaluate and review the overall system infrastructure which has been designed and built with fully redundant and no single point of failure. To ensure that the system works as designed, there are regular tests for system failover. For day-to-day operation, TCH applies at least the four-eyes principle of every action.

To ensure robustness in the operational process, TCH employs several methods to handle operational risk such as the adoption of a straight-through process (STP), Standard Operation Procedure (SOP), operational manuals, segregation of duty, roles and responsibilities of staff, the hierarchical management, code of authorization, self-auditing (entry and authorize by different users), timely internal and external audit. The external auditors audit TCH yearly in various dimensions including operations and finances. In addition, TCH is also subject to SEC inspection.

- 17.2 An FMI's board of directors should clearly define the roles and responsibilities for addressing operational risk and should endorse the FMI's operational risk management framework. Systems, operational policies, procedures, and controls should be reviewed, audited, and tested periodically and after significant changes.

TCH's Board of directors oversees and approves risk management policy, framework and business continuity management policy, which specifies roles and responsibilities of all related parties. The Business Continuity Management Policy "BCM" is set out by the Board of directors aiming to protect the public interest, prevent TCH from losing its reputation and comply with related regulations or standards, its objectives are as follows,

1. The operating team must determine business continuity procedures that comply with standards, policies, and the SET Group procedures. Build business continuity as the organization culture, training, developing, and encouraging all staff to realize and understand the importance of business continuity.
2. The operating team must plan, test and review all related documents such as BCP regularly or once there is a significant change. Also, report test results to the board and related managing team in order to ensure that the plan is practical, counteract the critical events and be able to restore the business and significant resources.
3. All managing teams and staff must realize and associate with the business continuity plan to ensure that the plan is successive.



Moreover, the TCH Board of directors is responsible for designating policies and a framework of risk management of TCH. The TCH Board of directors appointed a risk management committee consisting of some of TCH board members and from experts in risk management area to give opinions and recommendations to ensure that all significant enterprise-wide risks are managed comprehensively in accordance with policies and international standards.

TCH risk management framework is reviewed annually. The results or plan adjustments will be reported to the TCH Board of directors after they are reviewed.

The TCH Board of directors has strongly supported management in the segregation of duty, checks and balances, and control to ensure that management's corrective actions were implemented. In addition, the delegation of authority has been clearly determined and documented.

The TCH Board of directors has appointed an audit committee to supervise and review TCH's internal control system to ensure conformity with international standards.

The internal audit department, an independent unit, shall report directly to the audit committee and then give advice to the TCH Board. The department shall undertake the roles for review, monitor and assess the operational procedure and its risks of TCH. The annual audit plans are approved by TCH Board of directors at the beginning of the year. As prescribed by the general risk policy of the risk management, the internal audit department is responsible to audit and evaluate the adequacy and effectiveness of the internal control systems according to TCH's annual audit plan, which was developed using a risk-based approach. The audit findings and management responses have been directly reported to the audit committee and subsequently to TCH Board of directors.

For IT aspect, the IT Sub-Committee (ITC) has been appointed to review, make advice and approval on IT strategic plan including software vendor qualification of highly importance system, review and make advice to SET Group in terms of IT development plan and current procedures. The ITC includes external IT experts and SET Groups' IT Executives. In terms of system development, TCH's applications developments and maintenance of existing programs align with SET group's methodologies which include the steps of requirement gathering, sign-off, testing, and system promotion. Thus, the changes to system software are authorized and widely tested with participants for acceptance before launch. Besides, TCH has regular meetings with members and stakeholders at both the operational and executive levels to ensure that any change and its impact have been thoroughly analyzed and well-informed to stakeholders in advance.

Furthermore, the external audit plays an additional role in evaluating and giving managerial advice to the executives for any operational risk that may arise to the TCH, especially for the issues that

tend to have a conflict of interest if it is audited by the persons in the organization . The audit will be conducted annually and focused on several areas; operation procedure, accounting, and IT security, for example, margin rates calculation, fees calculation, returns on collateral management, and the usage of the admin user .According to IT security, an external audit will also conduct the penetration test in order to find the weaknesses of IT systems and prevent cyber-attack, specifically trading systems, clearing systems, and depository systems. The test result will be reported to the TCH Board and also the SEC on yearly basis.

In addition, SEC shall regularly inspect TCH in every area including IT, system changes implementation procedure, Operational procedure, Risk management models, and tools.

17.3 An FMI should have clearly defined operational reliability objectives and should have policies in place that are designed to achieve those objectives.

The operational objectives of TCH are to provide efficient and high-standard clearing services with international standard connectivity to the securities and derivatives trading through the exchanges as a central counterparty with a profound clearing system and managerial risk containment. To pursue the objectives, the Clearing system is designed to be a web-based application that allows members' applications to connect through standard message connectivity in order to lessen members' workload, minimize human errors, and increase the reliability of the system.

Under SET Group, the Clearing system is one of the critical systems. To represent significance of the Clearing system, It has dedicated sufficient staff to support the operation and improvement of the system. The Service Level Agreement (SLA) is set to the highest level of accountability of IT department including System availability, Resolution time, Capacity, and system incident. The numerical standards of Recovery Time Objective (RTO), and Recovery Point Objective (RPO) of the clearing system are stipulated to 2 hours and 1 minute respectively in the SLA and clearly specified in the Business Continuity Plan (BCP) and Disaster Recovery Plan (DRP) documents. In addition, the acceptable rate of error affecting participants is stated in the KPI of the organization, etc.

The actual performance according to SLA is reported to the management on monthly basis. A meeting arrangement between Executives of TCH and IT will be regularly conducted to report the progress of any project, incidents, and service level of the passing months including system performance and capacity usage.

In order to fulfill the operational objectives, TCH has implemented operational reliability procedures as follows,

- Providing an efficient and user-friendly system for participants with a high capacity to support the number of transactions.
- Placing alternative sites in order to support any dangerous and disastrous events, such as natural disasters, political upheaval, contagious diseases, etc., while smoothing regular businesses
- Having standby for a backup system to immediately take over the main site system. The 3rd backup site is also prepared and can be operated if the backup site is down.
- Setting test plans for backup systems and sites annually.
- Testing of business continuity plans, with members, participants, banks, software vendors, etc, timely and regularly.
- Maintaining and evaluating the incident report to determine and remedy any root causes
- Upgrading any obsolete software and hardware to maintain its robustness
- Backing up significant and historical references of data, information, transactions, and logs of all occurrences in the clearing system.

In terms of Clearing system, the DRP test including the case of failover of both the primary site and secondary site shall be conducted once a year, members are also invited to the test. These mechanisms are created to ensure that all reliability objectives (such as RTO/RPO) are met.

17.4 An FMI should ensure that it has scalable capacity adequate to handle increasing stress volumes and to achieve its service-level objectives.

There is an annual test of the scalable capacity of the stress volumes to assure that the system can support over-normal-level transactions or records based on historical data.

In addition, when there is a system change, IT department also conducts the non-functional test such as the system capacity test, before launching the new enhancement. System and Services key capacity are reviewed monthly and upgrades will be made if necessary.

IT operation under SET Group conducts real-time monitoring all significant systems such as Trading, Clearing, and Depository including other supporting systems related to those specified areas. Once capacity usage nearly reaches the threshold level or there is malfunction occurred, IT operator will resolve it and escalate the event to the relevant person in-charge.

Capacity usage will be reported to the executives regularly. The warning maximum limit as a percentage of the hardware capacity has been set up to give a warning alarm to review the capacity of the related systems. This is to ensure that TCH has enough lead time to upgrade the system. IT audit will be conducted for ensuring the appropriateness of system testing and monitoring.

17.5 An FMI should have comprehensive physical and information security policies that address all potential vulnerabilities and threats.

IT security policies have been implemented for all systems in SET group including the clearing system of TCH. The policy including physical and information security has been reviewed by Chief IT Officer and submitted to TCH Board of directors for approval. In addition, SET Group focuses on upgrading the operational level of its IT professionals according to global best practices in terms of information security (ISO 27001) and reducing the risk of various threats to make the business run smoothly according to IT management standards (ISO 20000). This helps increase efficiency and service to reduce operational cost and increase customer satisfaction. SET uses international IT governance guidelines to develop applications for working system operations, determine IT security policy, and review work procedures to strike a balance between control and flexibility.

**Physical security policy:**

- A control of access to the restricted sites or hardware areas, including the working area of a significant system for fund transfer/processing is implemented. No unauthorized personnel is allowed to access that area.
- The sites specified for special purposes, such as alternate sites for business continuity plans, or disaster recovery plans, are prepared and controlled the accessibility. Only exclusive team staff are assigned to access and run operations.

**Information security policy:**

- The use of a computer and its facilities requires password logging-in, a 2-factor authentication is required to access vital systems, and automatically force logged out when not being used for a certain period.
- Data classification policy is implemented and defined to allow only relevant and authorized staff to access or view information related to risk exposure and clearing and settlement transactions of clearing members whereas the irrelevant staffs shall be prohibited.





- Information, transactions, and records of TCH activities can be accessed only by authorized personnel with a user/password of their own. Each personnel is assigned a limited scope of access to each group of functions. No entry to other functions is allowed if they have no duty and concern.
- Data leakage prevention has been established by IT security for preventing any leak of data by monitoring the copying, retrieving, deleting, etc., by any persons not relevant to that system.
- System or software developed by outside vendors has to be compliant with the SET security policy as well as being tested to be not harmful to the main functions.
- Information and records are daily and timely backed up in a secured means of data storage, and stored in a safe place.
- Critical system, especially TCH system, is designed to be a closed-end system, where members and participants have to access by the proprietary network.
- Automatic expiry of passwords of system users is set in order to make sure that no unintentional user can learn to access the system data.
- Creating awareness among all staff to prevent data leakage such as phishing mail tests and surfing prevention is in place.

Moreover, IT security procedure consists of Human Resource Security, Asset Management, Access Control, Cryptography, Physical and Environmental Security, Operations Security, Communications Security, System Acquisition, Development and Maintenance, Supplier Relationships, Information Security Incident Management, Information Security Aspects of Business Continuity Management and Compliance.

17.6 An FMI should have a business continuity plan that addresses events posing a significant risk of disrupting operations, including events that could cause a wide-scale or major disruption. The plan should incorporate the use of a secondary site and should be designed to ensure that critical information technology (IT) systems can resume operations within two hours following disruptive events. The plan should be designed to enable the FMI to complete settlement by the end of the day of the disruption, even in case of extreme circumstances. The FMI should regularly test these arrangements.

As a core infrastructure in the Thai capital market, SET group realizes the vital role to provide continuity of services for the important functions; trading, clearing and depository. A Business Continuity Plan (BCP) exists to facilitate resumption of critical business functions in the event of a

disaster. The BCP covers loss of premises, failure of systems and communication lines. The data are backed up daily and stored in a secured location. Furthermore, environmental control systems and an emergency power supply (generator) are in place at the data center. There is also an uninterruptible power supply (UPS).

Besides, being the continuity of critical functions, the BCP aims to assign responsibility, mitigate reputational risk, and guide preparedness at the secondary site to ensure that all core business functions can continuously operate.

A business continuity plan is designed to ensure that the processing of critical applications can continue and be tested at least annually with external participants. There are alternate sites and facilities and BCP manual to enable the BCP. The BCP manual consists of the following areas;

1. The objectives of BCP:

- To ensure that TCH can continuously operate core businesses during the disaster event happened to the main site e.g., Fire, Explosion, Pandemic, Terrorism, Flood, Earthquake, Protestation, etc.
- To guide staff and associates to proper conduct during the crisis.
- To reduce impact on TCH's reputation, confidence and financial effect during crisis.
- To encourage all core businesses in keeping copy of vital records at the sites which can be accessed including working at home.
- To prepare all necessary office tools and resources required during working at other sites or at home.

2. Recovery Strategies:

Cover several scenarios such as;

- Multiple periods which the main site cannot be entered. Less than 7 days: Management team, core staff and members' staff shall operate at the recovery sites. More than 7 days: Computer capacity and workstation for all staff shall be reviewed in order to support all staff.
- Settlement process failure e.g., connectivity between TCH and banks fail. The manual cash transfer in paper form shall be utilized.

3. List of vital records including operation manual, contact list of members' operation staff and settlement banks' staff etc.



4. List of BCP staff: Role and contact
5. Call tree.
6. List and procedures in recovery critical business functions and applications.
7. Recovery procedure
8. Return to normal procedure

The BCP test is designed to cover various scenarios such as flood, fire, earthquake, political unrest etc. It is expected to resume TCH operation within a specified duration.

TCH has an internal system / communication channel in place which facilitates designated persons such as executives and staff to inform and acknowledge the situation via a mobile application, called SET DNA.

The crisis management procedure and line of command during crisis event are defined into 2 flows; before and after the BCP is activated. The IT related escalation process has been established to identify communication channels, decision-making from internal to relevant authorities. These communication procedures and line of command are also tested annually in BCP test.

For data resumption, all exchange's main functions, including CCP, are simultaneously backed up by every transaction and data to commit real-time resumption of data. The reconciliation procedure has been identified to reconcile trade information data in the trading system and clearing system to ensure that all the trades have been transmitted to the clearing system. In addition, TCH also provides the information for the member to reconcile their clearing transactions both intra-day and end-of-day. Should there be any discrepancy, they are able to notify TCH to check and resolve it.

Furthermore, TCH makes available both primary and secondary computer sites. The secondary site will be ready to be used for IT systems, office supply, and facilities and are designed to differentiate from the main site. The location of the secondary is considered to be unpublic and not close to the primary to prevent the same effect from such an event impact to the primary. Additionally, in the extreme situation when both sites are inaccessible, the alternate site, aka 3rd site, will be operated in a location far from the primary and secondary sites.

In the severe circumstance when no system is available including back-up and third sites, TCH has arranged an offline procedure so-called "CCP Offline". The offline procedure will ensure completeness and continuity of main CCP functions including clearing and settlement, collateral placement, and intra-day margin call if the market fluctuate. The manual process between TCH, TSD and settlement banks has been designed as the last resort to ensure that TCH can clear and settle with clearing members within the specified period.

SET group including TCH set up the BCP test on a yearly basis concerning wide-scale events and major disruptions. BCP is tested as the industry-wide test, which includes related participations such as Brokers, clearing members, depository members, settlement banks, Bank of Thailand, Listed companies and TSD as a Central Securities Depository. Testing date shall be well prepared and jointly agreed with related organization such as The Bank of Thailand “BOT” in order to facilitate the members who also are the BOT’s participants. Test scenario are conducted and reviewed every year to cover different possible scenarios.

The BCP test includes IT system and operational staff ready to perform all significant business functions such as trading, surveillance, clearing & settlement and depository functions, in order to seamlessly provide services to members/participants.

The test also involves the production and/or back-up run with the concerned parties’ back-up and/or production, or vice versa. After BCP testing, Internal Audit Committee, which is an independent unit, is responsible for assessing and reviewing the result, making comments, and reporting to SET’s risk management committee, SET’s audit committee, TCH, and SET Board of directors. The Risk Management Department has the responsibility to report test results including TCH and its members to the SEC within the specified time. Business units have to review the BCP plan annually before and after the test.

- 17.7 An FMI should identify, monitor, and manage the risks that key participants, other FMIs, and service and utility providers might pose to its operations. In addition, an FMI should identify, monitor, and manage the risks its operations might pose to other FMIs.

In terms of risks that members or utility providers may pose to its operations such as extremely high and concentrated trading volume, power outage, communication failure, etc., they are mitigated by conducting testing of disaster recovery plan bi-annually. Scenarios will be varied and identified by management. It will be confidential to all operational staff until the test time in order to ensure that the staff are prompt to operate and handle any situation.

To mitigate the risk arising from members, TCH has assigned Member supervision team to do on-site inspection and inspect member’s required material documents and member’s operation to ensure that they are all ready for risk planning and operate in compliance with TCH’s rules and regulations.

In some situations when fundamental infrastructures fail to serve normal needs, for example, during a natural disaster, TCH provided members the facilities for their business continuity at the alternate sites in order to make sure that the members' operation can operate smoothly.

For other FMI, TCH has two main links with local FMIs (1) the link with TSD to facilitate the securities settlement as well as a custody of collateral in form of securities and (2) the link with BOT via a system called BAHTNET to facilitate money settlement for securities trading. The legal arrangement is provided in various forms such as legal contracts, rules, and regulations to define the duties and liabilities of each entity and ensure the security and operational process within their systems.

The related operational risks due to link establishment are basically mitigated through the monitoring system, regular IT audit, BCP testing, and off-line procedure. TCH, TSD, and BOT jointly conduct the test for Business Continuity Plan (BCP) as mentioned previously. Moreover, TCH and TSD as members of BAHTNET system also attend the Disaster Recovery Plan (DRP) test with BOT regularly to cover the significant operations between TCH, TSD and BOT in order to mitigate operational risk and secure the effective services and the business continuity during emergency or disaster time.

In addition to BCP test which assure smooth operation, BOT conducts a test in the event of BAHTNET system disruption (BAHTNET Offline) once a year. When BOT activates BAHTNET Offline, TCH will send Multilateral Funds Transfer (MFT) transaction according to the format, channel and time pre-specified by BOT to assure the money settlement will be performed completely.

## Principle 18

### Access and participation requirements

*An FMI should have objective, risk-based, and publicly disclosed criteria for participation, which permit fair and open access.*

#### Key consideration

18.1 An FMI should allow for fair and open access to its services, including by direct and, where relevant, indirect participants and other FMIs, based on reasonable risk-related participation requirements.

#### Type of clearing member

##### Securities Market / Securities Clearing Service

Currently, there are two types of clearing members in securities clearing service, detail as follows:

- 1) General Clearing Member (GCM): a member who undertakes the securities clearing and settlement for itself or clients, or for other members or other Members' clients.
- 2) Direct Clearing Member (DCM): a member who undertakes the securities clearing and settlement for itself or clients whereby the member's clients must not be the members of SET or the members of TCH.

Moreover, apart from clearing members, TCH has also bound with Settlement agent (SA) by agreement. Settlement agent acts as an agent to settle the clearing and settlement transactions, for securities clearing services, on behalf of clearing member (DCM & GCM) whereas such Member is still a direct counterparty to TCH as given in Regulations. This means, in case SA cannot settle, TCH will revoke the Securities clearing and settlement transaction and re-process such unsettled position back to the clearing member as being a counterparty with TCH.

Basically, SA can be custodian banks, commercial banks, government banks, finance companies, and securities companies. Moreover, SA shall agree and consent to comply with the relevant regulations of TCH including notifications, orders, and circular letters.

**Derivatives Market / Derivatives Clearing Service**

There is only one type of clearing member, the General Clearing Member (GCM) which is also a member of TFEX. GCMs are permitted by TCH to use the service made available by TCH, for a member's account, or for the account of a member's client, or for the accounts of other members, for which members conduct clearing on their behalf.

Requirement for Clearing member

TCH has set up minimum membership requirements to allow fair and open access to TCH clearing and settlement services upon the risks of each applicant that might pose to TCH's stability. There are general requirements and financial requirements for each type of clearing member, as clearly stated in the rules and website.

<b>Requirement</b>	
<b>Securities Business</b>	<b>Derivatives Business</b>
1. Be a juristic person licensed to conduct business in the category of securities brokerage or securities dealing, or other persons as prescribed by the TCH; 2. Must maintain adequate net capital ratio (NCR) as prescribed by SEC; 3. Must be the depository member of TSD; 4. Must be the clearing fund member.	1. Must obtain a derivative broker's license; 2. Must be a TFEX member; 3. Must have risk management staff who are not marketing licensees or traders; 4. Must maintain adequate net capital ratio (NCR) and/or capital adequacy ratio (BIS ratio) as prescribed; 5. Must have systems to monitor and control their own positions as well as those of their clients; 6. Must have systems to audit and monitor margin placement; 7. Must have appropriate risk management systems.



<b>Financial Requirement</b>	
<b>Securities Business</b>	<b>Derivatives Business</b>
<ol style="list-style-type: none"> <li>1. Shareholders' equities               <ol style="list-style-type: none"> <li>(a) GCM: Must maintain at least THB500 million.</li> <li>(b) DCM: Must maintain at least THB400 million.</li> </ol> </li> <li>2. Initial contribution               <ol style="list-style-type: none"> <li>(a) GCM: pay at least THB18 million.</li> <li>(b) DCM: pay at least THB13 million.</li> </ol> </li> </ol>	<ol style="list-style-type: none"> <li>1. Shareholders' equities               <p style="margin-left: 20px;">GCM: Must maintain at least THB100 million.</p> </li> <li>2. Initial contribution               <ol style="list-style-type: none"> <li>(a) To clear all types of derivatives in TFEX: pay at least THB6 million.</li> <li>(b) To clear only one type of derivatives in TFEX: pay at least THB1 million.</li> </ol> </li> <li>3. Securities Deposit (SD)               <ol style="list-style-type: none"> <li>(a) To clear all types of derivatives in TFEX: pay at least THB5 million.</li> <li>(b) To clear only one type of derivatives in TFEX: pay at least THB4 million.</li> </ol> </li> </ol>
<b>General requirement</b>	
<b>Securities Business</b>	<b>Derivatives Business</b>
<ol style="list-style-type: none"> <li>1. Must not have executives who are disqualified by SEC;</li> <li>2. Must have sufficient securities or derivative back-office operations officers;</li> <li>3. Must have compliance officers;</li> <li>4. Must have internal audit officers;</li> <li>5. Must have never been the subject of allegations, proceedings or charges of misconduct;</li> <li>6. Must have a computer system and other required operating systems connected to TCH's systems;</li> <li>7. Must have a financial reporting system directly connected to TCH's systems;</li> <li>8. Must have an office and other administrative equipment appropriate for the efficient conduct of business.</li> </ol>	

18.2 An FMI's participation requirements should be justified in terms of the safety and efficiency of the FMI and the markets it serves, be tailored to and commensurate with the FMI's specific risks, and be publicly disclosed. Subject to maintaining acceptable risk control standards, an FMI should endeavour to set requirements that have the least-restrictive impact on access that circumstances permit.



The clearing membership requirement such as legal requirements, financial strength, operational capability, staffs and executives' qualifications, infrastructure readiness, risk management and IT readiness are laid down in order to make sure that the clearing members are not induced risk to both TCH and other stakeholders in clearing & settlement system since the process of member admission.

- The access requirement is determined by TCH Risk sub-committee, TCH Board of Directors and approved by the SEC to ensure fair, open and least-restrictive impact on access.
- TCH has clearly stated membership requirements and qualification in the rules and already posted on the website.
- TCH has established procedures for member supervision and on-going monitoring to secure that the member can maintain their qualifications at all times when the membership is still active. This is not only to ensure the creditability of clearing members but also to secure the immunity of TCH as CCP.

#### **Access Criteria with Least Restriction**

To ensure that TCH services are accessible and there is the least or no restrictive access in both securities and derivatives clearing services, TCH has determined the qualification of members by two major aspects to emphasize more varieties of choices for participating TCH services as follows,

- 1) the type of participating activity in each clearing service whether
  1. the applicant would like to clear only their trading activities (DCM) or clear for other trading member in the same market (GCM) (available only in securities clearing) and
  2. the applicant would like to clear all products or specific products in each clearing service (available only in derivatives clearing)
- 2) the scope of participation across clearing services (Securities clearing service or Derivatives clearing service).

With the least restriction to access, the members will have more options and flexibility to operate their business. In addition, these two factors are taken into account in order to determine the financial requirements, ensuring that TCH's members are able to fulfil the obligations per their risk-related activities, in a manner commensurate with their corresponding risks.

Be noted that all content mentioned above are publicly disclosed both in the format of rules and regulations and comprehensive information. Also, for the applicant who would like to become clearing member, details on membership admission, apart from TCH regulation with respect to

securities and derivatives, are also provided in a conclusive context on TCH website. This would assist applicants to assess their ability and readiness in using TCH's services.

18.3 An FMI should monitor compliance with its participation requirements on an ongoing basis and have clearly defined and publicly disclosed procedures for facilitating the suspension and orderly exit of a participant that breaches, or no longer meets, the participation requirements.

#### **Direct participation**

- Generally, clearing members are required to regularly report on financial status and capital requirements. As a result, TCH is able to regularly monitor the member's financial strength through their submitted financial statements.
- For the risk monitoring for performance of members, in securities clearing, TCH monitors their daily clearing transactions and also assess member's risk exposure. While, for derivatives clearing, TCH calculates member's exposure in accordance with the SPAN margining system. The members are required to place collateral/margin as requested by TCH.
- All members are required to maintain their qualifications for their membership status by continuing risk management practices and timely reporting to the TCH. The report also includes firstly, a significant change in the company operations of the Member. Secondly, any other circumstances that may adversely affect the Member's operations, financial condition, and liquidity should be subjected to report.
- TCH has also inspected members at their premise on an ongoing basis, to ensure members' declaration per the application form and their compliance with all TCH rules.
- Moreover, TCH imposes additional controls on the members in the following events among others:
  - Net capital at the end of any business day both the case of dropping below warning level or minimum level.
  - The shareholders' equity both in case of drops below warning level and minimum requirement
  - There is a significant change in the company operations.
  - Members' risk value in the securities clearing and settlement system is in excess of the level prescribed by TCH.
  - Members fails to place or to fully place collateral, or collateral enforced by TCH is not sufficient, within the time period prescribed by TCH.

Member has to do or be enforced to take the following actions pursuant to the TCH rules and regulations:

- Immediately inform TCH of such event in writing
- Submit a plan to rectify its problem
- Place additional collateral as prescribed by TCH
- Have its transaction volume limited or place additional collateral as prescribed by TCH
- Be suspended from the provision of its derivatives clearing and settlement services
- Be terminated.

More details of participation requirements and procedures for facilitating the suspension and orderly exit of a participant that breaches, or no longer meets, the participation requirements are provided in the rules and as posted on the website.

### **Indirect participation**

#### **Securities market**

In securities clearing, the clearing member's clients and settlement agent are deemed as an indirect participant.

In point of fact that TCH does not have any legal relationship with the clients of the clearing member and current legal framework in relation to securities market does not allow TCH to directly monitor clearing member's clients. Therefore, according to the current practice in the securities settlement, TCH shall only calculate all clients' netting obligation separated from the member's netting obligation.

Regarding the clearing and settlement undertaken by Settlement Agent, even though, TCH does not guarantee all settlement transactions which are settled by the settlement agent and settlement obligations will be drawn back to clearing member, who has obliged with them since the first place in case the SA fails to fulfil such obligation. In addition, TCH is able to monitor settlement volume of settlement agents via TCH system. This enables TCH to spot once there are significant volume coming and communicate all related party for the preparation, while TCH itself are also able to prepare for an extra procedure in terms of liquidity management to guarantee the soundness in clearing and settlement process.



### Derivatives market

TCH has legal basis to enforce their derivatives clearing members to manage risk of their clients as follows;

- Members must manage their clients' default risk by having a risk management officer in charge of determining the fund limit and the trading limit in the trading account of their client.
- Members must have a system to check and control the derivatives position of their client to ensure that the deposit of margins by each client will not be lower than the amount specified by TCH.
- Members must open a position account in accordance with the type of clients and calculate collateral pursuant to the conditions prescribed by TCH.

However, it should be noted that, in both securities and derivatives market, TCH collects collateral from direct participants which already includes all clearing obligations both from direct and indirect participants. If their risk profile deteriorates, the additional collateral shall be collected.

# Principle 19

## Tiered participation arrangement

*An FMI should identify, monitor, and manage the material risks to the FMI arising from tiered participation arrangements.*

### Key consideration

19.1 An FMI should ensure that its rules, procedures, and agreements allow it to gather basic information about indirect participation in order to identify, monitor, and manage any material risks to the FMI arising from such tiered participation arrangements.

#### Indirect participation

Regarding securities clearing services, TCH views the clients of clearing members and Settlement agent as indirect participants.

The definition of General Clearing Member (GCM) and Direct Clearing Member (DCM) has given that both of them can undertake the securities clearing and settlement for themselves or clients, whilst the GCM can also perform a wider scope of such activity by including other members or other members' clients. As such, TCH deems that the client of the clearing member is an indirect participation which can be through both GCM and DCM.

In addition, for securities market, TCH has a contractual agreement with the Settlement Agent (SA). SA is an agent to settle the clearing and settlement transactions, for securities clearing services, on behalf of the clearing member (DCM & GCM) whereby such Member remains to bound the rights and obligations to TCH as given in its regulations, including the obligations the SA fails to perform. SA is not involved in the novation process initially occurring between member and TCH, as they are merely the agent to settle on the clearing member's behalf. Therefore, the counterparty in the novation process is still clearing members and TCH as mentioned in the Regulations.

Whilst, for derivatives clearing services, there is only one type of clearing member, the General Clearing Member (GCM). The same logic is also applied with clearing members (GCM) in

derivatives clearing services. Thus, clients of the GCM in derivatives clearing are deemed as an TCH's indirect participation as well.

### **Tiered participant Arrangement**

In Securities Acts and Derivatives Acts, (SEA and DA) requires TCH to segregate its members' assets (intermediaries' assets) from its own and shall keep the asset of each respective member separately for its own account. On top of that, at the member level, DA and SEC Notification clearly state that the member must keep clients' asset accounts separately from members' asset accounts.

The segregation structure of asset custody between the member and their clients enables TCH to control and manage the risk risen from member and members' clients separately. Besides, it also provides the protection of the asset of its members and members' client especially from being regarded as the bankrupt assets of members. By this operational design, the material dependencies between direct participants (members) and indirect participants (members' clients) can be effectively mitigated.

### **Securities clearing services**

Regarding the management of tiered participant arrangement for the member's client in securities domain, TCH has only the segregation structure of assets between the member and their client as a tool to handle. While, for the settlement agent, TCH has a system in place for the settlement agents to simulate their obligation intraday and for TCH to monitor the settlement transactions of each clearing member and each settlement agent. Also, TCH has procedures to notify both the settlement agent and its counterpart clearing members prior to the settlement date to support the case of a significant proportion of transactions in order to make a preparation for fulfilling their obligations on the due date. TCH ourselves will also have an additional internal process to prepare liquid resources in case of significant volume.

### **Derivatives Clearing services**

Since the failure to complete the settlement obligation of a clearing member potentially comes from the default of its clients, TCH states in its regulation requiring clearing members to have a risk management officer in charge of determining the fund limit and the trading limit in the trading account of their client. Moreover, the clearing members must have a system to check and control such as the derivatives position of their clients and the deposit of margins by each client in order to ensure that they will not be lower than the amount specified by TCH.

Furthermore, the clearing member's risk management aspects are addressed at both the stage of the admission procedure and ongoing basis. The applicant must elaborate their risk management procedures together with related operational process on client accounts for example, criteria to be used for determining open positions for each client accounts, a process for monitoring and controlling clients' position concentration, and measure for handling the event when positions exceed the limit, as required in the application package

- 19.2 An FMI should identify material dependencies between direct and indirect participants that might affect the FMI.

### **Securities Clearing Services**

- **Client of Member**

Referring to SEC Notification and TCH regulation with respect to securities, the clearing member is required to keep clients' asset accounts separate from members' asset accounts. Therefore, the obligation of securities and payment settlement is performed on a netting basis in the member account and in the omnibus client account, which the risk arising from each client is unable to identify. However, pursuant to TCH rules, the

Even though, TCH calculates the netting obligation across the member's clients. Those obligations are still taken into account in TCH's CCP model and risk management procedure including the contribution to the Clearing fund with respect to TCH regulation. This would help TCH to control and manage the risks that may arise from such an omnibus client account

- **Settlement Agent**

Settlement agent's agreement conceptually states that SA who act as an agent of clearing member must follow the procedure as described in agreement and also comply with TCH regulation relevant to the assignment to settle on behalf clearing member. TCH requires clearing member and SA to record the securities clearing and settlement transactions relating to trading on the Exchange into TCH system following notification of TCH.

Moreover, TCH regulation clearly defines the material dependencies between clearing member (both DCM and GCM) and SA in carrying out the securities clearing and settlement on the member's behalf, whereby such member remains bound by the rights

and obligations to TCH as CCP. In case that SA cannot settle, TCH will re-process such unsettled position back to clearing member as being a counterparty with TCH.

In order to track the settlement obligation which SAs derive from the clearing members, TCH accommodates a protocol to monitor settlement transactions of SAs at least on daily basis, while SAs can also track their potential obligations via simulation service by themselves on TCH system. This would help settlement agent and their counterpart clearing members to make a preparation for settlement. Moreover, TCH ourselves will also have internal process for preparing liquid resources in case of significant volume.

### **Derivatives Clearing Services**

Derivatives Acts (DA) and TCH regulation with respect to derivatives clearly state that member must keep clients' asset accounts separate from members' asset account. This allows TCH to calculate and record the collateral, positions, obligation, and margin assets of clients separately from those of the member's proprietary for the purpose of monitoring.

For client accounts, TCH (in relation to derivatives) provides that clearing member may open a position account in accordance with the type of clients and calculate collateral pursuant to the rules, procedures, and conditions prescribed by TCH.

With this, Member can open a position account in TCH system only for the clients whom the member or trusted third party has verified them with customer due diligence [by the Member or trusted third party]. In addition, the assets in such client account shall only be used for derivatives transaction of the respective client whose asset is accounted for as required in DA

The condition regarding the type of account is captured by the concept that if the member cannot identify that their client is an end-beneficial owner, only gross position account and gross margining are allowed to conduct.

As a result, when to call for a margin, TCH can calculate clients' obligations individually before gathering them into one requirement and the member's obligation in another requirement. By these designed procedures, TCH can monitor the number of open positions and margin requirements per individual account to identify customer accounts with significant settlement volume in the derivatives trading.

- 19.3 An FMI should identify indirect participants responsible for a significant proportion of transactions processed by the FMI and indirect participants whose transaction volumes or



values are large relative to the capacity of the direct participants through which they access the FMI in order to manage the risks arising from these transactions.

### **Securities Clearing Services**

In the securities market, TCH is unable to process with the individual client of the clearing member since the netting obligation will be calculated across the member's clients. However, such calculated obligations of the clients and relative risks are already incorporated into TCH's CCP model (Early Warning System, Settlement Cap, and contribution to Clearing fund)

Also, apart from enabling settlement agent to forecast for their obligation via the simulation module on TCH system, TCH always monitors the potential significant volume at least a daily basis so that TCH can inform the SA and the clearing member (SA's counterparty) in advance as a warning sign and also can prepare for TCH itself for the liquidity resource just in case.

### **Derivatives Clearing Services**

In the derivatives market, TCH has a legal basis and procedure in place to enable itself to identify indirect participants. If TCH finds out that there are margin requirement calls relatively large to the capacity of the direct participant (clearing member), TCH will alert and coordinate such members about these extraordinary settlement obligations of indirect participants (Clients).

- 19.4 An FMI should regularly review risks arising from tiered participation arrangements and should take mitigating action when appropriate.

In general, for securities and derivatives market, TCH monitors settlement obligations and collects collateral from direct participants at least on daily basis with the CCP models that have already taken into account the risk exposure from direct and indirect participants. TCH also review the appropriateness of financial resources and liquid resources to cover potential exposures in securities and derivatives clearing on a quarterly basis.

In securities market, the consideration of risk exposure of each member and its clients is witnessed in the calculation procedure of risk management models which are Early Warning System, Settlement Cap, and contribution to the Clearing fund as prescribed in TCH regulation and TCH Notification.

Whereas, on the derivatives side, the examples for tiered participation arrangements are

- performs an intra-day margin call and also monitors volatility and movement of the market. TCH regularly reviews its margin rate on monthly basis and publishes on the website.
- impose an additional procedure in managing risk posed by the indirect participants such as the regulation related gross position account if end-beneficial owner at the client level cannot be identified.

Besides, there is a mutual agreement in industry to require level of margin collecting from clients in a multiplier amount of the margin rate as announced by TCH.

Furthermore, apart from clearing regulation, regarding the trading protocol, TFEX (Thailand Futures Exchange) have stipulated the position limit that can be held by a person for derivatives contracts. In case where the position limit cannot be met, the corresponding position shall be closed per TFEX Regulation.

## Principle 20

### FMI links

*An FMI that establishes a link with one or more FMIs should identify, monitor, and manage link-related risks.*

#### Key consideration

20.1 Before entering into a link arrangement and on an ongoing basis once the link is established, an FMI should identify, monitor, and manage all potential sources of risk arising from the link arrangement. Link arrangements should be designed such that each FMI is able to observe the other principles in this report.

Before establishing a link arrangement, TCH will conduct risk assessments that may affect the clearing and settlement system. All risks and impacts from the linkage related to legal, credit, liquidity, regulatory, cyber-attack, and operational aspects are thoroughly addressed and evaluated.

TCH has FMI links with only one local FMI; Thailand Securities Depository Co., Ltd (TSD) which is a solely central securities depository in Thailand. In this regards, TCH has applied for its member with the rationale for establishing the link is to pursue CCP roles and facilitating the securities settlement traded on SET and mai as well as custody of collateral in form of securities.

Likewise TCH, TSD is subjected to the PFMI, thus, all the applicable principles (such as legal, credit, liquidity, custody, and operational risk) are mandatory to be properly managed and enable to be observed aligned with PFMI principles.

Moreover, TCH also applies the ongoing processes of risk management to handle the risk arising from link arrangements in both legal and operational aspects.

Legal aspect:

- All material perspectives have been addressed in legal agreements under Thai law (SEA act / SEC regulations). Those include the duties and liability, operational process,

services schedule, reporting, fee, and confidentiality, to ensure that each role of FMI has been well preserved by law under link arrangement.

- TCH has to comply with the regulations and risk management stipulated by TSD to ensure that TCH does not impose any additional risk to the system and vice versa.
- In addition, the stipulation of settlement finality of linked FMI that works synchronously will play a very crucial part to ensure that transactions made via another FMI, at a certain point, be complete and not subject to reversal even if the parties to the transaction go bankrupt or fail.

Operational aspect:

- TCH has its own system to closely monitor on timely basis for the linked activities, the process of securities settlement, with TSD. This also includes system alerts to track for any difficulties so that TCH can capture and handle problems on time.
- The regular IT audit has included the monitoring of compliances among the link.
- TCH and TSD jointly conducts the test for Business Continuity Plan (BCP) and Disaster Recovery Plan (DRP) regularly to cover the significant operations between TCH, TSD and payment system in order to mitigate operational risk and secure the effective services and the business continuity during emergency or disaster time.
- Furthermore, TCH sets up a “CCP offline procedure” in place to ensure the continuity of operation when there are system disruptions and none of TCH’s sites including back-up and third sites are available. Such a procedure will enable their members, including TCH, to complete their transactions with minimization of business impacts.

20.2 A link should have a well-founded legal basis, in all relevant jurisdictions, that supports its design and provides adequate protection to the FMIs involved in the link.

TCH and TSD are subject to Thai law. As such, TCH has signed agreements with TSD for depository service in order to define the rights, obligations and liabilities of each party under the laws of Thailand.

In addition, with respect to the link, the finality of securities settlement is clearly prescribed in SEA, SEC’s rule, TCH’s rule and TSD’s rule with the concept that the delivery and taking delivery of securities shall be deemed completed when TSD has correctly delivered securities to TCH or the member who is entitled to take delivery of securities in accordance with TCH’s



report on clearing data. When the delivery of Securities is completed, the Member who is obligated to deliver Securities shall not be able to revoke such delivery

This legal basis is stipulated to emphasize the validity of securities settlement and the point of time when it is no longer revocable, supporting by the contractual arrangements addressing the framework for the linked with other FMI (TCH and TSD) and the provision of settlement instructions. All of these are aimed to secure a certain final settlement of TCH service.

- 20.3 Linked CSDs should measure, monitor, and manage the credit and liquidity risks arising from each other. Any credit extensions between CSDs should be covered fully with high-quality collateral and be subject to limits.

This consideration is not applicable to TCH as a CCP.

- 20.4 Provisional transfers of securities between linked CSDs should be prohibited or, at a minimum, the retransfer of provisionally transferred securities should be prohibited prior to the transfer becoming final.

This consideration is not applicable to TCH as a CCP.

- 20.5 An investor CSD should only establish a link with an issuer CSD if the arrangement provides a high level of protection for the rights of the investor CSD's participants.

This consideration is not applicable to TCH as a CCP.

- 20.6 An investor CSD that uses an intermediary to operate a link with an issuer CSD should measure, monitor, and manage the additional risks (including custody, credit, legal, and operational risks) arising from the use of the intermediary.

This consideration is not applicable to TCH as a CCP.

- 20.7 Before entering into a link with another CCP, a CCP should identify and manage the potential spill-over effects from the default of the linked CCP. If a link has three or more CCPs, each CCP should identify, assess, and manage the risks of the collective link arrangement.

This consideration is not applicable as TCH has not established a link with other CCPs.



20.8 Each CCP in a CCP link arrangement should be able to cover, at least on a daily basis, its current and potential future exposures to the linked CCP and its participants, if any, fully with a high degree of confidence without reducing the CCP's ability to fulfil its obligations to its own participants at any time.

This consideration is not applicable as TCH has not established a link with other CCPs.

20.9 A TR should carefully assess the additional operational risks related to its links to ensure the scalability and reliability of IT and related resources.

N/A – Applicable to TR only

## Principle 21

### Efficiency and effectiveness

*An FMI should be efficient and effective in meeting the requirements of its participants and the markets it serves.*

#### Key consideration

21.1 An FMI should be designed to meet the needs of its participants and the markets it serves, in particular, with regard to choice of a clearing and settlement arrangement; operating structure; scope of products cleared, settled, or recorded; and use of technology and procedures.

In order to serve members' needs, TCH carefully considers the requirements, necessity, and demand for operational systems and procedural implementation, and also tries to minimize the impact on other stakeholders and other systems connected to the clearing system before launch by setting a market consultation in terms of session of focus group meeting with members (e.g. the professional clubs/associations, vendor forum and general hearings for the whole group of members).

By doing so, TCH can get views, requirements, feedback, impact, implementation timeline and potential obstacles to be considered for the development. In addition, members' opinions through the hearing session and international practices, including relevant principles will also be taken into consideration when designing for the new development as well.

In addition, TCH also conducts the customer satisfaction survey annually and meets with depository' client upon request. All of these will help TCH to understand concerns arising from technical, operational procedures including service fees in order to meet the needs of TCH's member.

21.2 An FMI should have clearly defined goals and objectives that are measurable and achievable, such as in the areas of minimum service levels, risk-management expectations, and business priorities.

TCH aims to serve as the central counterparty to all trading activities on SET, mai, and TFEX. As the role must be, TCH will guarantee clearing and settlement for a concerned party no matter what any counterparty may not be able to fulfill obligation arising from such trading activities. Through this mechanism, counterparty risk will be lessened, and the market will be more efficient. TCH also aims to promote continuous development and provide excellent services equipped with international standards, robust risk management, and appropriate technology.

Regards to minimum service levels, the standard practice in TCH' services (clearing and settlement) is setup and prescribed on a regular service schedule and provided on TCH website. Also, TCH has a Business Continuity Plan (BCP) and Disaster Recovery Plan (DR) to secure the continuity of CCP services during emergency time.

In respect of risk-management expectations, to assure the integrity of CCP the system, TCH assesses and monitors the sufficiency of financial resources on a daily basis to ensure that the financial resource is sufficient to cover the credit exposures once a default of two largest exposures clearing members has occurred under stress scenarios determined by TCH. Furthermore, back-testing is conducted to ensure the sufficiency of financial resources.

For business priority, Long-term, medium-term and short-term plans as well as their objectives have been classified and communicated with members on a regular basis. With this information, TCH members can prepare for the change and be ready for the go-live of those projects. Should the members have fairly concerns, the plans shall be reconsidered.

21.3 An FMI should have established mechanisms for the regular review of its efficiency and effectiveness.

Regards to the aspect of efficiency and effectiveness regular review, TCH has designed measurement mechanisms for its services as follows;

#### **(1) Project Implementation**

Prior to the implementation for example;

- Informing plan and communicating with the members regularly.
- Conducting User Acceptance Testing (UAT) and performing Industry-Wide test
- Setting up a dashboard to track member readiness by monitoring their development status/tasks in order to keep the project on schedule.



- Reporting the progress of project to TCH Board periodically in order to take advice and guidance from the management's view.

#### After Go-Live

- Conducting a project post-mortem for evaluating the success (or failure) of a project's ability once the project has gone live.
- Engaging the related parties such as brokers and custodian banks through having regular or particular meetings, client visits, and customer satisfaction surveys in order to gather comments and feedback on the quality of services provided.
- Reporting TCH Board for the statistical data related to the operational plan and share some parts of the disclosable information to the public via newsletter on TCH website.

#### **(2) Day-to-day services provided.**

TCH conducts a customer satisfaction survey annually for both securities and derivatives market. The measurement of satisfaction is created to address important areas such as operational system quality of service, information dispersion, staff service or open-ended questions/recommendations, etc. The summary of survey results and comments are reported to TCH Board of directors on annual basis. In terms of system satisfaction, the IT meeting is also conducted a regular meeting to gather feedback from both internal users and participants.

The review of the efficiency and effectiveness related to plans and procedures allows TCH to acknowledge concerns and level of seriousness from member's perspectives. The issues and proposed solution will then be raised to executive level, TCH board of directors, and in various forms of committees, such as business development, strategic body, risk management, governance, product development, etc. to handle in case of policy issues, if necessary.

Moreover, the clearing and settlement statistics, the progress of business development plan and major incident event will be reported to TCH Board of directors on quarterly basis in order to ensure efficiency and effectiveness of TCH services operated.

## Principle 22

### Communication procedures and standards

*An FMI should use, or at a minimum accommodate, relevant internationally accepted communication procedures and standards in order to facilitate efficient payment, clearing, settlement, and recording.*

#### Key consideration

22.1 An FMI should use, or at a minimum accommodate, internationally accepted communication procedures and standards.

TCH accommodates communication standards in both the Securities market and Derivatives market and facilitates clearing members' straight-through process (STP). (At present, communication channels between TCH and relevant parties are available via four channels:

1. Web browser via HTTPS –web-based application on a proprietary secured network;
2. file upload;
3. API message;
4. SWIFT message

Through web browser, file upload, and API message, members can send/receive data with TCH for all clearing and settlement services. While SWIFT channel supports only transactions routed to the Pre-settlement matching system, to match settlement instructions between a clearing member and settlement agents, mainly custodian banks to whom foreign investors or institutional investors deposit securities and money.

To enable the streamline of messages routed from various sources and formats, the system that translates and converts messages from international format to proprietary database is accommodated by TCH. Regarding the messaging format, TCH provides communication channels to support members' need for STP, text file upload, and API messages in proprietary formats. For SWIFT messages, ISO standard is applied.

In addition, to increase efficiency by adopting straight-through processing as well as minimize manual interventions and risks in the clearing and settlement process, TCH has also adopted international reference codes and communication standards as follows

1. ISIN code: a reference data of securities products for the purpose of tracking transactions consistently across markets worldwide.
2. BIC Code: an international identifier of financial and non-financial institutions to facilitate automated processing of the transaction.
3. ISO 15022: a message standard for the instruction routed between TCH and clearing members.
4. ISO 20022: a new message standard for the payment message with Bank of Thailand.

## Principle 23

### Disclosure of rules, key procedures, and market data

*An FMI should have clear and comprehensive rules and procedures and should provide sufficient information to enable participants to have an accurate understanding of the risks, fees, and other material costs they incur by participating in the FMI. All relevant rules and key procedures should be publicly disclosed.*

#### Key consideration

23.1 An FMI should adopt clear and comprehensive rules and procedures that are fully disclosed to participants. Relevant rules and key procedures should also be publicly disclosed.

#### Disclosure of rules and procedures

Official TCH rules and procedures consist of rules, procedures, announcements and circulation letters. Before the enforcement date, they will be circulated to all members in advance. These clearing rules & regulations are also disclosed on the TCH website: [www.set.or.th/th/tch/overview](http://www.set.or.th/th/tch/overview). These also include general information, and news and public relations relating to CCP, daily risk parameter files (for derivatives clearing). In the case of some specific information to members, TCH has provided a web portal or emails, where user/password are needed, for members only to retrieve, such as user manuals, system training, test scenarios, test result reports, circular letters, member hearing presentation, etc.

For the perspectives of adopting comprehensive rules and procedures, before rules amendments, TCH sets regular meetings with members/participants to communicate new plans, regulatory changes, system development to gather views and comments from them. For some sub-groups of members significantly impacted by the change, TCH sets exclusive visit or small focused group to make sure of serving their needs and requirements.

Also, TCH always consult a SET legal department for the necessary legal analysis, and, where required, and the relevant authorities to ensure that TCH's regulations are consistent and enforceable under the relevant Thai law. In this regards, any new rule proposal or amendments proposed by TCH shall be considered by TCH Board of Directors and come into force upon

approval of the Capital Market Supervisory Board of the SEC whereby TCH shall notify its stakeholder through the circulation of corporate email and announcement on TCH website before such rules go into effect.

- 23.2 An FMI should disclose clear descriptions of the system's design and operations, as well as the FMI's and participants' rights and obligations, so that participants can assess the risks they would incur by participating in the FMI.

### **System designs and operations**

System designs and operations are described in a user manual which members are able to retrieve from the web portal for their reference. The user manual will be updated regularly regarding the new development.

Either, before a new TCH member takes effect or major development is implemented, the members have to be trained and test to ensure user's understanding and the system readiness as well as the acknowledgment of the system's design and operations.

In addition, IT and operation meetings with members are regularly arranged for clarification on system development and to gather impact analysis and risk assessment.

### **Members' rights and responsibilities**

In general, the details related to TCH such as governing law, members' rights and responsibilities as well as fees and fines are also publicly disclosed on the TCH website. In addition, to create awareness and common understanding about the rights and responsibilities of being a TCH clearing member, all rules and regulations regarding clearing members are handed to those who are interested in applying as a TCH clearing member since the admission process.

Once they become TCH clearing members, they are required to take a training session incorporating guidance for a newcomer such as system usage, and TCH rules. The training will enable members who have rights to use TCH clearing systems for clearing and settlement regarding their obligations to understand the procedure in practice. Moreover, TCH provides clearing reports and results to members so that the member can reconcile and forecast whether they can fulfill their obligations towards TCH to keep clearing and settlement procedures performing smoothly.

Apart from this, in both securities and derivatives clearing, TCH has also disclosed the degree of discretion it can exercise to remedy the disruption affecting the operation of the system. As TCH

will take any appropriate acts under its rules and procedures for resolving the situation, under such condition, the members must accept nor do anything which is an opposition to or non-cooperation with TCH in this regard.

- 23.3 An FMI should provide all necessary and appropriate documentation and training to facilitate participants' understanding of the FMI's rules and procedures and the risks they face from participating in the FMI.

TCH has set up regular training courses for members every time of significant change, new launch, and concept review regarding clearing systems or procedural implementation. The training is widely undertaken by all concerned parties and clearing members, who are directly concerned with the change. The intensive training for members is also set up, if necessary, for their full understanding and practicable ability to proceed. All materials of user training and manual are also available for members on the web portal.

In addition, TCH shall arrange a meeting with the members' compliance at least annually for any changes or updates, including providing operation guidelines and documentation that members need to comply with.

Furthermore, On TCH website, members can recheck their understanding of the regulations and procedures by the simplified version of some rules, especially risk management calculation provided by TCH. Any regulatory announcements are well prescribed in the format of guidelines, timetables, step-by-step processes, or FAQs for ease to follow.

Also, Members can contact via an email or calling directly to TCH staff when any clarification is needed for a prompt respond.

- 23.4 An FMI should publicly disclose its fees at the level of individual services it offers as well as its policies on any available discounts. The FMI should provide clear descriptions of priced services for comparability purposes.

TCH has publicly disclosed its fees, fines, and associated expenses charged to members occurring from the process of application to the ongoing services via its notification on the website so the members are able to conduct a cost-benefit analysis and compare the fees across similar FMIs.

For the process of new fee, fee change or any changes that affect members, TCH has compared the necessary cost to set up reasonable prices by gathering all information from the costs that

may arise, such as systems development, the workforce to implement, and running the costs for the business sustainability. All fees and fines must be accepted by the stakeholders in the public hearing before considering by the TCH board, and then, lastly, submit to SEC for the formal approval. The participant will be informed in advance of the preparation before such fees take effect.

Any exclusive discounts or specific fees in some special cases have to be reviewed and asked for the approval from TCH Board of directors before taking effect.

23.5 An FMI should complete regularly and disclose publicly responses to the CPSSIOSCO Disclosure framework for financial market infrastructures. An FMI also should, at a minimum, disclose basic data on transaction volumes and values.

In response to CPSS-IOSCO Disclosure framework for financial market infrastructures, TCH has disclosed its CPSS-IOSCO disclosure framework for the PFMI both qualitative and quantitative in English language version on TCH website.

Apart from the rules, regulations and PFMI qualitative/quantitative disclosure posted on TCH website, the following information is also publicly provided:

- TCH financial statement with the description of business services of CCP,
- Significant statistics such as total value/volume of securities and derivatives clearing and settlement on SET, mai, and TFEX.
- Newsletter to update the current development of TCH business/work procedure and system enhancement

**Principle 24****Disclosure of market data by trade repositories**

*A TR should provide timely and accurate data to relevant authorities and the public in line with their respective needs.*

This principle is not applicable to TCH.

**Key consideration**

- 24.1 A TR should provide data in line with regulatory and industry expectations to relevant authorities and the public, respectively, that is comprehensive and at a level of detail sufficient to enhance market transparency and support other public policy objectives.
- 24.2 A TR should have effective processes and procedures to provide data to relevant authorities in a timely and appropriate manner to enable them to meet their respective regulatory mandates and legal responsibilities.
- 24.3 A TR should have robust information systems that provide accurate current and historical data. Data should be provided in a timely manner and in a format that permits it to be easily analyzed.





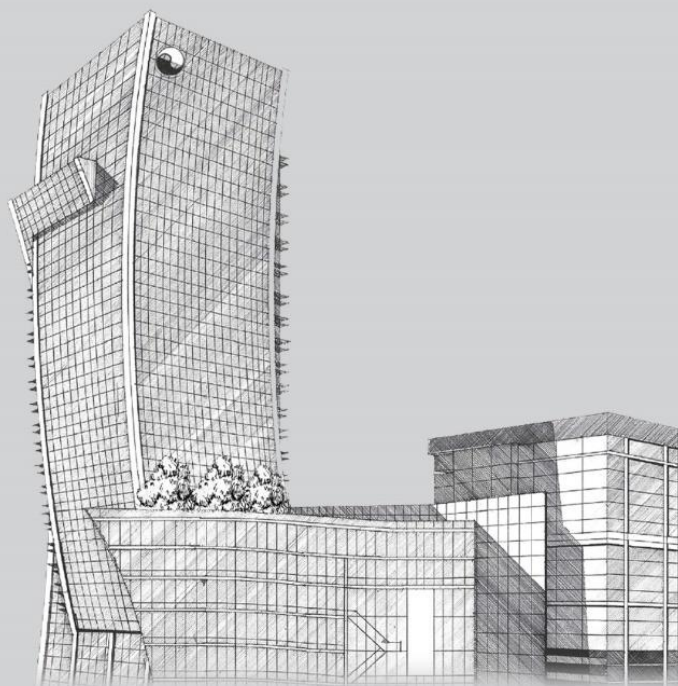
**List of publicly  
available resources**

TCH



## V. List of publicly available resources

Audited financial accounts of TCH	<a href="https://www.set.or.th/en/tch/about/tch-factsheet">https://www.set.or.th/en/tch/about/tch-factsheet</a>
BAHTNET Services B.E. 2549	<a href="https://www.bot.or.th/English/PaymentSystems/Payment_Regulation/BN_Regulation/BAHTNET%20Regulation/E_BAHTNET2549_Finish.pdf">https://www.bot.or.th/English/PaymentSystems/Payment_Regulation/BN_Regulation/BAHTNET%20Regulation/E_BAHTNET2549_Finish.pdf</a>
Bankruptcy Act	<a href="https://www.led.go.th/doing/pdf/ba2483.pdf">https://www.led.go.th/doing/pdf/ba2483.pdf</a>
BOT Notification	<a href="https://www.bot.or.th/App/FIPCS/Eng/PFIPCS_list.aspx?docgroup=2">https://www.bot.or.th/App/FIPCS/Eng/PFIPCS_list.aspx?docgroup=2</a>
Clearing members, qualifications and duties	For securities: <a href="https://www.set.or.th/en/tch/services/equities-bond/services">https://www.set.or.th/en/tch/services/equities-bond/services</a> For derivatives: <a href="https://www.set.or.th/en/tch/services/derivatives/services">https://www.set.or.th/en/tch/services/derivatives/services</a>
Derivatives Act B.E. 2546 (A.D. 2003) as amended	<a href="https://www.sec.or.th/EN/Documents/ActandRoyalEnactment/Act/act-derivatives2003-amended.pdf">https://www.sec.or.th/EN/Documents/ActandRoyalEnactment/Act/act-derivatives2003-amended.pdf</a>
Notification of the office of the Securities and Exchange Commission	<a href="http://capital.sec.or.th/webapp/nrs/nrs_viewall_en.php">http://capital.sec.or.th/webapp/nrs/nrs_viewall_en.php</a>
PAYMENT SYSTEM ACT B.E 2560 (2017)	<a href="https://www.bot.or.th/English/PaymentSystems/PSA_Oversight/Pages/default.aspx">https://www.bot.or.th/English/PaymentSystems/PSA_Oversight/Pages/default.aspx</a>
PFMI (April 2012)	<a href="https://www.bis.org/cpmi/publ/d101a.pdf">https://www.bis.org/cpmi/publ/d101a.pdf</a>
PFMI: Disclosure framework and Assessment methodology (December 2012)	<a href="https://www.bis.org/cpmi/publ/d106.pdf">https://www.bis.org/cpmi/publ/d106.pdf</a>
Royal Decree Regulating Electronic Payment Service Business, B.E. (2551) 2008	<a href="https://www.bot.or.th/English/AboutBOT/LawsAndRegulations/SiteAssets/e_payment.pdf">https://www.bot.or.th/English/AboutBOT/LawsAndRegulations/SiteAssets/e_payment.pdf</a>
Securities and Exchange Act B.E. 2535 (A.D. 1992) as amended	<a href="https://www.sec.or.th/EN/Documents/ActandRoyalEnactment/Act/act-sea1992-amended.pdf">https://www.sec.or.th/EN/Documents/ActandRoyalEnactment/Act/act-sea1992-amended.pdf</a>
SET Annual Report	<a href="https://www.set.or.th/en/about/overview/report/annual-report">https://www.set.or.th/en/about/overview/report/annual-report</a>
TCH board of directors & subcommittee	<a href="https://www.set.or.th/en/tch/about/main">https://www.set.or.th/en/tch/about/main</a>
TCH Clearing Rules and regulations / notifications / circulation letters	<a href="https://www.set.or.th/en/tch/rules-regulations/regulations">https://www.set.or.th/en/tch/rules-regulations/regulations</a>
TCH's corporate governance principles	<a href="https://media.set.or.th/set/Documents/2022/Dec/TCH_CG_EN.pdf">https://media.set.or.th/set/Documents/2022/Dec/TCH_CG_EN.pdf</a>



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