INTERNATIONAL MONETARY FUND

IMF Country Report No. 14/308

REPUBLIC OF KOREA

FINANCIAL SECTOR ASSESSMENT PROGRAM

October 2014

DETAILED ASSESSMENT OF COMPLIANCE ON THE CPSS-IOSCO PRINCIPLES FOR FINANCIAL MARKET INFRASTRUCTURES—BOK-WIRE+ AND KRX CPP

This Detailed Assessment of Compliance on the CPSS-IOSCO Principles for Financial Market Infrastructures—BOK-WIRE+ and KRX CPP on the Republic of Korea was prepared by a staff team of the International Monetary Fund and the World Bank. It is based on the information available at the time it was completed on July 2013.

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International Monetary Fund
Washington, D.C.

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DETAILED ASSESSMENT OF OBSERVANCE

ASSESSMENT OF OBSERVANCE OF THE CPSS-IOSCO PRINCIPLES FOR FINANCIAL MARKET INFRASTRUCTURES—BOK-WIRE+ AND KRX CCP

Prepared By

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This Detailed Assessment Report was prepared in the context of a joint IMF-World Bank Financial Sector Assessment Program (FSAP) mission in the Republic of Korea during April and July, 2013, led by Ghiath Shabsigh, IMF, and overseen by the Monetary and Capital Markets Department, IMF, and the Finance and Private Sector Development Vice Presidency, World Bank. Further information on the FSAP program can be found at http://www.imf.org/external/np/fsap/fssa.aspx, and www.worldbank.org/fasp.

INTERNATIONAL MONETARY FUND

THE WORLD BANK

Contents

Glossary

BCP	Business Continuity Plan
BOK	Bank of Korea
BOK Act	Bank of Korea Act
CSD	Central Securities Depository
CCP	Central Counterparty
CLS	Continuous Linked Settlement
COMS	Composite Optimized Margin System
CPSS	Committee on Payment and Settlement Systems
DM	KRX Derivatives Market
DVP	Delivery versus Payment
ETF	Exchange Traded Fund
FIC	Financial Investment Company
FMI	Financial Market Infrastructure
FSC	Financial Services Committee
FSCMA	Financial Investment Services and Capital Markets Act
FSS	Financial Supervisory Service
GPD	Generalized Pareto Distribution
IOSCO	International Organization of Securities Commissions
IT	Information Technology
JCF	Joint Compensation Fund
KDIC	Korea Deposit Insurance Corporation
KTB	Korea Treasury Bonds
KFTC	Korea Financial Telecommunications and Clearings institute
KOSDAQ	Korean Securities Dealers Automated Quotations
KOSPI	Korea Composite Stock Price Index
KRI	Key Risk Indicator
KRX	Korea Exchange
KSD	Korea Securities Depository
KSFC	Korea Securities Finance Corporation
KRW	Korean Won
MOU	Memorandum of Understanding
MPC	Monetary Policy Committee
MSB	Monetary Stability Bonds
OTC	Over the Counter
PFMI	CPSS-IOSCO Principles for Financial Market Infrastructures
PS	Payment System
PVP	Payment versus Payment
ROMPSS	Regulation on Operation and Management of Payment and Settlement Systems

RCSA	Risk Control Self Assessment
RTGS	Real Time Gross Settlement
RTO	Recovery Time Objective
SIPS	Systemically Important Payment System
SSS	Securities Settlement System
TR	Trade Repository
VAR	Value at Risk
WROMPSS	Working Regulation on Operation and Management of Payment and Settlement Systems

EXECUTIVE SUMMARY

Korea has a well-developed payment, clearing, and settlement infrastructures. BOK-WIRE+ is the real-time interbank gross payment and settlement system, and the backbone of the infrastructure where the final payments of various markets are settled. It is operated by the Bank of Korea (BOK). The Korea Exchange (KRX) is the main player in the securities and derivatives market, operating three exchanges and offering clearing and settlement services for all securities and derivatives traded on the KRX. While the authorities have decided to establish a central counterparty (CCP) for over-the-counter (OTC) derivatives at a future date, discussions are ongoing on the desirability of transforming the current trade reporting systems into full-fledged trade repositories (TRs). The planned CCP for OTC derivatives should ensure full compliance with the Principles for Financial Market Infrastructures (PFMI) before being launched, taking into account lessons learned from the assessment of the CCP for exchange-traded products.

BOK-Wire+ is largely compliant with the PFMI, and is overall sound. It is subject to comprehensive and transparent risk management frameworks comprising clear policies and guidelines, governance arrangements, and operational systems including regularly tested default and business continuity procedures. All transactions once settled in BOK-Wire+ are deemed final and irrevocable, as well as bankruptcy remote.

There is room for improvement in certain areas to enhance the level of compliance of the BOK-Wire+ with the PFMI. It is recommended that the operator of BOK-Wire+ improves the collateral risk management framework by adopting regular testing of haircuts and an independent validation of haircut procedures at least annually. The BOK should provide more clarity in the regulations regarding settlement finality and queue management, particularly with regard to revocation of queued transactions. It should also fully implement the disclosure framework, including disclosure of relevant rules and regulations in English. Finally, BOK's oversight powers should be strengthened, to include linked financial market infrastructures (FMIs) and participants, particularly to obtain authentic information and enforce compliance.

The CCP of the KRX has taken steps to increase compliance with the PFMI. The CCP contributes to the safety and efficiency of the securities and derivatives market in Korea, but also concentrates systemic risk. Important steps to improve its risk management systems have been initiated in the recent period such as the introduction of intraday margin calls, back testing and sensitivity analysis, which need to be further implemented. The sizes of the joint compensation fund and settlement reserves have been increased to strengthen the KRX's financial protection against a potential default of its clearing members. The introduction of the operational risk management system in January 2013 enables the KRX to manage its companywide risks in a consistent and comprehensive manner.

However, additional steps to further compliance of the CCP with the PFMI related to the management of credit risks are warranted. The KRX should reform the credit risk management framework for the securities market, by collecting risk-based collateral (margin) on a daily basis to cover the KRX's exposures towards its clearing members between the transaction and settlement days. The KRX should also reconsider the current design of its joint compensation funds, in particular by removing the fixed size requirement of the fund to better adapt to increased exposures. The KRX's criteria for settlement banks and custodians should be increased. Finally, the KRX's risk management framework, and in particular its margin model, should be reviewed and validated by an experienced and independent entity, such as an academic or a consultant.

The independence of the KRX risk management committee should be improved and the size of staff responsible for the management of credit and liquidity risk should be increased. The committee, although independent of the business departments, is chaired by an executive director who is also responsible for strategy and planning, and therefore not fully independent from business related matters. Staffing levels in the risk management team and the clearing and settlement department responsible for risk management is small compared to the scope of their responsibilities; it should be increased. More generally, the focus of the KRX on the safety and efficiency of the CCP should be increased, for example by placing higher priority on the safety and efficiency of the CCP and on financial stability in the KRX's company objectives.

Recovery planning for CCPs has recently been introduced as a tool to reduce the potential burden for tax payers. CCPs should maintain viable plans with preventive measures for restoring the CCP's ability to operate as a going concern. In drafting a recovery plan the KRX should decide which of its operations are critical to continue in times of crisis. The KRX should also develop crisis scenarios that go beyond the default procedures and business continuity plans. The scenarios may cover extreme but plausible events, such as the default of a large participant that is part of a financial group that provides multiple services to the KRX, such as settlement and custody activities combined with a decrease in the value of assets widely used as collateral.

The overlap in responsibilities among the Financial Services Committee (FSC) and the BOK hampers effective regulation, supervision, and oversight of the KRX CCP. Overlap in regulation between central banks and market regulation is common in many countries. Authorities in those countries should ensure the effectiveness of supervision and oversight by appropriate cooperation and coordination arrangements. The mission is of the opinion that the BOK and the FSC do not appropriately cooperate in the regulation, supervision and oversight of the FMIs in Korea, in particular with regard to the KRX and the Korea Securities Depository (KSD). Formal cooperation among the BOK and FSC at the highest level has not been used to discuss any matters related to FMIs. The cooperation at the technical level is informal, without adequate agreements that supported the BOK in effectively exercising its oversight responsibilities.

It is therefore recommended to formalize the cooperation among the BOK and FSC at a more technical level, for example the FSC capital markets division and the BOK payment systems policy team. Such a cooperative framework could be in the form of a Memorandum of Understanding (MOU) to ensure effective coordination between the BOK and FSC where their roles as regulators overlap. It should enable the BOK to ensure that its suggestions are implemented and to confirm the authenticity and completeness of the information submitted by the FMIs. The BOK and FSC should "speak with one voice" to avoid any inefficiencies in their communication towards the KRX and KSD. It should also allow the FSC to benefit from relevant information that is obtained by the BOK during international meetings or meetings with the FMI operations council. The authorities should develop a crisis management framework allowing timely coordination in case of an operational or financial crisis.

To further improve the regulatory structure for FMIs it is recommended to increase the powers of the BOK and the resources of the FSC. There is a need to amend the existing statute to provide the BOK with enforcement tools to effectively discharge its oversight responsibilities. Also, although the FSC staff has good knowledge and is relatively effective in its activities the work load is considered too large for one staff member, especially given the complexity of the topic and the two year rotation policy of the FSC. An increase in resources will support a proactive policy approach and a more effective guidance of the Financial Supervisory Service (FSS) by the FSC.

BACKGROUND, KEY FINDINGS, AND FOLLOW-UP

A. Introduction

Assessor and objectives

1. This report contains the assessments of the BOK-Wire+ and KRX CCP based on the PFMI. The assessment was undertaken in the context of the International Monetary Fund's (IMF's) Financial Sector Assessment Program (FSAP) to the Republic of Korea in April and July 2013. The assessors were Gynedi Srinivas of the World Bank's Payment Systems Development Group and Froukelien Wendt of the IMF's Monetary and Capital Markets Department. The assessors would like to thank the Korean counterparts for their excellent cooperation and generous hospitality.

2. The objective of the assessment has been to identify potential risks related to the FMIs that may affect financial stability. While safe and efficient FMIs contribute to maintaining and promoting financial stability and economic growth, they may also concentrate risk. If not properly managed, FMIs can be sources of financial shocks, such as liquidity dislocations and credit losses, or a major channel through which these shocks are transmitted across domestic and international financial markets.

Scope of the assessment

3. The scope of the assessment includes two main FMIs as well as the authorities in Korea responsible for regulation, supervision, and oversight of FMIs. The BOK-Wire+ and the KRX CCP are assessed against all relevant principles of the PFMI. The authorities, being the BOK, the FSC, and the FSS, are assessed using the responsibilities for authorities of FMIs. Unlike the BOK-Wire+ system the KRX-CCP has not been assessed earlier during an FSAP.

B. Methodology and Information used for the Assessment

4. The information used in the assessment includes relevant national laws, regulations, rules, and procedures governing the systems and other available material. Other available material included annual reports; self assessments; responses to the IMF questionnaire; websites from the regulators, overseers, supervisors, operators and stakeholders, and other relevant documents.[1] In addition, discussions were held with regulators, overseers, and supervisors, being the BOK, FSC, and FSS. The assessment also benefited from discussions with the KRX, the KSD, and main stakeholders.

5. At the request of the IMF the authorities conducted self assessments. The BOK prepared a self assessment of the BOK-Wire+ system, whereas the FSC conducted an assessment of

[1] Not all information was available in English. Therefore, not all references to documents could be fully verified.

the KRX-CCP. Both self assessments were based on the PFMI. The self assessment included an assessment of the responsibilities of the Korean authorities.

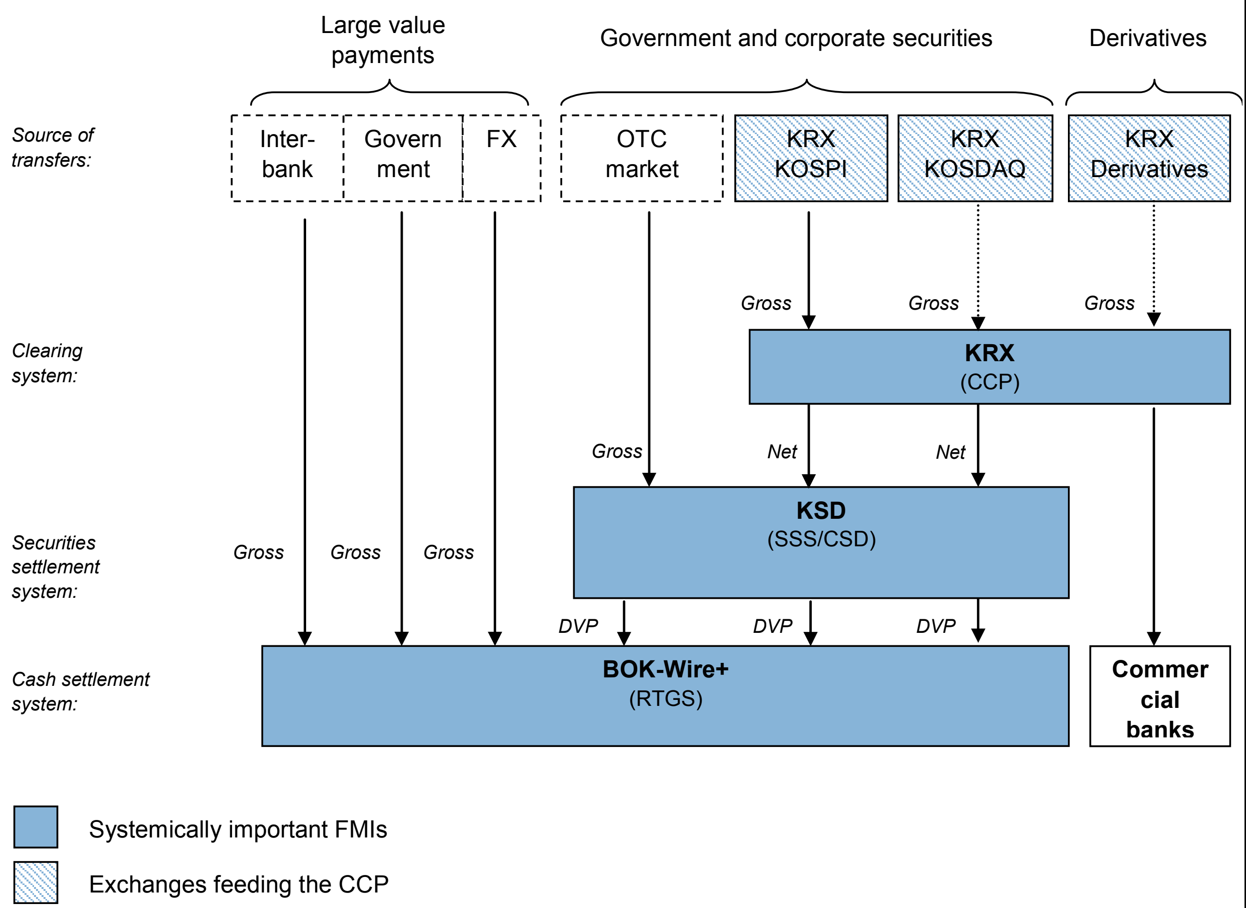
6. The assessment is based on information available in July 2013. Information available after July 2013 has not been taken into account in determining the assessment ratings.

C. Overview of the Payment, Clearing, and Settlement Landscape

7. Korea's payment, clearing, and settlement infrastructure consists of a consolidated set of systemically important FMIs (see Figure 1). The BOK-Wire+ is the interbank payment system and the backbone of the infrastructure in which the ultimate payments of various markets are settled. The KRX is the main player in the securities and derivatives market, operating three exchanges, which are (i) the Korea Composite Stock Price Index (KOSPI) market; (ii) the Korean Securities Dealers Automated Quotations (KOSDAQ) market; and (iii) the derivatives market (DM). In addition, the KRX offers CCP services to all these markets and has a majority stake in the KSD, which is a securities settlement system, central securities depository (CSD), and maintains the register for all securities traded on the KRX. Discussions are ongoing on the desirability to transform the current trade reporting systems into full-fledged TRs. Also, the authorities have decided to introduce a CCP for OTC derivatives in 2014.

8. The KRX is the main securities and derivatives market operator in Korea and is one of the largest exchanges worldwide. The KRX opened for trading in 1956 with 12 listed companies. It grew rapidly, supported by government policies that fostered the capital market as a means to support economic development and encourage companies to go public. The KRX introduced continuous trading in 1975, and automated its order-routing system in 1983. In 1997, the trading and clearing systems were fully automated and the KRX began to operate without the trading floor. Futures and options have been available for trading in Korea since 1996 and 1997, respectively. In 2012, the KRX ranked number one as the exchange with the highest number of stock index option contracts traded in the world. It was number five measured in value of bond trading and number eight in value of share trading.

Figure 1. Systemically Important Payment, Clearing, and Settlement Systems in Korea



Source: Staff.

BOK-Wire+

9. **The BOK-Wire+ is the hybrid real-time gross settlement (RTGS) system which is owned and operated by the BOK.** The BOK has been operating Korea's large-value payment system, the BOK-Wire, since December 1994. BOK-Wire was used for the transfer and settlement of funds between financial institutions having current accounts with the BOK. With the growing increase in settlement volumes and the need to save participants' intraday liquidity, the BOK launched a plan to upgrade the BOK-Wire in May 2005. BOK-Wire was replaced with BOK-Wire+ in 2009, which has a hybrid settlement function using continuous bilateral and multilateral offsetting mechanisms added to the RTGS system. Table 1 provides details on the RTGS and hybrid settlement functions. The BOK-Wire+ is used for the settlement of all short-term financial transactions (general funds transfers, interbank short-term lending/borrowing, third-party funds transfers), the cash leg of securities transactions, the Korean won (KRW) leg of foreign exchange settlement and the settlement of retail

payment systems. BOK-Wire+ is also used for the implementation of BOK monetary policy operations and for the issuance and redemption of government and other public bonds.

10. All transactions settled in the BOK-Wire+ are deemed final and irrevocable. The Debtor Rehabilitation and Bankruptcy Act, enacted in 2006, stipulates that transactions settled in the BOK-Wire+ are exempt from bankruptcy proceedings.

11. Participants in the BOK-Wire+ are both banks and nonbanks who must open current accounts with the BOK. Local and foreign banks, insurance companies, securities dealers and brokers, government agencies, and the Continuous Linked Settlement (CLS) bank are allowed to open current accounts with the BOK. Participants should be financially sound, devote an adequate number of staff to BOK-Wire+ operations, and generate sufficient volumes. Participant requirements are laid down by the governor of the BOK in line with the principles set out by the monetary policy committee (MPC), which is the ultimate decision-making body.

12. In June 2010, the BOK implemented a tiered participation model in BOK-Wire+. Indirect participants send and receive large-value transfers through direct participants. The BOK reviews the participant access criteria on an annual basis.

13. Participants in the BOK-Wire+ hold two types of accounts—a current account and a deposit account for settlement. The current account is used for the settlement of transactions in the RTGS system and is used for fund transfers for BOK loans, government and public bond transactions, and CLS and retail payment system settlements. General fund transfers, short-term interbank lending/borrowing, and the cash leg of securities transactions are settled in the hybrid system using the deposit account for settlement.

14. The BOK provides intraday credit to participants facing temporary liquidity shortages through intraday overdrafts, and intraday repo in BOK-Wire+.[2] The BOK is able to provide settlement liquidity as it is the sole issuer of legal tender in Korea, taken together with its mandate to promptly intervene in the market in times of crisis to provide loans to participants in order to prevent delays in settlement caused by temporary liquidity shortages. Participants' intraday settlement liquidity needs have reduced considerably since the introduction of BOK-Wire+.

15. Queuing arrangements are different in the RTGS and the hybrid components of the BOK-Wire+. Payment orders in the RTGS system are processed using the bypass FIFO (first in, first out) rule. In the hybrid system, the participants can change the priority of the message from urgent to normal and vice versa to facilitate settlement. All other transactions such as netted retail payment system settlements, receipt of treasury funds from financial institutions and redemptions of short-term loans with specified maturities are processed and settled at designated times.

[2] Liquidity adjustment loan is an overnight standing facility provided by the BOK with its interest rate pegged above the Base Rate depending on the day on which the loan is taken by the participant.

Table 1. Summary of Settlement Methods in the BOK-Wire+

Settlement system (settlement account)	Applicable transactions	Settlement mechanism
RTGS system (Current account)	• CLS fund transfers • Designated-time net settlements • Issuances and redemptions of government and public bonds • BOK loans • Funds transfers between participants after 5.30 pm to repay intraday overdrafts	RTGS
Hybrid system (Deposit account for settlement)	• General fund transfers (including third-party fund transfers) • Short-term interbank lending/borrowing • Cash leg of securities transactions (including BOK repo transactions)	RTGS, bilateral and multilateral offsetting

Source: CPSS Redbook Korea, 2011.

The KRX securities and derivatives clearing and settlement systems

16. The KRX operates two markets for securities, which are the KOSPI and KOSDAQ markets. The KOSPI market is the main securities market for stocks and bonds. Stocks can be shares, investment funds, exchange-traded funds (ETFs), and securitized derivatives. Bonds can be corporate and government bonds, including monetary stabilization bonds and bonds of the Korea deposit insurance corporation (KDIC). The KOSDAQ market is a dedicated market for small and medium-sized businesses. At the end of 2012 a total of 1,784 companies were listed at the KRX representing a market capitalization of USD 1,179 billion. Listing and trading of foreign shares is still modest, with 17 foreign companies, representing a trading volume of USD 4 billion in 2012. Table 2 provides some key statistics for the securities market.

17. The KRX also operates the DM, which was the largest derivatives market worldwide for stock index options in 2012. The DM opened in 1996 with the introduction of index futures based on KRX's main benchmark stock index, the KRX KOSPI 200. KOSPI 200 options were introduced in 1997 and government bond futures and US dollar derivatives in 1999. The DM also offers trading in commodity and currency options. Table 3 provides some key statistics for the derivatives market.

Table 2. KRX Securities Market Volumes as Percentage of GDP in 2012

Cash Market	Nr of Transactions (million)	Value of Trading (billion USD)	Percent of GDP	Nr of Listed Instruments
Government securities	3.5	1,120	98	4,619
Corporate bonds	-	6	0.5	5,628
Shares	1.218	1,518	133	1,784
ETF	0.03	120	11	135
Securitized derivatives	-	0.05	0.0	3,896

Source: World Federation of Exchanges.

Table 3. KRX Derivatives Market Volumes as Percentage of GDP in 2012

Derivatives market	Nr of Contracts Traded (million)	Value of Trading (billion USD)	Percent of GDP	Rank World
Stock index options	1,575	5,066	445	1
Stock index futures	62	7,071	621	9
Single stock futures	100	53	5	5
Interest rate futures	43	4,110	361	8
Commodities futures	0.02	0.1	0.0	16
Currency futures	54	551	48	5

Source: World Federation of Exchanges.

18. **The KRX CCP clears all products that are traded on the KRX securities and derivatives markets and is of systemic importance to the financial system of Korea.** A default of the KRX CCP has the potential to highly disrupt the domestic financial markets as potentially many financial institutions may be affected by its losses and no alternative CCP is operational within Korea. The values cleared by the CCP indicate what markets are of particular systemic importance. The value of trading of the KRX stock markets relates to GDP with a factor 1.3, the government bond market with a factor of nearly 1, the stock index option market with a factor 4.4, and the stock index future market with a factor of 6.2. The systemic importance of the KRX CCP will further increase with the introduction of OTC derivatives clearing.

19. **The main role of the KRX-CCP is to guarantee the settlement of securities and derivatives in case of default of one or more of its participants.** In its role as CCP, the KRX assumes settlement obligations, performs multilateral trade netting, and confirms settlement of funds and securities in accordance with the Financial Investment Services and Capital Markets Act (FSCMA). The KRX has established a risk management framework to protect itself against exposures from its members. As a first line of defense, the KRX has established participation requirements for clearing members, which are stricter than the access criteria for trading members. The aim of the

risk management framework is to cover potential losses in the securities market by the joint compensation fund for securities and settlement reserves, whereas potential losses in the derivatives market should be covered by margin, the joint compensation fund for derivatives, and settlement reserves. The joint compensation fund consists of contributions from clearing members, whereas the settlement reserves are funds of the KRX dedicated to cover potential losses resulting from the guarantee function of the KRX CCP.

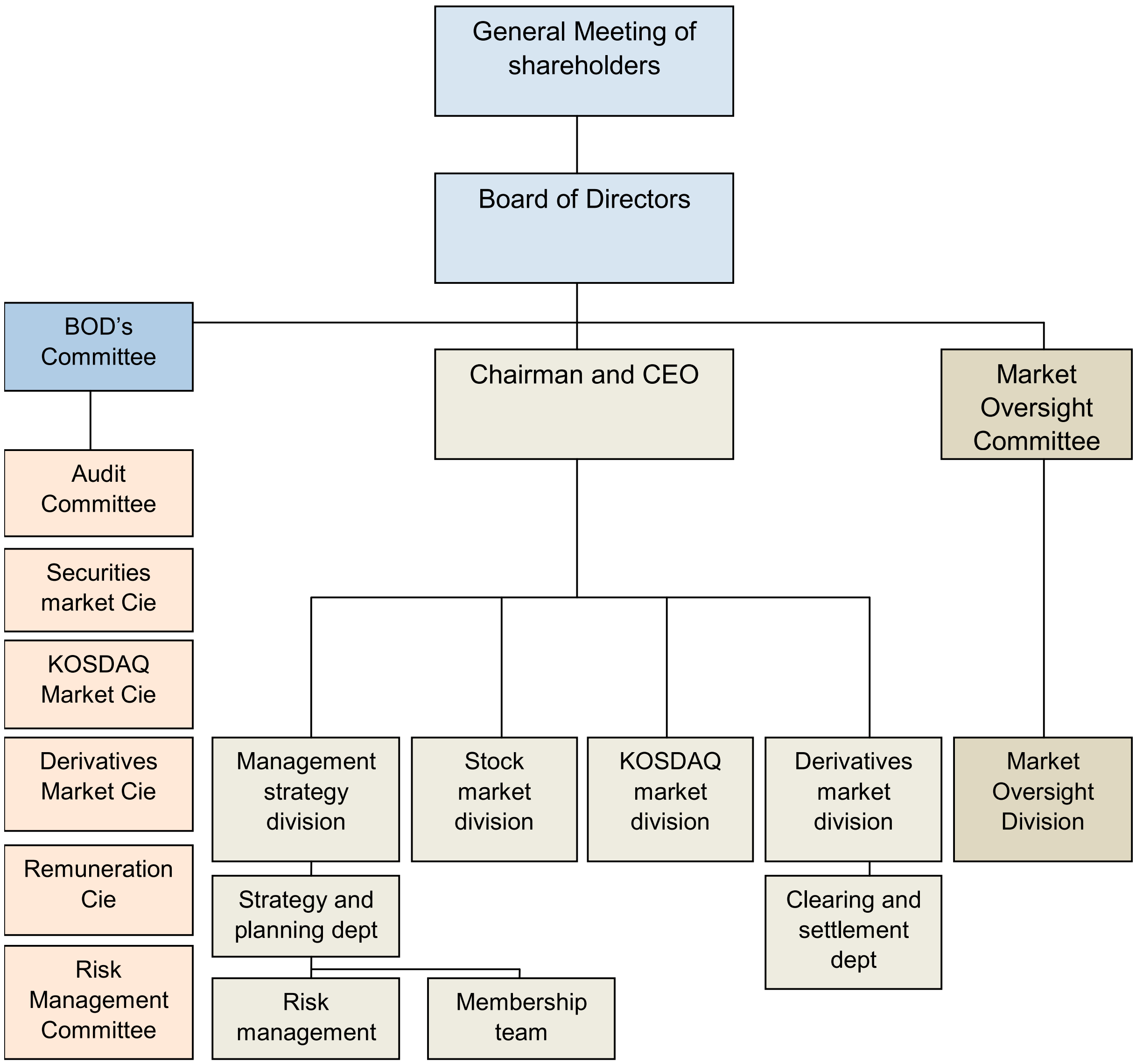
20. Cash settlement is conducted both in central bank money and in commercial bank money. The cash leg of most securities transactions, except for general bonds,[3] is settled in the BOK-Wire+ system. The cash payments following derivatives transactions are settled in the books of six commercial banks, which are called settlement banks. The settlement banks also act as custodian banks, keeping the cash collateral deposited by clearing members on behalf of the KRX.

21. The CCP is integrated into the KRX organization and is part of the same legal entity. The departments responsible for the CCP activities are the clearing and settlement department, the risk management team, and the membership team. The clearing and settlement department is responsible for the regulations and operations of the CCP. The clearing and settlement department falls under the DM business division, although it also manages the CCP activities for the securities divisions. The risk management team and membership team fall under the management strategy division. These teams are responsible for the company wide risk management framework and the membership management and monitoring respectively. In addition, the risk management committee is responsible at board level for the approval of risk management policies and regulations and sets risk limits for the company. Figure 2 illustrates the organization structure of the KRX.

22. The KRX is a corporation owned by the members, market-related organizations, and treasury stock of the KRX. The 36 member firms together have the largest stake (88.17 percent), followed by the 3 market-related firms (7.21 percent) and the KRX treasury (4.62 percent). The KRX has two subsidiaries. The KRX owns a stake of 76.63 percent in the KOSCOM. The KOSCOM is an information technology (IT) company responsible for the development and operations of the trading and clearing systems. The KSD is the CSD and is owned by the KRX for 70.41 percent.

[3] General bonds refer to all listed bonds of which the settlement cycle is T+0.

Figure 2. Organization Structure of the KRX

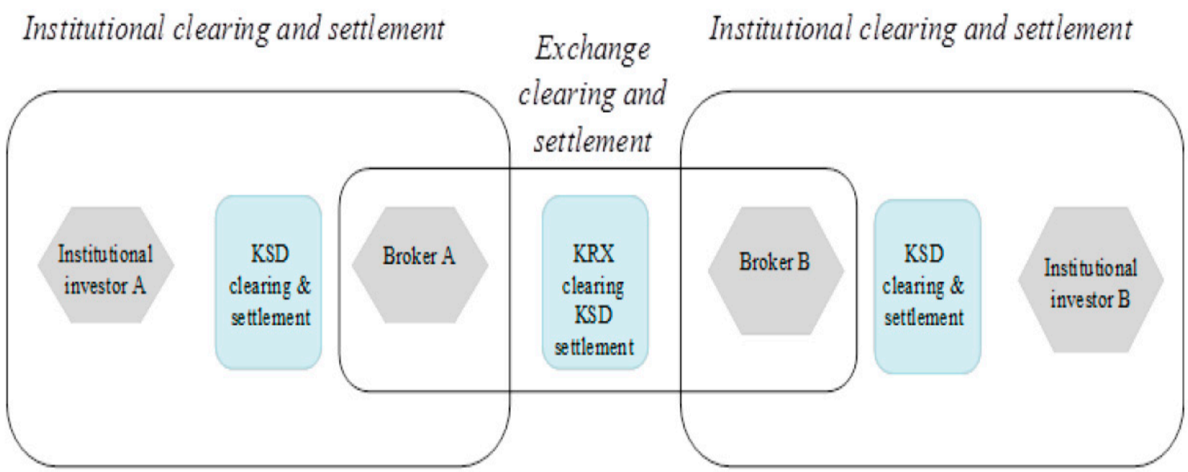


Source: The KRX.

23. The KSD is the sole CSD in Korea, established as a special corporation under the FSCMA. The KSD is the securities settlement system (SSS) and CSD for all securities listed and traded on the KRX markets. The KSD also settles securities that are traded OTC. In 2012, the value of stocks traded OTC was USD 999 billion, which is approximately two-thirds of the value of exchange traded stocks. Bonds are more heavily traded in the OTC market compared to the value of exchange transactions in bonds, with a value of more than USD 6 trillion in 2012. Since 2013 the KSD acts as the CCP for institutional settlements in OTC traded stocks, bonds, repos, and securities lending.

Figure 3 illustrates how the role of the KSD as a CCP adds to the role of the KRX CCP. The KSD also operates as the warehouse for gold derivatives traded on the DM.

Figure 3. The Role of the KRX and KSD as CCPs for Institutional Transactions



Source: The KSD.

24. Settlement procedures differ for different types of instruments traded. Table 4 outlines the differences per market. For stocks and bonds traded on the KOSPI and KOSDAQ markets, the KRX notifies its members and the KSD of the settlement details. Settlement takes place on T+2 for stocks, T+1 for government bonds, and T+0 for general bonds using a delivery versus payment (DVP) model 3 in all cases. OTC transactions are also settled by the KSD. Institutional stock transactions are settled on T+2 using a DVP model 2 arrangement. Bond transactions are settled on T+1 using a DVP model 1 arrangement, whereas other stocks are settled on T+2 using a DVP model 2 arrangement. The settlement of the securities is in all cases conditional upon the payment of the cash.

Table 4. Summary of Settlement Methods of the KRX and KSD

	KOSPI			KOSDAQ	DM	OTC		
	Stocks	**Govt. Bonds**[4]	**General Bonds**	**Stocks**	**Options Futures**	**Institutional Stocks**	**Bonds**	**Freeboard Stocks**
CCP	KRX	KRX	KRX	KRX	KRX	KSD	-	-
Securities settlement	KSD	KSD	KSD	KSD	-	KSD	KSD	KSD
Cash settlement	BOK-Wire+	BOK-Wire+	Commercial banks	BOK-Wire+	Commercial banks	BOK-Wire+	BOK-Wire+	BOK-Wire+
DVP model	DVP3	DVP3	DVP3	DVP3	-	DVP2	DVP1	DVP3
Settlement day	T+2	T+1 (T+0 for repos)	T+0	T+2	T+1 (T+3 for physical settlement)	T+2	T+1	T+2
Number of members	61	85	85	61	63	Na	Na	Na

Sources: The KSD and CPSS Redbook Korea 2011.

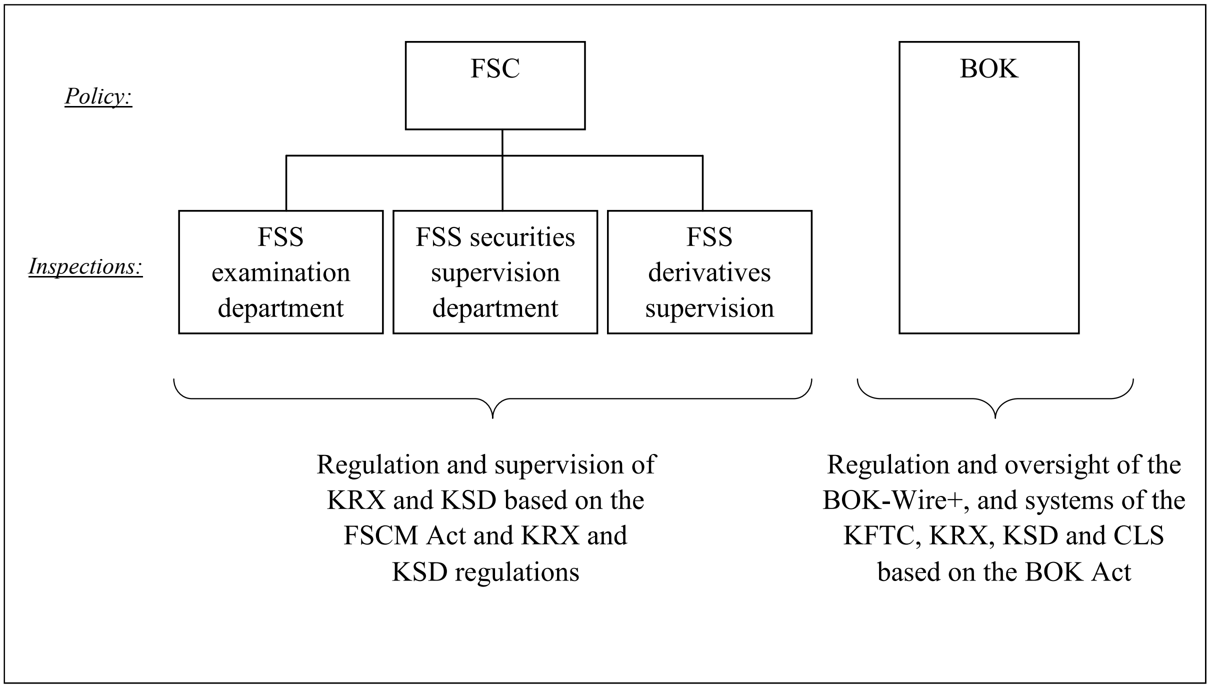
Regulation, supervision, and oversight of Financial Market Infrastructures

25. The KRX is regulated, supervised and overseen by the FSC and BOK based on statutory law. The regulation and supervision of the FSC is based on the FSCMA. The KRX needs approval from the FSC to amend its regulations. The FSC is empowered to induce change by using a range of disciplinary measures as described in the FSCMA. The Bank of Korea Act (BOK Act) stipulates that the BOK shall play a principal role in overseeing payment and settlement systems. The BOK Act provides the legal ground for the BOK to collect information, perform assessments, request improvement, and monitor any payment and settlement systems.

26. Where the FSC is the government organization responsible for the regulation and supervision of the KRX it may request the FSS to conduct inspections. The FSCMA prescribes that the FSS may inspect the business, financial status, books, documents, or other materials related to the KRX. The governor of the FSS has to report the result of the inspection to the FSC. In case the KRX is found to violate the rules the FSS may advice the FSC on any disciplinary measures. Figure 4 illustrates the regulatory structure for FMIs in Korea.

[4] Government bonds include Korea Treasury bonds, Korea International bonds, and Korean national housing bonds.

Figure 4. Regulation, Supervision, and Oversight of FMIs in Korea



Source: Staff.

27. **A reform agenda is currently being discussed for OTC derivatives clearing.** Since 2008, the financial supervisory authorities, the BOK, and major market participants have jointly discussed how to enhance the efficiency and safety of OTC derivatives market activities in Korea. In the light of market growth and the lessons learnt from the recent global financial crisis, the decision has been taken to build a new infrastructure for the OTC derivatives market, including a CCP and a trade repository. While the details are still being discussed by a task force established in February 2010, the instruments most likely to be subject to CCP clearing are interest rate swaps. The FSC completed the legislative process in July 2013. The launch date of the OTC derivatives CCP is expected in 2014.

D. Key Findings and Follow up for the BOK-WIRE+

General organization (Principle 1-3)

28. **The BOK has a well-founded and clear legal and regulatory framework governing the operations of the BOK-Wire+ and its participants' rights and obligations.** The BOK Act and the relevant regulations articulate the legal basis for the BOK-Wire+ to participants and the public in a clear and understandable way. The rules and regulations are enforceable and in accordance with the relevant acts. The relevant jurisdiction for each legal aspect is Korea. The regulation lists the various settlement services made available in the BOK-Wire+. While this provides an implicit

understanding that the settlement through BOK-Wire+ is final, it is suggested that an explicit clause to this effect is inserted in the regulation.[5] Further, the BOK could consider articulating its legal basis in a better manner by providing hyperlinks or placing the relevant acts and regulations on its payments systems webpage.

29. The BOK has an explicit commitment towards the safety and efficiency of the payment system as a whole. This is laid down in article 81 (1) of the BOK Act. The BOK also explicitly supports and works towards financial stability in terms of article 1 of the BOK Act. These two articles read in conjunction with article 28 of the BOK Act reinforcing the objectives of safety, efficiency, and financial stability. Risk management decisions related to BOK-Wire+ are taken by or reported to the MPC, the ultimate decision-making body. The internal audit department audits the operation of BOK-Wire+. The National Assembly and the board of audit and inspection, a government agency, audit the operations of BOK-Wire+ as well. A consultative committee of participants in the BOK-Wire+ has been established. The committee meets at least twice a year to discuss various issues relating to risk management, business procedures, standardization of IT systems, and fees. When the BOK changes its major policies with respect to payment and settlement systems, it must notify the relevant institutions in advance and collect their opinions. The revised policy changes are placed on the website of the BOK and are also notified to the participants. The changes are also reflected in the annual payment and settlement systems report which is placed on the website of the BOK. It is suggested that issues related to governance could be considered for inclusion as a separate chapter in the annual payment and settlement systems report.

30. The main risk that the BOK has identified relates to the interdependency between systemically important FMIs in Korea, including BOK-Wire+, and their participants. Other systemically important systems, such as the KRX systems, CLS, and the retail payment systems conduct their ultimate settlements in BOK-Wire+. The BOK recognizes that any operational disruptions in BOK-Wire+ could cause risks to the participants and other FMIs, leading to increased credit and liquidity risks. Delays in settlement and operational disruptions in other FMIs could be potential sources of risk to BOK-Wire+, in terms of pending payment instructions and queue management related issues, leading to an extension of operating hours of the BOK-Wire+ system. If needed an emergency response committee is set up and necessary action is taken. The business continuity plan (BCP) is reviewed annually. The BCP for the BOK-Wire+ deals with 12 potential scenarios. The BCP scenarios also take into account the nonavailability of the systems of operators of FMIs like the KRX, KSD, and the Korea Financial Telecommunications and Clearing Institute (KFTC)[6] on a system-by-system basis. It is recommended to develop in addition scenarios that deal with the simultaneous disruption of more than one FMI.

[5] Which is the ROMPSS, or Regulation on Operation and Management of Payment and Settlement Systems.

[6] The KFTC is a retail payment operator.

Credit and liquidity risk management (Principle 4–7)

31. The BOK's exposure to credit risk is limited as it provides intra-day credit to participants on a fully collateralized basis; however, the collateral framework could be enhanced. The collateral management system is operated efficiently through a link with the KSD, which keeps the government securities that the BOK accepts as collateral. The assets that are accepted as collateral are subject to a haircut, have low credit and market risks and are highly liquid. However, details regarding testing the sufficiency of the haircut, stress-testing, and pro-cyclicality are not available. Details of any independent validation taking place on an annual basis are also not available. There is a need to increase the frequency of the review of the haircut methodology taking into account the above aspects including an independent validation of the methodology on an annual basis. In addition, stress testing scenarios should include adverse market conditions in line with the PFMI requirements.

32. Liquidity risk in the BOK-Wire+ system is minimized due to the provision of an intraday liquidity facility by the BOK to the participants in the BOK-Wire+ system. Moreover, the hybrid settlement system significantly reduced the liquidity needs of the participants. The BOK as operator of the system monitors the settlement and payment flows in BOK-Wire+ system on a real time basis and initiates measures if required to smoothen payment flows. The differential pricing fees mechanism also contributes to smoothening payment flows throughout the operating hours of the BOK-Wire+ system. Nevertheless, there is a concentration of settlement transactions after 4.00 pm, due to incoming settlements from the KRX, and settlement of call loans and repo transactions (which are the principal sources of liquidity for Financial Investment Companies (FICs)). In view of the above, an impact study on the impact of differential pricing on payment flows may be undertaken by the BOK.

Settlement (Principle 8–10)

33. Settlement of payment transfers in BOK-Wire+ is achieved in real-time and payments once settled are final and irrevocable; cash settlement happens in central bank money. The BOK-Wire+ provides for finality of settlement as set out in article 5 of the relevant BOK-Wire+ regulation, in which the various types of settlement services provided by BOK-Wire+ are specified. However, the regulation and working regulation[7] do not explicitly define the point at which settlement is deemed final. The provisions in article 5 are implicit statements regarding the settlement finality being made available in BOK-Wire+. Further, participants can cancel/revoke a payment instruction which is placed in a queue. Revocation and cancellation can only be done with the consent of a pre-arranged funds beneficiary institution. It is accordingly recommended that relevant articles in the regulation and working regulation be appropriately amended to emphasize and reflect these positions.

[7] The regulation and working regulation are respectively the ROMPSS and the Working Regulation on Operation and Management of Payment and Settlement Systems (WROMPSS).

Central securities depositories and exchange-of-value settlement systems (Principle 11, 12)

34. DVP and payment versus payment (PVP) settlement mechanisms are being used for the settlement of securities and foreign exchange transactions respectively in central bank money in the BOK-Wire+. Adoption of these forms of settlement has led to the elimination of principal risk.

Default management (Principle 13, 14)

35. The BOK has rules and procedures governing the disposal of collateral of a defaulting participant with respect to the intra-day liquidity facilities provided by the BOK. These rules and procedures are publicly available on the BOK webpage. In addition, when the rules and procedures are revised, the BOK reflects the opinions of the relevant institutions and provides guidance to participants through BOK-Wire+ before the date of effect of such revision.

General business and operational risk management (Principle 15–17)

36. To manage operational risk, the BOK has established comprehensive operational management guidelines covering technology, risk factors, human resources, monitoring, control, and periodical testing. It has a recovery time objective (RTO) of 2 hours. The BCP is developed in line with the relevant regulation and working regulation and relevant sub-regulations and deals with 12 potential scenarios. These are found to be adequate in tackling operational risk and ensuring the continuity of operations of BOK-Wire+. The BCP scenarios also take into account the nonavailability of the systems of operators of FMIs like the KRX, KSD, and the KFTC on a system-by-system basis. However, it is desirable to develop a more holistic approach taking into account a disaster scenario when the operations of more than one FMI are disrupted.

37. KSD is assessed once every two years by BOK as part of its oversight activity. Given the critical nature of the FMI, the BOK could consider assessing the FMI at more frequent intervals.

Access (Principle 18–20)

38. BOK-Wire+ has fair and open access criteria for participation, which comprehensively considers each participant's risk management capability, the stable and efficient operation of BOK-Wire+, and the possibility of systemic risk. Though tiered participation arrangements are in place, the risks of indirect participation in BOK-Wire+ are very small because the scope of usage through indirect participation is limited and transactions of indirect participants through direct participants can be identified and monitored in real time. While this being so, it is not clear as to how the BOK monitors that direct participants are putting through transactions on behalf of indirect participants which are limited to the availability of funds in the indirect participants account with the direct participant. The BOK may consider seeking a periodical statement to this effect from the direct participants.

Efficiency (Principle 21, 22)

39. **The operational objectives stipulated in the relevant regulations on BOK-Wire+ have been fulfilled.** BOK-Wire+ is operated efficiently and its system design has been developed to reflect the needs of the participants and the financial markets.

40. **BOK-Wire+ uses international standards for communicating with participants, and international messaging service providers such as SWIFT to communicate with CLS bank.** The initiative to migrate to ISO 20022 message standards may be initiated and completed.

Transparency (Principle 23, 24)

41. **The BOK-Wire+ regulation and its sub-regulations are disclosed through the website of the BOK and, to facilitate participants' understanding of BOK-Wire+, the BOK provides them with manuals and guidebooks.** The BOK plans to use the disclosure framework published by the CPSS-IOSCO in December 2012. In addition, the BOK should also make the relevant information and data it discloses, in a language commonly used in financial markets in addition to the domestic language.

Table 5. Ratings Summary of the BOK-Wire+

Assessment category	Principle
Observed	Principles 1,2,3,4,7,8,9,12,13,15,16,17,18,19,21,22
Broadly observed	Principle 5
Partly observed	Principle 23
Not observed	-
Not applicable	Principles 6, 10, 11, 14, 20 and 24

E. Key Findings and Follow-up for the KRX-CCP

General organization (Principle 1–3)

42. **The legal basis for the KRX-CCP is generally sound and enforceable.** The FSCMA and the KRX market regulations sufficiently describe the organization and responsibilities of the KRX. The Debt Rehabilitation and Bankruptcy Act provides for a firm statutory foundation for netting, set-off and closing out of positions. There's a high certainty that the KRX regulations, procedures and contracts are enforceable in the Korean jurisdiction. A third country financial institution which intends to apply for KRX membership has to establish a local entity or a branch to get a business license from the FSC as a financial investment trader or financial investment broker.

43. **There is room to improve the legal framework in the normal course of business.** The regulatory framework could be further improved by increasing its clarity. The relevant provisions for CCP clearing are currently comingled with concepts related to the KRX trading activities. The KRX

regulations could make better use of the internationally used concepts, in particular the concepts used in the PFMI. Finally, as the KRX currently has not developed a recovery plan the regulatory framework has no explicit provisions that support recovery activities.

44. The governance arrangements of the KRX are transparent and the roles and responsibilities of its board and management are clearly described and publicly available. Nonexecutive directors are appointed to represent public interests. The KRX has established a risk management committee and a risk management department to identify, monitor, and manage companywide risks as well as CCP-related risks. The risk management department reports to the board and the board endorses major decisions.

45. The governance arrangements do however contain some gaps and issues of concern that should be addressed in a defined timeline. The risk management committee is, although independent of the business departments, chaired by an executive director who is also responsible for strategy and planning, and therefore not fully independent from business related matters. The risk management team and the clearing and settlement department, that are responsible for the management of credit and liquidity risks, is small compared to the scope of their responsibilities. It is therefore recommended to extend staff resources dedicated to risk management. Finally, the objectives of the KRX do not place a particular high priority on the safety and efficiency of the KRX-CCP. It is recommended to include the safety and efficiency of the CCP as one of the objectives of the KRX and explicitly state that the KRX CCP intends to support financial stability.

46. The KRX has developed a companywide risk management framework, consisting of policies, tools, governance arrangements, and default procedures for managing credit, liquidity, operational, and market risks. The risk management framework has recently been implemented and requires business departments and the market oversight department to identify, monitor, and manage its risks. In addition to this bottom-up approach the KRX board decides on risk management limits. The risk management framework is reviewed on an annual basis and includes risks related to external stakeholders, such as settlement banks, the KSD, and the BOK. The risk management framework is regularly assessed through independent audits.

47. The KRX has not started with the development of plans for recovery or orderly wind down. The KRX should decide which of its operations are critical to continue in times of crisis. The KRX should also develop crisis scenarios that go beyond the default procedures and business continuity plans. The scenarios may cover extreme but plausible events, such as the default of a large participant that is part of a financial group that provides multiple services to the KRX, such as settlement and custody activities and a simultaneous decrease in the value of its collateral. The lack of such a plan is an issue of concern, given the size of systemic importance of the KRX-CCP and the impact of a potential failure of KRX on the financial stability in Korea.

Credit and liquidity risk management (Principle 4–7)

48. The KRX has identified various sources of credit and liquidity risks related to its CCP activities. The KRX has developed the settlement risk management system that monitors credit exposures per clearing account in real time. For the derivatives markets credit risks are in general properly identified and monitored. The KRX manages credit risks in the derivatives markets by collecting margin, joint compensation fund contributions and by allocating its settlement reserves to cover credit losses. The KRX uses daily stress testing to determine the sufficiency of its financial resources available in the event of a clearing member's default in extreme but plausible market conditions. The KRX has defined a risk management waterfall for the use of financial resources in case of credit losses. The legal and regulatory framework supports this framework.

49. For the derivatives market the CCP covers its credit exposures to its clearing members through a margining system,[8] which is based on internationally used margin models. The margin model is risk based and comprises both initial and variation margin. The initial margin is determined per product group based on the maximum net loss, calculated with a 99.7 confidence level and using a 2-day close-out period. The scenarios used for calculating volatility margins are based on price changes in the underlying assets and option volatility. The KRX allows for offsets in a conservative way. Currently, the CCP does not have the operational capacity to make intraday margin calls, although it has plans to implement intraday margin calling in 2014.

50. The KRX has taken an important step by starting the development of a comprehensive risk management framework for the securities market. The KRX started to investigate the introduction of securities margin, as securities volumes are large and the KRX is exposed to credit losses between the trading and settlement day. Currently, potential credit loss is covered by the joint compensation fund for the securities market. As the size of the joint compensation fund is defined in the regulations it is not possible for KRX to adapt the fund to accommodate increased exposures in the securities market in a timely manner.

51. Despite these positive developments several features of the credit risk management framework are not in line with the PFMI requirements and potentially pose risk to the market. The credit risk management models, including the margin models, are not validated by an independent entity, such as its regulators or an external expert, such as an academic or consultancy bureau. The models are also not subject to back testing and sensitivity analysis. It is therefore not possible to assess whether the margin models sufficiently cover credit exposures in the derivatives market. The concept of affiliated members is not yet considered in the credit risk management framework of the KRX. The risk management waterfall should better reflect the suggestion of the PFMI that part of the KRX capital should be taken before the financial resources of surviving clearing members can be used (skin in the game).

52. The KRX has established clear policies regarding eligible collateral and has tools to set and enforce conservative haircuts. The KRX can further improve its collateral management by implementing collateral limits. The KRX accepts a broad range of assets as collateral, including domestic and foreign cash, listed bonds, U.S. government bonds and listed securities. In practice,

[8] The margining system is called the Composite Optimized Margin System (COMS).

the majority of collateral is deposited in government bonds. Collateral is marked to market on a daily basis, except for bond securities which are marked to market on a weekly basis. The KRX should implement a stress testing framework for collateral.

53. The KRX does have an effective framework for the management of liquidity risks, consisting of a liquidity guideline and access to credit lines that are sufficiently large. The KRX is able to identify, measure, and monitor its settlement and funding flows on an ongoing basis. The KRX stress tests its liquidity needs both daily and monthly and reports its findings on a quarterly basis to the risk management committee. The KRX does not stress its liquidity needs for foreign currencies, as settlements in foreign currencies are low. If needed the KRX can draw on an FX credit line with one of its liquidity providers. The liquidity providers need to comply with specific criteria set out in KRX rules. The KRX does not rely on central bank money; however, its largest liquidity provider has a public profile and a triple A credit rating.

Settlement (Principle 8–10)

54. Securities settlements are final as soon as the settlement account has been debited or credited, which occurs real time during the settlement day. Derivatives transactions are final as soon as the KRX has determined the net obligation per clearing member, following a transaction. The Debt Rehabilitation and Bankruptcy Act protects the KRX against any insolvency proceedings following the bankruptcy of a clearing member.

55. The KRX conducts its money settlements for the securities market in central bank money and for the derivatives markets through commercial banks. The main reason for using commercial bank money for derivatives is that the majority of clearing members active in derivatives trading do not have direct access to the BOK-Wire+. The KRX therefore uses the accounts of six commercial banks to settle cash following derivatives transactions. The KRX has a limited set of criteria to select its settlement banks. Banks should be regulated and supervised and have a capital ratio of at least 8 percent. It monitors compliance with these criteria on a monthly basis. The KRX does not impose additional requirements, such as creditworthiness, access to liquidity, and operational reliability. The KRX should increase its requirements for settlement banks and monitor compliance with these requirements regularly. It may also consider including an expiration date in its contracts with the settlement banks to provide incentives to the settlement banks to continue to provide adequate services and reduce risks.

56. The DM business regulations and enforcement rules specify processes, procedures and controls to monitor and manage the delivery process and associated risks related to the physical delivery of gold derivatives. The KRX requests the deposit of physical delivery margin to cover potential losses in case one of the counterparties is not able to fulfill its obligations in the delivery process. In addition, rules and procedures are in place to protect the KRX against any losses related to the damage of gold bars.

Central securities depositories and exchange-of-value settlement systems (Principle 11, 12)

57. The KRX eliminates principal risk by applying DVP arrangements for the settlement of the different products that it clears. The arrangements ensure final settlement with conditional final settlement of one obligation upon the final settlement of the other. Different DVP models are used to ensure efficiency and accommodate the needs of different markets and different market participants.

Default management (Principle 13, 14)

58. The KRX has developed default rules and procedures to manage a participant's default. The KRX has appropriate discretionary power to implement these rules. The rules do include the necessary actions to be taken by the KRX, potential changes to normal settlement practices, the treatment of proprietary and customer transactions and accounts, and the existence of other mechanisms that may be activated, such as an auction. The default manual is tested on an annual yearly basis. Key stakeholders are involved in the testing. The KRX rules and regulations could articulate certain key aspects in a more extensive way, such as the actions that an FMI can take when a default is declared and the extent to which such actions are automatic or discretionary. The internal plan should be reviewed by its management and the relevant board committees at least annually or after any significant changes to the FMI's arrangements.

59. Segregation and portability arrangements are in place for the securities and derivatives market. The account structures of the KRX, KSD, settlement banks, and clearing members segregate the clearing member's proprietary assets from its customer assets. The segregation and portability arrangements are supported by the legal framework. The relevant laws and regulations are publicly disclosed. Although the KRX is not able to monitor individual client positions during normal business it has the power to ensure timely transfer of customer accounts from the failing participant to another participant in times of crisis. The CCP should extend its regulatory provisions on portability arrangements for the securities market and use similar rules for the securities market as are currently available for the derivatives market.

General business and operational risk management (Principle 15–17)

60. The KRX has a system in place to identify potential general business risks, which includes risks related to the introduction of new products and services. The KRX holds sufficient liquid net assets funded by equity so that it can continue operations and services as a going concern if it incurs general business losses. However, as the KRX does not have a plan for recovery or orderly wind-down, no explicit link is drawn by the KRX between the size of its liquid net assets and the length of time required to maintain its critical operations and services. Assets held to cover general business risk are of sufficient quality and liquidity. The KRX can raise additional equity if needed. The potential recovery plan of the CCP should link the size of the available liquid net assets and the length of time requirement to maintain critical operations and services. It should also contain a reassessment of the sufficiency of the size of the settlement reserves.

61. The KRX holds its own and its participants' assets at supervised and regulated entities, but the KRX should enhance the monitoring of its custodians. The KRX' selection criteria for custodians and subsequent monitoring systems should be upgraded to ensure that these entities have robust accounting practices, safekeeping procedures, and internal controls that fully protect the assets held in custody. The maximum allowed concentration of settlement flows is set at 60 percent, however the KRX may analyze whether it is able to withstand the default of a custodian holding 60 percent of assets and adapt the percentage if needed. The KRX's investment strategy allows only investments in cash, government bonds and monetary stabilization bonds, which supports timely liquidation. The KRX should disclose its investment policy in English.

62. The KRX has an operational risk management framework in place consisting of systems, policies, procedures, and controls to identify, monitor, and manage operational risks. Its procedures ensure scalable capacity adequate to handle increasing stress volumes. The KRX recently developed policies for physical and information security policies. A BCP is in place, as well as a secondary and third site. The BCP is regularly tested with all relevant stakeholders. The RTO is 3 hours, which allows for same day settlement, but is not fully in line with the prescribed RTO of 2 hours by the PFMI.

Access (Principle 18–20)

63. The access criteria of the CCP allow for fair and open access to its services based on reasonable risk-related participation requirements. The KRX has publicly disclosed procedures for facilitating the suspension and orderly exit of a participant that no longer meets the participation requirements.

64. The current legal framework does not allow the KRX to monitor settlement positions of individual customers. Subsequently, the KRX is not able to monitor positions at that level. The KRX's regulations regulate the relationship between its participants and its indirect participants. The KRX is however able to regularly identify indirect participants responsible for large positions in the DM market. It should increase its possibilities to identify risks from tiered participation in the securities market.

Efficiency (Principle 21, 22)

65. The KRX has arrangements in place to consult its participants on a regular basis and address their needs in the design of its services. The CCP is subject to government audits that aim to ensure the efficiency of KRX's operations. Its fees and investments are subject to approval of a market efficiency committee. The KRX has established mechanisms for the regular review of its efficiency and effectiveness, such as customer satisfaction surveys.

66. The KRX does not use internationally accepted communication procedures and standards for communication with its clearing members, settlement banks, the KSD, and the BOK. Conversion into internationally accepted communication procedures and standards is technically possible, but costly. The KRX should at least be able to accommodate the internationally accepted communication network and procedures to eliminate manual interventions in clearing and settlement processing, reduce risks, and increase efficiency by allowing for full straight through processing.

Transparency (Principle 23, 24)

67. The KRX has recently disclosed responses to the CPSS-IOSCO Disclosure Framework for FMIs, which enable participants to assess the risks they incur by participating in the CCP. Rules and regulations are disclosed on the website in Korean. Various rules and regulations are available in English, as well. The website also contains statistics and various descriptions of the risk management and operational systems. The KRX provides ad hoc training and information to its clearing members. Fees are also publicly disclosed. It is recommended that the KRX discloses all its rules, regulations and guidelines on its website in English.

Table 6. Ratings Summary of the KRX-CCP

Assessment Category	Principle
Observed	1, 7, 8, 9, 10, 12, 13, 14, 15, 17, 18, 21, 23
Broadly observed	2, 3, 5, 6, 16, 19, 22
Partly observed	4
Not observed	-
Not applicable	11, 20, 24

F. Key Findings and Follow up for Authorities

68. FMIs in Korea are subject to regulation and oversight of the BOK and subject to regulation and supervision of the FSC and FSS. The legal underpinning of the responsibilities suggests overlap as both regulators are responsible for financial stability and have responsibilities related to the KRX and KSD. This is the case in many countries and needs to be managed by a consultative and cooperative framework in the form of an MOU to ensure effective coordination between the BOK and FSC where their roles as regulators overlap.

69. The powers of the FSC and FSS are considered sufficient. The powers of the BOK are considered not to be effective. While the BOK may request other FMIs than the BOK-Wire+ to take measures for the improvement of their operating rules and to provide related information, it has no powers to ensure that its suggestions are implemented, nor is the BOK able to confirm the authenticity of the submitted information and ascertain whether only selective information has been submitted by these entities. There is a need to amend the existing statute to empower the BOK to effectively discharge its oversight responsibilities including the powers to obtain authentic information and to be able to oversee that its observations/findings are implemented by the FMIs and the ability to impose sanctions when required.

70. The resources of the BOK and FSS are considered sufficient, however, the resources of the FSC are considered insufficient. Although the FSC staff has good knowledge and is relatively effective in its activities, the work load is considered too large for one staff member, especially given that staff members rotate every two years. The seconded KRX staff brings appropriate knowledge, however, may prevent the FSC from preparing independent opinions. It is recommended that the FSC extends the number of staff members responsible for clearing and settlement related matters to allow for a proactive and complete analysis of the compliance of the KRX CCP with the relevant laws, regulations and the PFMI. It will also allow for a more proactive cooperation with the FSS.

71. The authorities disclose the main laws and policies on FMIs, but further disclosure of information is recommended. The BOK discloses its policies publicly with respect to all FMIs including the BOK-Wire+. The FSC and FSS objectives are publicly disclosed in the FSCMA. The BOK should make the relevant information and data it discloses, in a language commonly used in financial markets in addition to the domestic language on its website. The FSC and FSS should provide dedicated information on FMIs on their websites.

72. The BOK and FSC have both publicly announced their support for the PFMI; further implementation of the PFMI is needed. The BOK has implemented the PFMI as the oversight framework for the BOK-Wire+. The BOK's application of the PFMI as the oversight framework is however incomplete, due to the regulatory overlap with the FSC and the BOK's lack of powers to see that its decisions are implemented by other FMIs. The FSC intends to adapt the regulations under the FSCMA in accordance with the PFMI. The FSC, together with the FSS, is in the process of approving regulations for OTC derivatives trading and clearing. Regulations for exchange traded stocks, bonds and derivatives have not yet been adapted to reflect the PFMI.

73. The BOK and FSC do not appropriately cooperate in the regulation, supervision and oversight of the FMIs in Korea, in particular regarding the regulation, supervision and oversight of the KRX and KSD. Cooperation among the BOK and FSC at the highest level has proven not to be effective, as FMIs so far have not been discussed at that level. The cooperation at the technical level is informal, without adequate agreements and arrangements. This impedes the BOK from effectively exercising its oversight duties. The KRX has to respond to requirements of two different regulating and supervising authorities that may be overlapping or even contracting. The FSC cannot benefit from specific knowledge that is obtained by the BOK in its role as overseer, for example information obtained during international meetings or during the FMI operations council. There are no crisis management arrangements between the authorities to manage a potential financial or operational crisis relating to FMIs in Korea.

74. It is recommended to formalize the cooperation between the BOK and the FSC regarding the regulation, supervision and oversight of FMIs. This formal arrangement should enable the cooperation between the BOK and FSC at the appropriate technical and management level and should improve the efficiency and effectiveness of the regulation, supervision, and oversight, in particular in relation to the KRX CCP and the KSD. Such a cooperative framework could be in the form of an MOU having a sound legal basis to ensure effective coordination between the BOK and FSC where their roles as regulators overlap. It should enable the BOK to ensure that its suggestions are implemented and to confirm the authenticity and completeness of the information submitted by the FMIs. The BOK and FSC should "speak with one voice" to avoid any inefficiencies in their communication with the KRX and KSD. It should also allow the FSC to benefit from relevant information that is obtained by the BOK during international meetings or meetings with the FMI operations council.

75. The BOK and FSC should define arrangements regarding the frequency of their information exchange and plan joint meetings with the FSS, KRX, and KSD. They should also develop a crisis management plan and test such a plan to enable timely and effective cooperation in times of crisis that may affect the safety and efficiency of the FMIs. Any assessments should be shared. Before finalizing an assessment the authorities should consult each other and take each other's comments into account.

Table 7. Ratings Summary of the Authorities

Assessment category	Responsibility
Observed	A,
Broadly observed	B, C, D
Partly observed	E
Not observed	-
Not applicable	-

G. Recommendations for the BOK-Wire+

List of Prioritized Recommendations				
Principle	**Issues of Concern and Other Gaps or Shortcomings**	**Recommended Action**	**Relevant Parties**	**Comments and Priority**
5	The haircuts are determined in terms of appendix 4 of the WROMPSS. The haircut ratios are determined once every two years. Details regarding testing the sufficiency of the haircut, stress-testing and pro-cyclicality are not available.	There is a need to increase the frequency of the review to take into account the above aspects and changing market conditions. Details regarding testing the sufficiency of haircuts, stress-testing and pro-cyclicality should be readily available.	BOK	Short-term, medium priority

7	The participants can cancel/revoke a payment instruction which is placed in a queue (article 10 (3) of ROMPSS and articles (20) and (42) of WROMPSS). Revocation and cancellation can only be done with the consent of a pre-arranged funds beneficiary institution.	The relevant articles in the ROMPSS and WROMPSS may be suitably amended to emphasize and reflect this position.	BOK	Medium-term, medium priority
7	There is a concentration of settlement transactions towards the closing hours of BOK-Wire+.	An impact study on the impact of differential pricing on payment flows may be undertaken by BOK, as it would facilitate deeper analysis of the payment flows and could lead to avoidance in the concentration of payment instructions.	BOK	Short-term, medium priority
8	The provisions in article 5 are implicit statements regarding the settlement finality being made available in BOK-Wire+.	The ROMPSS and WROMPSS may be suitably amended to explicitly define the point at which settlement is deemed final and irrevocable in BOK-Wire+.	BOK	Medium-term, medium priority
3, 17	The BCP laid down for the BOK-Wire+ in accordance with the ROMPSS, WROMPSS and the relevant sub-regulations thereof deals with 12 potential scenarios. The BCP scenarios also take into account the non-availability of the systems of operators of FMIS like the KRX, KSD and the KFTC (retail payment operator) on a system-by-system basis.	It is desirable to develop a more holistic approach taking into account a disaster scenario when the operations of more than one FMI are disrupted rather than taking into account non-availability of individual systems.	BOK	Short-term, high priority
23	To facilitate the understanding of stakeholders, including participants, the BOK plans to use the disclosure framework published by CPSS-IOSCO in December 2012.	The CPSS-IOSCO disclosure framework may be used.	BOK	Short-term, medium priority
23	BOK should also make the relevant information available in a language commonly used in financial markets in addition to the domestic language.	All information provided in Korean language may also be made available in English on the BOK website.	BOK	Short-term, medium priority

H. Recommendations for the KRX-CCP

List of Prioritized Recommendations				
Principle	**Issues of Concern and Other Gaps or Shortcomings**	**Recommended Action**	**Relevant Parties**	**Comments and Priority**
1	Not all PFMI concepts covered in legal framework.	Improve clarity of legal and regulatory framework by explicitly distinguishing between the trading and CCP activities in the FSCMA. The KRX regulations could make better use of the internationally used concepts.	KRX, FSC, FSS	Medium-term, medium priority
1	Not all laws and regulations disclosed in English.	Improve the disclosure of laws and regulations, in particularly by disclosing laws and regulations in English.	KRX	Medium-term, medium priority
2	Objectives for CCP not sufficiently explicit on safety and efficiency of operations and support for financial stability.	Explicitly address the CCP activities of the KRX within the KRX organization in particular by explicit and publicly disclosed objectives regarding the safety and efficiency of its operations and support for the financial stability.	KRX, FSC	Short-term, medium priority
2	Insufficient independence risk management committee.	The risk management committee should be chaired by an individual who is independent from the FMI's executive management.	KRX, FSC, FSS	Short term, high priority
2	Lack of resources allocated to risk management tasks.	Increase the number of staff in the KRX risk-management team to manage companywide and CCP risks in a proactive way.	KRX	Short-term, high priority
3	No recovery plan.	Develop a recovery plan in line with the requirements stated in the PFMI and the other relevant documentation provided by the standard setting bodies CPSS and IOSCO. The legal framework should be adapted to support the plans.	KRX, FSC	Short-term, high priority
4	No margin collected for the securities market.	Reform the credit risk management framework for the securities market, by collecting risk-based collateral (margin) on at least a daily basis.	KRX, FSC, FSS	Short-term, high priority
4	The size of the joint compensation fund cannot easily be	Consider to remove the fixed size requirement of the fund in the KRX regulations to better address the	KRX, FSC, FSS	Medium-term, high priority

	adapted to increased exposures.	need for increased funds in case of increased exposures. The contribution could be based on the exposures of a particular clearing member instead of its trading volumes.		
4	Unclear whether affiliates concept is applied.	Ensure that credit risk calculations take into account not only the individual clearing members, but also its affiliates.	KRX	Medium-term, high priority
4	Plans on back testing need to be implemented.	Continue with planned reforms regarding the introduction of back testing, sensitivity analysis and the skin in the game concept.	KRX and stakeholders	Short-term, high priority
4	No independent validation of risk management and margin models.	Ensure that credit risk management model and margin model are reviewed at least annually by a qualified and independent entity.	KRX	Short-term, high priority
5	No concentration policy; weekly mark to market for bonds; no stress tests for haircuts	Upgrade the collateral framework by developing a concentration limit policy, apply daily mark to market for bond collateral and implement stress tests for haircuts.	KRX	Medium-term, high priority
6	Intraday margin regulations approved but arrangements not implemented	Continue the implementation of intraday margin arrangements.	KRX and stakeholders	Short-term, high priority
6	Standardized close out period does not acknowledge differences in liquidity among products.	Better substantiate the close-out period of 2 days for the individual products that are cleared by the KRX.	KRX	Medium-term, medium priority
7	No stress testing of liquidity needs for settlement FX currencies	Implement stress testing exercises for foreign currencies.	KRX	Medium-term, medium priority
8	Limited information on exact moment of irrevocability.	Enhance clarity of DM regulations to specify the point after which member's obligations may not be revoked by a clearing member.	KRX, FSC, FSS	Medium-term, high priority
9	Limited selection criteria for settlement banks	Increase requirements for settlement banks and monitor compliance with these requirements regularly.	KRX and stakeholders	Short-term, high priority
10	Limited information in DM regulations.	Further improve the DM rules and regulations by more explicitly specifying the KRX's role as CCP in the delivery process.	KRX, FSC, FSS	Medium-term, medium priority

13	Regulations do not cover all details on default management procedures.	Further improve the securities and DM regulation by specifying the key concepts related to the management of a default by the CCP in line with the PFMI.	KRX, FSC, FSS	Medium-term, high priority
14	Limited regulations for portability in securities market	Extend regulations on portability arrangements for the securities market in line with the derivatives market regulations.	KRX, FSC, FSS	Medium-term, medium priority
15	The KRX has no recovery plan.	The potential recovery plan of the KRX should link the size of its liquid net assets and the length of time requirement to maintain its critical operations and services. It should also contain a reassessment of the sufficiency of the size of the settlement reserves.	KRX, FSC, FSS	Short-term, high priority
16	Insufficient selection criteria for custodians	Broaden selection criteria for custodians to ensure robust accounting practices, safekeeping procedures, and internal controls. The KRX should monitor compliance regularly.	KRX and settlement banks	Short-term, high priority
16	60 percent cap is too high for the KRX to manage losses in case of a custodian's default.	Reconsider the 60 percent cap on the value of assets held by one custodian based on an analysis of KRX' ability to withstand the default of a custodian holding 60 percent of assets.	KRX	Short-term, high priority
16	Investment policy not publicly available in English.	Disclose investment policy in English.	KRX	Short-term, medium priority
17	RTO of 3 hours is regulatory requirement.	The KRX, together with the FSS, should adapt the regulatory framework to accommodate an RTO of 2 hours in line with the PFMI.	KRX, FSC, FSS	Medium-term, medium priority
19	Legal impediments to monitor positions of clearing members' clients.	Increase possibilities to identify risks from tiered participation.	KRX, FSC, FSS	Medium-term, medium priority
22	Proprietary network does not accommodate internationally accepted standards.	Accommodate the internationally accepted communication network and procedures.	KRX and stakeholders	Medium-term, medium priority
23	Not all rules, regulations and guidelines available in English.	Disclose all rules, regulations and guidelines in English.	KRX	Medium-term, medium priority

I. Recommendations for Authorities

List of Prioritized Recommendations				
Responsibility	**Issues of Concern and Other Gaps or Shortcomings**	**Recommended Action**	**Relevant Parties**	**Comments and Priority**
B	Lack of powers BOK	Increase powers of the BOK	BOK	Short-term, high priority
B	Limited resources FSC	Increase resources of the FSC	FSC	Short-term, high priority
C	Insufficient disclosure on FMIs (in English).	Improve disclosure of information in English, in particular on websites of the FSC and FSS.	BOK, FSC, FSS	Medium-term, medium priority
D	Current KRX regulations do not include PFMI requirements.	Adapt the regulations under the FSCMA to reflect the requirements of the PFMI.	FSC, FSS	Short-term, high priority
E	Cooperation and coordination among authorities considered ineffective.	Formalize cooperation and coordination among the BOK and FSC regarding the regulation, supervision and oversight of FMIs.	BOK, FSC	Short-term, high priority

DETAILED ASSESSMENT OF OBSERVANCE OF PRINCIPLES—BOK WIRE+

Detailed Assessment of Observance of Principles	
Principle 1: Legal basis An 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 The legal basis should provide a high degree of certainty for each material aspect of an FMI's activities in all relevant jurisdictions.	**Material aspects and relevant jurisdictions** The BOK Act provides the legal basis for each material aspect of the FMI's activities with a high degree of certainty http://www.bok.or.kr/broadcast.action?menuNaviId=824). The legal basis is provided in the BOK Act as under: Chapter II, Section 3 - article 28 (clauses 10, 11, 11-2, 11-3) provides BOK with the powers to deliberate and decide upon all basic matters for the operation and management of payment systems. Chapter IV, Section 2—article 62 enables the reserves held by banking institutions with the BOK to be used for the settlement of balances with the BOK or other banking institutions.

	Chapter IV, Section 3—article 65 empowers the BOK to provide emergency credit to banking institutions including providing credit to overcome temporary shortages to complete funds settlement in the event of breakdown of their electronic information processing systems or other incident. Chapter IV, Section 6—article 80 enables the BOK to provide credit to for-profit-enterprises. Chapter IV, Section 7—article 81 (1) lays down that BOK can determine for the purpose of promoting the safety and efficiency of the payment system as a whole, all matters relating to the payment and settlement systems that it operates. Article 81 (2) enables BOK to request other operators or their supervisors to take measures for improving the system operating rules. All such payment system operators are required to furnish materials related to payments and settlements to the BOK in terms of article 81 (3). Additionally, article 81 (4) requires all participant institutions of payment systems operated by the BOK to provide any relevant materials to the BOK. Article 81.2 allows the BOK to provide temporary intraday liquidity to participants in the payment systems it operates. Pursuant to article 81 of the BOK Act, the BOK has established the ROMPSS, as well as its sub-regulation the WROMPSS stipulating the details of BOK-Wire+'s operation. The ROMPSS provides detailed regulations on: operations of payment systems, management of settlement risk, oversight, and other supplementary provisions. The WROMPSS provides details of: standards for BOK-Wire+ participation and operation; transactions by account type (current and deposit account); funds transfers through current account covering general funds transfers; funds settlement for government and public bond transactions; CLS transactions; net settlement transactions; funds transfers through deposit account covering general funds transfer; bilateral and multilateral offsetting; call transactions; third-party funds transfer; DVP; intra-day liquidity support through intraday repos to institutions eligible for the same; settlement risk management comprising net debt caps; collateral; loss-sharing arrangements; oversight arrangements; and supplementary provisions (available in Korean on the BOK website at (http://www.bok.or.kr).The details of the DVP and PVP are also provided in the ROMPSS and WROMPSS. Settlement finality is ensured through article 120 of the Debtor Rehabilitation and Bankruptcy Act. Article 120 (1) says that "the effects of transfer instruction or payment, execution thereof, settlement, deductions, deposit funds, the furnishing of security, disposition, appropriation, and settlement involving the participant shall accrue under the conditions as prescribed by the person who operates the payment and settlement system, notwithstanding the provisions of this Act and they shall not be subject to cancellation, termination, revocation, or setting aside." This provision is applicable when "rehabilitation procedures commence for any participant in the payment and settlement system that is designated by the governor of the BOK after consulting with

	regard thereto with the FSC in order to ensure the completeness of the payment and settlement system" (http://www.moleg.go.kr/english). Bilateral netting is recognized under the Civil Act in articles 492 to 499. The legal recognition for electronic transactions including electronic payments is provided by the Electronic Financial Transaction Act. Article 2 (2) defines an electronic financial transaction while article clauses (3), (6), (11), and (12) define an electronic payment transaction, an electronic payment gateway, an electronic payment means and electronic funds transfer respectively (http://www.moleg.go.kr/english). Immobilization of securities has its legal basis in the FSCMA articles 294 to 323). Dematerialization of securities is dealt with under the overall provisions of the Registration of Bonds and Debentures Act, and the Government Bonds Act. Registration of Bonds and Debentures Act articulates the legal basis for issuing the local government bonds, corporate debentures, and other special bonds in registered form. Short-term bonds are issued and distributed in the form of electronic securities under the Issuance and Distribution of Short-term Bonds Act. The BOK-Wire+ is only subject to the laws of Korea. **Legal basis for each material aspect** The legal basis for the enforceability of netting arrangements in the hybrid BOK-Wire+ system are provided under the provisions of the Civil Act (Civil Act, articles 492 to 499) read with the provisions of the ROMPSS (article 5) and WROMPSS [section 2 (articles 16 and 17), section 3 (1), (2), (3) and section 4 (1), (2), (3), (4). The BOK-Wire + provides for finality of settlement as set out in article 5 of ROMPSS wherein the various types of settlement service provided by BOK-Wire+ are specified. The settlement so arrived at is protected under article 120 of the Debtor Rehabilitation and the Bankruptcy Act. The provisions of article 120 are also applicable to securities transactions and in view thereof, ensure finality of settlement. Intra-day liquidity support to participating institutions (banks, qualified financial investment companies and KRX) in BOK-Wire+ is made available by BOK under article 81-2 of the BOK Act. Chapter 3 of the WROMPSS—article 58-2 to 58-9 provides details of the intra-day liquidity support to participant institutions other than banks in BOK-Wire+.

Key consideration 2 An FMI should have rules, procedures, and contracts that are clear, understandable, and consistent with relevant laws and regulations.	The ROMPSS and WROMPSS and the sub-regulations thereof are clear and understandable. They include the exact definitions of the concepts of the terms and are enacted in accordance with the domestic legal framework. They are posted on the BOK's webpage. The MPC of the BOK has the powers to revise the ROMPSS. The governor of the BOK has the powers to revise the WROMPSS and the director-general of the payment & settlement systems department the authority to revise the sub-regulations of the ROMPSS (available in Korean on BOK website at http://law.bok.or.kr) Regulations are revised only after they have been vetted and cleared by the legal office of the BOK. The audit department also reviews the regulations. The BOK seeks the legal opinion of external experts as and when necessary. Prior to the date of effect of an amendment, the BOK informs participants of the amendment through an official document or in the consultation committee of participants. Major changes are also described in the payment and settlement systems report, which is published annually.
Key consideration 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.	The full text of the BOK Act and the relevant regulations are posted on the BOK's webpage, and the main contents of the regulations are also included in the "payment systems in Korea" handbook on the Korean payment and settlement system. Prior to the date of effect of an amendment, the BOK informs the participants about the amendments through an official document or through the consultation committee of participants. Major changes are also described in the payment and settlement systems report, which is published annually.
Key consideration 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.	**Enforceability of rules, procedures, and contracts** The BOK regulations are based on the BOK Act and revised in accordance with the BOK Act. They are also in accordance with the Debtor Rehabilitation and Bankruptcy Act, the Civil Act, the Digital Signature and Framework Act on Electronic Commerce, etc. **Degree of certainty for rules and procedures** The rules and regulations of BOK-Wire+ have been drawn up in accordance with the relevant statutes. As indicated above, these rules and regulations are vetted by the legal office of the BOK. So far there have not been any instances of these rules and regulations being challenged in a court of Law. In view of the above, it can be stated that the BOK has a high level of confidence that its rules and procedures are enforceable in Korea.

Key consideration 5 An FMI conducting business in multiple jurisdictions should identify and mitigate the risks arising from any potential conflict of laws across jurisdictions.	Though the KRW is one of the currencies settled in the CLS, the settlement of the KRW leg is carried out in the accounts of the BOK and hence is subject only to the laws and the relevant rules and regulations of BOK-Wire+.
Key conclusions for Principle 1	The BOK has a well-founded and clear legal and regulatory framework governing the operation of BOK-Wire+ and its participants' rights and obligations. The BOK Act and the relevant regulations such as the ROMPSS and the WROMPSS articulate the legal basis for its activities to participants and the public in a clear and understandable way. The rules and regulations are enforceable and are in accordance with the relevant acts. The relevant jurisdiction for each legal aspect is Korea.
Assessment of Principle 1	Observed
Recommendations and comments	Article 5 of the ROMPSS lists out the various settlement services made available under BOK-Wire+. While this provides an implicit understanding that the settlement done in the accounts of the BOK through BOK-Wire+ is final, it is suggested that an explicit clause to this effect is inserted in the ROMPSS. Further, the BOK could consider articulating its legal basis in a better manner by providing hyperlinks or placing the relevant acts and regulations on its payments systems webpage.

Principle 2; Governance An FMI should have governance arrangements that are clear and transparent, promote the safety and efficiency of the FMI, and support the stability of the broader financial system, other relevant public interest considerations, and the objectives of relevant stakeholders.	
Key consideration 1 An FMI should have objectives that place a high priority on the safety and efficiency of the FMI and explicitly support financial stability and other relevant public interest considerations	The BOK has an explicit commitment towards the safety and efficiency of the payment system as a whole. This is laid down in article 81 (1) of the BOK Act which states that "for the purpose of promoting the safety and efficiency of the payment system as a whole, the BOK may determine all the necessary matters concerning the payment systems that it operates", i.e., the BOK-Wire+, which is the only payment system operated by the BOK. The BOK also explicitly supports and works towards financial stability in terms of article 1 (1) of the BOK Act which states that the "BOK shall pay attention to financial stability in carrying out its monetary and credit policies." These two articles read in conjunction with article 28 (Decisions on Monetary and Credit Policies) of the BOK Act further reinforce the objectives of safety, efficiency and financial stability. Article 28, clause (10) says that the MPC shall deliberate and decide on "basic matters for the operation and management of the payment systems according to the provisions of article 81" (stated above).

	The ROMPSS which governs the operations of BOK-Wire+ also has the public policy objectives of safety and efficiency embedded in it. Article 3 (1) of the ROMPSS states that the BOK "shall seek to secure the safety and efficiency of the payment systems as its objectives in carrying out matters related to their operation and management". These objectives are sought to be achieved through "oversight of the payment systems" (article 3 (2)). To achieve the above objectives, the BOK through its oversight unit (in the payment & settlement systems department) conducts real-time monitoring of the BOK-Wire+ system, reports on the daily payment trends and quarterly oversight activities, and further assesses the BOK-Wire+ every two years in accordance with international standards and recommends any improvements as needed. Moreover, with the final settlements of all systemically important payment systems, such as the SSSs, the RPSs, and the CLS system, happening in BOK-Wire+, its stable operations contribute to overall financial stability.
Key consideration 2 An 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, at a more general level, the public.	**Governance arrangements** Article 12 of the BOK Act establishes the MPC as the policy-making body of the BOK. The MPC comprises seven members, with the governor of the BOK concurrently acting as its chairman. As the highest policy-making body of the BOK, the MPC in terms of article 28 (10) is entrusted with the "basic matters for the operation and management of the payment systems according to the provisions of article 81." The governance arrangements of the MPC are documented in the BOK Act. Articles 12 to 20 outline the composition of the MPC. The operations of MPC are contained in articles 21 to 27. The powers of MPC are elaborated in articles 28 to 31. Article 30 empowers the MPC to draw up regulations for the purpose of carrying out its duties. In accordance with article 28 (10) all matters concerning BOK-Wire+ are decided upon by the MPC. In accordance with the above, the BOK has drawn up the "regulation on the operation and management of payment and settlement systems". The payment and settlement systems department which administers these regulations is headed by a director-general who reports to a deputy governor. The deputy governor reports to the senior deputy governor/governor. Thus, all matters concerning BOK-Wire+ operation are reported to and decided on by the MPC in accordance with the BOK Act and the ROMPSS. Under the existing governance arrangements the oversight division is housed in the payment and settlement systems department, while the operations unit is located in the IT department. The two departments are headed by different director generals and report to two separate deputy governors. This arrangement allows for a formal separation of the operator and oversight functions. The operations of BOK-Wire+ are overseen by the oversight division. The reports of the oversight unit are submitted by the director general to the deputy governor concerned and to the higher authorities.

	The internal audit department headed by the auditor (Section 2 articles 43 to 46 of the BOK Act) can be construed as an independent unit as the auditor is appointed by the President of the Republic of Korea. The auditor undertakes an audit of all the activities of BOK including the operations of the BOK-Wire+. The audit reports are submitted to the government and the MPC. Further, a summary of the major developments concerning BOK-Wire+ is provided in the "payment and settlement systems report" which is an annual publication. **Disclosure of governance arrangements** Chapter III of the BOK Act deals with the appointment, powers, duties, and responsibilities of the executive officers comprising the governor, senior deputy governor, and other deputy governors. The powers and composition of the MPC are also laid down in the BOK Act. These are publicly disclosed on the BOK webpage. The BOK Act provides accountability to the owners, participants, and other relevant stakeholders. The ROMPSS, WROMPSS, and the sub-regulations of the ROMPSS along with the participation agreements between the BOK and the participants (in BOK-Wire+), together provide information on the governance arrangements. All these documents are available on the BOK website.
Key consideration 3 The roles and responsibilities of an FMI's 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 conflicts of interest. The board should review both its overall performance and the performance of its individual board members regularly.	**Roles and responsibilities of the board** The roles and responsibilities of the MPC are laid down in the BOK Act in Chapter II Monetary Policy Committee. The procedures for the functioning of MPC including managing members' conflict of interest are laid down in section II articles 12 to 20. The BOK Act is published on the BOK website. The MPC of the BOK is vested with overarching responsibility for ensuring financial stability and is responsible for the safety and efficiency of payment and settlement systems in terms of article 28 read with article 81 (1). The BOK Act provides for an appointment of an auditor by the President on the recommendation of the minister of strategy and finance (article 43 of the BOK Act). The auditor is empowered to audit the activities of the BOK and report them to MPC (article 45 (1)). In addition article 45 (2) enjoins upon the auditor to "prepare a comprehensive audit report and submit to the government and the MPC each year." The terms and duties of the members[9] of the MPC appointed under clauses 3 to 7 of Para 1 of article 13 are prescribed in articles 15 to 20 of the BOK Act. Articles 32 to 42 are devoted to the terms and duties of the governor, senior deputy governor and the deputy governors.

[9] One member recommended by the Minister of Strategy and Finance; one member recommended by the governor, the BOK; one member recommended by the Chairman of the FSC; one member recommended by the Chairman of the Korea Federation of Banks.

	Review of performance N/A
Key consideration 4 The board should contain suitable members with the appropriate skills and incentives to fulfill its multiple roles. This typically requires the inclusion of non-executive board member(s).	The MPC members consist of persons with abundant experience of, or excellent knowledge concerning, finance, the economy, and industry. And the MPC has public policy objectives and responsibilities for matters such as price stability and financial stability, in addition to the stable operation of BOK-Wire+. It is therefore regarded that the MPC members have appropriate experience and ability related to the operation of BOK-Wire+. The Governor, the chairman of the MPC, is appointed by the president following deliberation by the state council from among persons with ample experience of, or excellent knowledge concerning, finance, the economy, and industry. The senior deputy governor, a member of the MPC, is appointed by the president on the recommendation of the governor. The other MPC members are appointed by the president on recommendations of the minister of strategy and finance, the governor of the BOK, the chairman of the FSC, the chairman of the Korea chamber of commerce and industry, and the chairman of the Korea federation of banks.
Key consideration 5 The roles and responsibilities of management should be clearly specified. An FMI's management should have the appropriate experience, a mix of skills, and the integrity necessary to discharge their responsibilities for the operation and risk management of the FMI.	**Roles and responsibilities of management** The roles and responsibilities of the top executives (governor, senior deputy governor, Deputy Governor) are stipulated in Chapter 3 of the BOK Act. Article 39 provides for the governor to appoint and discharge employees of the BOK. Article 42 lays down the duties of probity and confidentiality that have to be observed by the top executives and the employees of the BOK. The Regulation on Organization and Personnel Management provides the detailed rules and regulations. Management reports the annual BOK-Wire+ plan to the governor and the MPC, assesses job performance regularly, and announces the status of BOK-Wire+ risk management through the annual payment and settlement systems report. **Experience, skills, and integrity** The BOK management (executive officers) is appointed from among persons with ample experience of, or excellent knowledge concerning, the financial markets and system, to fulfill policy objectives and responsibilities including the stable operation of BOK-Wire+. It is therefore regarded that management has appropriate experience and ability related to the operation of BOK-Wire+.
Key consideration 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	**Risk management framework** Important risk management decisions related to BOK-Wire+ are taken by or reported to the MPC in accordance with article 28 of the BOK Act. The framework for management of important risks is stipulated in the ROMPSS, WROMPSS, and the sub-regulations of the ROMPSS and the sub-regulations of BOK-Wire+ IT requirements. These are all documented. The

and emergencies. Governance arrangements should ensure that the risk-management and internal control functions have sufficient authority, independence, resources, and access to the board.	ROMPSS regulations are enacted and revised by the MPC, while the WROMPSS are formulated with the approval of the governor. The sub-regulations of the ROMPSS and the BOK-Wire+ IT guidelines are formulated by the respective director generals of the departments concerned. Issues relating to risk management (including settlement risk, liquidity risk, credit risk, IT operations, operational risk, and business continuity) are addressed in these guidelines. The decision–making parameters are stipulated in the ROMPSS and the WROMPSS. The ROMPSS is amended with the approval of the director general. The WROMPSS can be amended with the approval of the governor. In case if an emergency, in accordance with the BCP, the BOK decides analyzes it concerns a physical emergency such as a technical malfunction or an artificial or natural disaster, or a human disaster such as a disease epidemic. The BOK sets up an emergency response committee if necessary, and takes necessary actions. The BCP is checked annually, and revised as necessary. **Authority and independence of risk management and audit functions** The risk management aspects in BOK-Wire+ are looked after by the oversight division in the payment and settlement systems department. The audit is carried out independently by the internal audit division. The national assembly and the board of audit and inspection, a government agency, audit the operations of BOK-Wire+ as well. These streams together ensure that there is adequate governance surrounding the adoption and use of appropriate risk management measures.
Key consideration 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.	**Identification and consideration of stakeholder interests** Article 3 of the WROMPSS stipulates that the BOK should collect the views of the participants on the proposed changes. To this end a consultative committee of participants in the BOK-Wire+ has been established. The committee meets at least twice a year to discuss various issues relating to risk management, business procedures, standardization of IT systems and usage fees, etc. **Disclosure** When the BOK changes its major policies with respect to payment and settlement systems, it must notify the relevant institutions in advance and collect their opinions. The revised policy changes are placed on the website of the BOK and are also notified to the participants. In addition, these are also carried in annual payment and settlement systems report which is placed on the website of the

	BOK.
Key conclusions for Principle 2	The BOK has an explicit commitment towards the safety and efficiency of the payment system as a whole. This is laid down in article 81 (1) of the BOK Act. The BOK also explicitly supports and works towards financial stability in terms of article 1 (1) of the BOK Act. These two articles read in conjunction with article 28 (Decisions on Monetary and Credit Policies) of the BOK Act reinforce the objectives of safety, efficiency, and financial stability. Matters concerning important risk management related to BOK-Wire+ are decided on by or reported to the MPC, the ultimate decision-making body, in accordance with the BOK Act. The internal audit department audits the operation of BOK-Wire+. The national assembly and the board of audit and inspection, a government agency, audit the operations of BOK-Wire+ as well. A consultative committee of participants in the BOK-Wire+ has been established. The committee meets at least twice a year to discuss various issues relating to risk management, business procedures, standardization of IT systems, and usage fees, etc. When the BOK changes its major policies with respect to payment and settlement systems, it must notify the relevant institutions in advance and collect their opinions. The revised policy changes are placed on the website of the BOK and are also notified to the participants. In addition, these are also carried in annual payment and settlement systems report which is placed on the website of BOK.
Assessment of Principle 2	Observed
Recommendations and comments	Issues related to governance could be considered for inclusion as a separate chapter in the annual payment and settlement systems report.

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 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 the FMI. Risk-management frameworks should be subject to periodic review.	**Risks that arise in or are borne by the FMI** The BOK-Wire+ is the RTGS hybrid system owned and operated by the BOK. Payments from other systemically important FMIs, such as the KSD, CLS, and the retail payments are settled in BOK-Wire+. As is the case with any RTGS system, there is no credit risk as such in the design of the system, while liquidity risk and operational risk could still be prevalent. However, the provision of intra-day credit by BOK exposes BOK to credit risk. Intraday credit is provided in the form of intra-day overdraft for banks and intra-day repo for qualified financial investment companies and KRX. The intra-day credit provided by BOK to the participants (banks and

	nonbanks) is fully collateralized. The value of the collateral is subject to a haircut policy and the collateral securities can be classified as highly liquid securities bearing minimal credit and market risk. Operational risk is sought to be addressed through standardized IT systems and detailed business continuity plans. Further, comprehensive operational risk-management plans such as the risk control self-assessment (RSCA) and key risk indicator (KRI) processes have been established. Under the RCSA and the KRI, each risk factor and control measure for monitoring the same has been defined. **Risk management policies, procedures and systems** The BOK's principal risk-management framework related to BOK-Wire+ is provided in the ROMPSS that the MPC, the BOK decision-making body, has the authority to enact and revise. To elaborate, the framework for management of risks is stipulated in the ROMPSS, WROMPSS, and the sub-regulations of the ROMPSS and the sub-regulations of BOK-Wire+ IT requirements. Issues relating to risk management (including settlement risk, liquidity risk, credit risk, IT operations, operational risk, and business continuity) are addressed in these guidelines. Matters concerning important risk management related to BOK-Wire+ are decided on by or reported to the MPC in accordance with article 28 of the BOK Act. Furthermore, the BOK submits the payment and settlement systems report, on the operation and management of the payment and settlement systems, to the MPC on an annual basis. The management and oversight units in the payment and settlement systems department monitor the flows of payments in the BOK-Wire+ in real time. The real-time monitoring screen allows for monitoring the participants settlement balances in the current and settlement accounts and their use of intra-day overdraft from BOK. The real-time monitoring tool allows the BOK to have a bird's eye-view regarding the payment flows, pending transactions in the queue, and the use of intra-day liquidity facilities. This provides for a comprehensive measurement tool in aggregating exposures in the system and provides the capability to undertake trouble-shooting if required. **Review of risk management policies, procedures, and systems** The framework for the management of important risks is stipulated in the ROMPSS, WROMPSS, and the sub-regulations of the ROMPSS and the sub-regulations of BOK-Wire+ IT requirements. These are all documented.

	The ROMPSS regulations are enacted and revised by the MPC, while the WROMPSS are formulated with the approval of the Governor. The sub-regulations of the ROMPSS and the BOK-Wire+ IT guidelines are formulated by the respective director generals of the departments concerned. Issues relating to risk management (including settlement risk, liquidity risk, credit risk, IT operations, operational risk, and business continuity) are addressed in these guidelines. The decision–making parameters are stipulated in the ROMPSS and the WROMPSS. Any amendments to the ROMPSS are carried out by the MPC. The WROMPSS can be amended with the approval of the Governor. The Director General's notify amendments to the respective sub-regulations after the approval of the Deputy Governor concerned. In an emergency, in accordance with its BCP established in advance, the BOK decides whether it is a physical emergency such as a technical malfunction or an artificial or natural disaster, or a human disaster such as a disease epidemic, sets up an emergency response committee if necessary, and takes necessary actions. The BCP is checked annually, and revised as necessary. The risk management frameworks are assessed every two years. Notwithstanding the above, depending on the situation amendments to the ROMPSS and WROMPSS and the sub-regulations are carried out based on market developments internationally and nationally. The commitment to oversee payments and settlement systems in line with the PFMI as laid down in article 37 of the ROMPSS is one such example. The risk management frameworks as laid down in the ROMPSS, WROMPSS, and the sub-regulations are audited internally by the independent audit department of the BOK, and externally by the National Assembly and the board of audit and inspection, a government agency.
Key consideration 2 An FMI should provide incentives to participants and, where relevant, their customers to manage and contain the risks they pose to the FMI.	The Settlement Information System provided to the participants in BOK-Wire+ enables them to actively monitor their payment queues and liquidity balances and flows in real-time. The Settlement Information System enables participants to change the priorities of their payment instructions. Additionally, the participants can cancel/revoke a payment instruction which is placed in a queue (article 10 (3) of the ROMPSS). This feature has a an important bearing on both liquidity risk (principle 7) and settlement finality (principle 8) principles, as it introduces liquidity risk in the system due to the fact that the participants have a right to revoke a payment instruction which has been validated and accepted by BOK-Wire+ for final settlement.

	BOK provides incentives to participants to manage their risks by stipulating that the participants should adhere to the BOK-Wire+ participation standards as laid down in article 4 appendix-5 of the WROMPSS. The director general of the IT department of the BOK decides on all IT related issues (article 8 (2) of the WROMPSS), while all other issues are decided upon by the director general of the payment and settlement systems department as laid down in chapter 2 section 1 Standards for Bok-Wire+ Participation and Operation in the WROMPSS. Further, in terms of article 14 of the WROMPSS, the BOK operates a consultative committee of participants and payment system operators. In terms of article 3 of the WROMPSS, the BOK collects the opinions of participants where it intends to change existing policy or enact a new policy. To reduce the operational risk of and improve the efficiency of BOK-Wire+, some criteria (such as the establishment of internal standards for the minimum number of personnel fully dedicated to system-related duties and BOK-Wire+ transactions) are applied to those wanting to participate in the system. Fees are charged differentially, depending upon the time when payment instructions are submitted and settled, in order to ease the concentration of settlement at around the system closing time and enhance liquidity saving measures and smoothen settlement. Participants that cause risks by delaying deferred net settlements which are carried out at a designated time, or request for extensions of the BOK-Wire+ operating hours are induced to properly manage their risks through the imposition of sanctions. Article 6 of the WROMPSS provides powers to the director general of the payment and settlement systems department to annually assess the participants and impose sanctions on participants not complying with standards as stipulated by the BOK. The sanctions comprise imposing a requirement on the participants to comply with the prescribed standards, advise them to withdraw from BOK-Wire+ or could also result in cancellation of the participant access agreement. At a higher level, the governor of the BOK in terms of article 43 of the ROMPSS has the power to impose sanctions on a participant in BOK-Wire+ or linked payment system operators. For participants, the sanctions may take the form of a verbal warning, a request for corrective actions, or a partial or overall suspension of access to BOK-Wire+. For linked payment system operators, the sanctions may take the form of a verbal warning and a request for corrective actions.

Key consideration 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.	**Material risks** The BOK-Wire+ is the RTGS hybrid system owned and operated by the BOK in which final settlement of various other systemically important payment systems such as the securities market, foreign exchange market and the retail payments takes place. Therefore, the material risk that has been identified is the level of inter-dependency between systemically important payment systems (SIPS), participants, and the BOK-Wire+. It is recognized by BOK, that any operational disruptions in BOK-Wire+ could cause risks to the participants and other FMIs, leading to the building up of liquidity and settlement risks. Further, delays in settlement and operational disruptions in other FMIs could be potential sources of risk to BOK-Wire+, in terms of pending payment instructions and queue management related issues, leading to an extension of operating hours of the BOK-Wire+ system. These risks are monitored through the real-time monitoring tool in BOK-Wire+ which enables the payment and settlement systems department to monitor the settlement and payment flows as well as queued transactions. The IT department monitors the overall functioning of the IT system of BOK-Wire+. **Risk management tools** The framework for management of the risks arising from use of BOK-Wire+ are provided in Chapters 2 and 3 of the ROMPSS and, separately from it, in the agreements on use of the system between the BOK and the operators of payment and settlement systems. Article 12 of the ROMPSS enables BOK to prescribe standards for IT equipment, communication protocols, message delivery and business procedures. Article 13 of the ROMPSS specifies the duties of participants and payment system operators which include maintaining sufficient balances in their current accounts, and maintaining the hardware and software necessary for the use of BOK-Wire+ and have in place a business continuity plan. Article 14 clauses (1) and (2) of the ROMPSS detail the measures for ensuring business continuity and provides powers to the governor to guide all participants and payment system operators to establish and implement measures for their business continuity. Also, article 40 of the ROMPSS requires payment system operators to notify the BOK in case of any change to the regulations, business procedures, and IT systems which may affect their system's safety and efficiency. Article 41 of the ROMPSS enables BOK in an emergency situation to recommend to the payment system operators and

	participants to effect necessary changes in their procedures including the temporary suspension of a participant. More details are provided in articles 11 and 12 in Chapter 2 of the WROMPSS regarding the measures to be taken for ensuring business continuity and responding to system failure. The management framework for risks related to deferred net settlements is separately provided in article 8 read with Chapter 3 Management of Settlement Risk in the ROMPSS. Participants and operators causing any risks to the system are induced to properly manage their risks through the imposition of sanctions as laid down in article 43 of the ROMPSS. As part of its oversight function, BOK carries out an assessment of systemically important payment systems once in 2 years. The assessment of KRX (CCP) and KSD (CSD) was carried out in 2011 and 2010 respectively. A self-assessment of BOK-Wire+ has been carried out by BOK as part of the FSAP exercise.
Key consideration 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.	**Scenarios that may prevent an FMI from providing critical operations and services** The BCP laid down for the BOK-Wire+ in accordance with the ROMPSS, WROMPSS and the relevant sub-regulations thereof deals with 12 potential scenarios. While these are found to be adequate in tackling operational risk and ensuring the continuity of operations of BOK-Wire+, it would be appropriate that the BCP scenarios also take into account a more adverse disaster scenario when the operations of more than one FMI are disrupted rather than taking into account non-availability of individual systems in the BCP. **Recovery or orderly wind-down plans** BOK-Wire+ is a central bank-owned and operated system. It therefore has the ability to provide its critical operations as a going concern. In view of this fact BOK-Wire+'s recovery plan is limited to recovery from extreme circumstances that may impact the operational reliability of the BOK-Wire+ system. As explained in principle 17 the BOK-Wire+ BCP is divided into two parts, one being the precautionary measures against perceived risks and the other the recovery plans and emergency responses in accordance with detailed scenarios. In the recovery plans, there are several emergency scenarios involving physical disasters (such as technical failures, natural and artificial disasters) and human disasters (such as disease epidemics). Recovery and restoration procedures are prepared for both types of disaster.

Key conclusions for Principle 3	Matters concerning important risk management related to BOK-Wire+ are decided on by or reported to the MPC in accordance with article 28 of the BOK Act. The BOK's principal risk-management framework related to BOK-Wire+ is provided in the ROMPSS that the MPC, the BOK decision-making body, has the authority to enact and revise. To elaborate, the framework for management of risks is stipulated in the ROMPSS, WROMPSS, and the sub-regulations of the ROMPSS and the sub-regulations of BOK-Wire+ IT requirements. Issues relating to risk management (including settlement risk, liquidity risk, credit risk, IT operations, operational risk, and business continuity) are addressed in these guidelines. Furthermore, the BOK submits the payment and settlement systems report, on the operation and management of the payment and settlement systems, to the MPC on an annual basis. In BOK-Wire+ the final settlement of various other systemically important payment systems such as the securities market, foreign exchange market, and the retail payments takes place. Therefore, the material risk that has been identified is the level of interdependency between SIPS, participants, and the BOK-Wire+. It is recognized by the BOK, that any operational disruptions in BOK-Wire+ could cause risks to the participants and other FMIs, leading to the building up of liquidity and settlement risks. Further, delays in settlement and operational disruptions in other FMIs could be potential sources of risk to BOK-Wire+, in terms of pending payment instructions and queue management related issues, leading to an extension of operating hours of the BOK-Wire+ system. In an emergency, according to the BCP established in advance, an emergency response committee is set up and necessary action is taken. The BCP is reviewed annually, and revised as necessary.
Assessment of Principle 3	Observed
Recommendations and comments	The BCP laid down for the BOK-Wire+ in accordance with the ROMPSS, WROMPSS and the relevant sub-regulations thereof deals with 12 potential scenarios. The BCP scenarios also take into account the non-availability of the systems of operators of FMIs like the KRX, KSD, and the KFTC (retail payment operator) on a system-by-system basis. It is recommended to develop a more adverse disaster scenario when the operations of more than one FMI are disrupted rather than taking into account non-availability of individual systems in the BCP.

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 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.	Since BOK-Wire+ processes funds transfers based on an RTGS mechanism, no credit risk is involved as such. Nonetheless, the BOK is exposed to credit risk from the fact that it provides intraday liquidity to BOK-Wire+ participants. The provision of intra-day credit by BOK, in the form of intra-day overdraft for banks and intra-day repo for nonbank participants in BOK-Wire+ is fully collateralized. To this end, the BOK bears only limited credit exposure to the participants. The value of the collateral is subject to a hair-cut policy and the collateral securities can be classified as highly liquid securities bearing minimal credit risk. Where participants fail to repay the intra-day liquidity, the loan is converted to an overnight facility (liquidity adjustment loan) and a penalty rate is charged. Where participants fail to repurchase the securities for intraday repo, they should buy back the securities, with a penalty rate, on the next business day. The intraday overdraft facility provided to banks is on an interest free basis. However, interest is charged to banks when the intra-day overdraft availed by them exceeds 25 percent of the bank's equity capital. In the case of non-bank participants, the intra-day repo limit is pegged at 25 percent of the equity capital of the entity concerned. There is no cap on the amount of intraday liquidity support to KRX.
Key consideration 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.	**Intraday repo transaction** The BOK monitors and measures its credit exposures arising from intraday liquidity provision by intraday repo transactions with BOK-Wire+ nonbank participants in real time, and ensures that the provided intraday liquidity must be redeemed by no later than 5.15 p.m. Only qualified financial investment companies and the KRX are selected eligible to receive intraday liquidity through intraday repo transactions. Bonds eligible for the transactions are strictly limited only to Korea treasury bonds (KTBs), monetary stabilization bonds (MSBs), issued by the BOK, and other government-guaranteed bonds which have low credit, liquidity, and market risks. In addition, the BOK

	establishes stable and conservative haircuts taking into consideration sharp price fluctuations, and sets the limits of intra-day liquidity provision to individual participants proportional to their equity capital. Chapter 3, article 58 of the WROMPSS provides the details of intra-day repo transactions. The details include (i) a cap on the support to cover temporary shortage of funds settlement which shall not exceed 25 percent of the equity capital of the institution, with the exception for the KRX, which shall be provided the amount requested (article 58-3); (ii) securities subject to intraday repo transactions including their market transaction prices of the previous day and the haircuts prescribed by the BOK (article 58-4); (iii) methodology of the haircuts applied as specified in appendix 4 of the WROMPSS (article 58-5); (iv) method of availing intra-day repo support either through automatic route or through support by transaction basis (article 58-6); (v) repayment of funds drawn to meet temporary shortages in settlement balances (article 58-7); (vi) priority processing of transactions to support temporary shortages of settlement balances and repurchases (article 58-8); and (vii) recording and management of intra-day repo transactions (article 58-9). **Intra-day overdrafts** Intraday overdrafts to banks are provided as part of the broader monetary policy operations under the lending and deposit facilities of the BOK (http://www.bok.or.kr/broadcast.action?menuNaviId=1906). Intra-day overdrafts were introduced in September 2000 by the BOK to extend financial support to banks experiencing temporary shortages of settlement funds in the course of a day. Financial institutions that are subject to reserve requirements and participate in BOK-Wire+ are eligible for intra-day overdrafts. In the case where a bank fails to redeem its borrowings by the close of the business day, non-redeemed intra-day overdraft amount is converted into a liquidity adjustment loan. These loans are in principle provided on an interest-free basis. To avoid an increase in settlement risk arising from financial institutions' over-reliance on them, however, a certain level of interest is applied on loans exceeding 25 percent of a financial institution's equity capital—at a rate equivalent to the spread between yields on three-year treasury bonds and the uncollateralized overnight call rate during the last month of the immediately preceding quarter. The BOK monitors the amounts of intraday overdrafts of individual BOK-Wire+ participants in real time, and BOK-Wire+ is designed so that no further intraday overdrafts are provided to a participant when the amount of that participant's intra-day overdrafts reaches the value of its pledged collateral. And the BOK receives bonds, as collaterals, which have low credit, liquidity and market risks such as KTBs and MSBs.

	Chapter 4 of the Regulation on BOK's Loans issued by the MPC deals with intra-day overdraft facility to banks. The relevant articles are: article 14 (Qualified Financial Institution for Intraday O/D); article 15 (Time Limit of Redemption of Intra O/D); article 16 (Handling of Unredeemed Loan of Intra O/D); and article 17 (Collection of Interest for using Intraday O/D). Chapter 3 of the Working Regulation on the BOK's Deposits and Loans provides the details of the intra-day overdraft arrangements.
Key consideration 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.	Since BOK-Wire+ processes fund transfers based on an RTGS mechanism, no credit risk is involved as such. Even though the BOK is exposed to credit risk from the fact that it provides intraday liquidity to BOK-Wire+ participants, the credit exposures are fully covered by collateral with low credit, liquidity and market risks such as KTBs, MBSs and other government-guaranteed bonds, and by establishing stable and conservative haircuts.
Key consideration 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	N/A

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.	
Key consideration 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.	N/A

Key consideration 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.	N/A
Key consideration 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** If a participant fails to redeem its intraday liquidity provided by the BOK, the BOK may dispose of the collateral that the defaulting participant has presented. **Replenishment of financial resources** There is no process to replenish any financial resources because the BOK covers credit losses through collateral with low credit, liquidity and market risks, applying conservative haircuts.
Key conclusions for Principle 4	BOK's exposure to credit risk is limited as it provides intra-day credit to participants on a fully collateralized basis. The collateral management system is operated efficiently through a link with KSD. The collateral is subject to a haircut and has low credit and market risks and is highly liquid.
Assessment of Principle 4	Observed
Recommendations and comments	-

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.

<table>
<tr>
<td>Key consideration 1

An FMI should generally limit the assets it (routinely) accepts as collateral to

those with low credit, liquidity, and market risks.</td>
<td>BOK provides intra-day liquidity facilities to the participants in the BOK-Wire+ system on a fully collateralized basis.

The securities that it accepts as collateral from the participants in BOK-Wire+ (both banks and nonbanks) are KTBs issued by the government and MSB issued by the BOK.

No exceptions are made to this. The BOK Act however provides for such an exception in terms of article 65 Emergency credit to banking institutions, whereby any assets of the banking institution could be temporarily accepted as collateral. No instances of such exceptions have occurred in BOK-Wire+.

Wrong-way risk is not applicable as the collateral accepted are KTBs and MSBs.</td>
</tr>
<tr>
<td>Key consideration 2

An FMI should establish prudent valuation practices and develop haircuts that are regularly tested and take into account stressed market conditions.</td>
<td>Valuation practices

The BOK marks its collateral to the market on a daily basis at the start of the day. There are no instances of discretion having been exercised by BOK in this regard.

<u>Haircut Ratios</u>

<table>
<tr><th>Maturity[1)]</th><th>Under 1 Year[1)]</th><th>Under 3 Years[1)]</th><th>Under 5 Years[1)]</th><th>Uver 5 Years[1)]</th></tr>
<tr><td>Ratio[2)] (%)</td><td>98
(98)</td><td>97
(96)</td><td>96
(95)</td><td>95
(94)</td></tr>
<tr><td>Variation of government bond price[3)] (%)</td><td>1.60</td><td>1.71</td><td>1.68</td><td>2.02</td></tr>
</table>

Note: (1) Maturity based on mark-to-market day.
(2) Coupon bond standard; figures in ( ) for bonds such as discount bonds for which principal is repaid at one time.
(3) Standard deviation of the bond index/average bond price of the index x 100 from September 2007 to September 2008.

Haircutting practices

The haircuts are determined in terms of Article 1-3 (Appendix) of Working Regulation on BOK's Loans and Article 58-5 (appendix 4) of the WROMPSS.

The haircut ratios are determined once every six months. Details on the stress testing of haircuts, analysis on the sufficiency of collateral and pro-cyclicality are not available.</td>
</tr>
</table>

Key consideration 3 In order to reduce the need for pro-cyclical 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 BOK sets haircuts, in consideration of the risks related to the kinds of bonds involved and conditions of market stress (the need for pro-cyclical adjustments). These are set once every six months. There is a need to increase the frequency of the review to take into account changing market conditions.
Key consideration 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.	The BOK does not limit concentrated holdings of certain assets. The BOK is of the opinion that there is no need for concentration limits as the assets have low credit, liquidity and market risks. The BOK can therefore liquidate the collateral quickly without any significant adverse price effects.
Key consideration 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.	Not applicable. The BOK does not accept any cross-border collateral.
Key consideration 6 An FMI should use a collateral management system that is well-designed and operationally flexible.	**Collateral management system design** The collateral management system used is the Safe+ system of the KSD. The Safe+ system is linked to BOK-Wire+, which enables BOK to extend intraday liquidity support to banks and non-bank participants in BOK-Wire+. The Safe+ system also enables BOK, to dispose collateral as and when necessary. **Operational flexibility** The Safe+ system is a revised and improved version of the Safe system of KSD. It was operationalized in 2011 with increased processing capacity and more advanced features with enhanced user interface functionality.
Key conclusions for Principle 5	Securities eligible as collateral are limited to bonds having low credit, liquidity and market risks. The BOK applies haircuts to this collateral. The collateral management system is also operated efficiently through linkage to the KSD. The haircuts are determined in terms of appendices of the WROMPSS and Working Regulation on BOK's Loans. The haircut ratios are determined once every six months. Details regarding testing the sufficiency of the haircut, stress-testing and pro-cyclicality are not available. Details of any independent validation taking place on an annual basis are not available.

	There is a need to increase the frequency of the review to take into account the above aspects and changing market conditions.
Assessment of Principle 5	Broadly Observed
Recommendations and comments	There is a need to increase the frequency of the review of the haircut methodology taking into account the above aspects including an independent validation of the methodology on an annual basis. This would take into account any adverse market developments and fully protect the BOK.

Principle 6: Margin A CCP should cover its exposure to its participants for all products through an effective margin system that is risk-based and regularly reviewed.	
Key consideration 1 A CCP should have a margin system that establishes margin levels commensurate with the risks and particular attributes of each product, portfolio, and market it serves.	N/A
Key consideration 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.	N/A
Key consideration 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.	N/A

For a CCP that calculates margin at more-granular levels, such as at the sub-portfolio 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.	
Key consideration 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.	N/A
Key consideration 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 authorized to offer cross-margining, they must have appropriate safeguards and harmonized overall risk-management systems.	N/A
Key consideration 6 A CCP should analyze and monitor its model performance and overall margin coverage by conducting rigorous daily back testing—and at least monthly, and	N/A

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.	
Key consideration 7 A CCP should regularly review and validate its margin system.	N/A
Key conclusions for Principle 6	N/A
Assessment of Principle 6	N/A
Recommendations and comments	N/A

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 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.	Liquidity risk arises when participants cannot settle their payment obligations when due as part of the settlement process. In BOK-Wire+ liquidity risk arises when participants are unable to settle their transactions due to lack of balances in their accounts with BOK. To overcome this, BOK provides intra-day liquidity facilities to both banks and non-bank participants in a fully collateralized manner. In addition, BOK has introduced the hybrid settlement mechanism in BOK-Wire+ with bilateral and multilateral offsetting mechanisms which are triggered every 30 minutes for settling queued payment transactions. To manage liquidity risk stemming from late submission of payments, BOK has provided incentives to participants through a differential transaction processing fees whereby the amount fee payable is determined by the time of transaction submission and

	settlement. The transaction processing fee is higher towards the end-of-day of the BOK-Wire+ operating hours.
Key consideration 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.	The real-time monitoring tool in BOK-Wire+ enables the payment and settlement systems department of the BOK to monitor the settlement and payment flows as well as queued transactions in BOK-Wire+. The Settlement Information System provided to the participants in BOK-Wire+ enables them to actively monitor their payment queues and liquidity balances and flows in real-time. The Settlement Information System enables participants to change the priorities of their payment instructions. Additionally, the participants can cancel/revoke a payment instruction which is placed in a queue (article 10 (3) of ROMPSS and articles (20) and (42) of WROMPSS). Revocation and cancellation can only be done with the consent of a pre-arranged funds beneficiary institution. The relevant articles in the ROMPSS and WROMPSS may be suitably amended to emphasize and reflect this position and avoid any reference to lack of balances in the settlement/current account as being one of the reasons as is currently stated in the regulations. Where participants fail to repay the intra-day overdraft, the same is converted to an overnight facility (liquidity adjustment loan) and a penalty rate of interest is charged. The intraday overdraft facility provided to banks is on an interest free basis. However, interest is charged to banks when the intra-day overdraft availed by them exceeds 25 percent of the bank's equity capital. In the case of non-bank participants, the intra-day repo limit is pegged at 25 percent of the equity capital of the entity concerned. The team of the BOK in charge of operating BOK-Wire+ checks on a real-time basis the situation of settlements in the system, and guides participants to settle quickly funds transfer orders stored in queues for long time. The team of the BOK in charge of overseeing the system also monitors the system on a real-time basis. In addition, the BOK provides incentives (e.g. giving settlement information on a real-time basis) to participant to manage the liquidity risk (see principle 3).
Key consideration 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	BOK-Wire+ is a RTGS system owned and operated by the BOK, which is the central bank and is the lender of last resort in Korean Won, the settlement currency. Further, the system rules enable BOK to provide intra-day liquidity support to the participants on a collateralized basis. These factors enable BOK-Wire+ to continuously settle transactions on a gross basis in real-time.

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.	
Key consideration 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.	N/A
Key consideration 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	BOK-Wire+ is an FMI owned and operated by BOK which is the issuer of currency and is the lender of last resort. BOK is in a position to meet the KRW requirements of all participants at all points in time for settling their transactions.

relevant central bank. All such resources should be available when needed.	
Key consideration 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.	BOK-Wire+ is an FMI owned and operated by BOK which is the issuer of currency and is the lender of last resort. BOK is in a position to meet the KRW requirements of all participants at all points in time for settling their transactions.
Key consideration 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.	BOK-Wire+ is an FMI owned and operated by BOK which is the issuer of currency and is the lender of last resort. BOK is in a position to meet the KRW requirements of all participants at all points in time for settling their transactions.
Key consideration 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.	BOK-Wire+ is an FMI owned and operated by BOK.

Key consideration 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.	BOK-Wire+ is an FMI owned and operated by BOK which is the issuer of currency and is the lender of last resort. BOK is in a position to meet the KRW requirements of all participants at all points in time for settling their transactions in BOK-Wire+.
Key consideration 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.	BOK-Wire+ is a central bank owned and operated RTGS system which settles transactions on a gross basis and also employs a hybrid mechanism as a liquidity saving feature. BOK which is the issuer of currency and as the lender of last resort is in a position to meet the KRW requirements of all participants at all points in time for settling their transactions in BOK-Wire+. Accordingly, settlement is effected in real-time during the operating hours of the system. At the end-of-day in case any payment instructions of the participants remain in the queue for lack of settlement balances the same are cancelled by BOK from the system. However, the participants can cancel/revoke a payment instruction which is placed in a queue (article 10 (3) of ROMPSS and articles (20) and (42) of WROMPSS). Revocation and cancellation can only be done with the consent of a pre-arranged funds beneficiary institution. The relevant articles in the ROMPSS and WROMPSS may be suitably amended to emphasize and reflect this position.

Key conclusions for Principle 7	Liquidity risk in BOK-Wire+ system is minimized due to the provision of intraday liquidity facility by the BOK to the participants in the BOK-Wire+ system. Moreover, with the hybrid settlement system in operation the liquidity needs of the participants are reduced. BOK as operator of the system has a real-time monitoring tool to monitor the settlement and payment flows in BOK-Wire+ system and initiate measures if required to smoothen payment flows. The differential pricing fees mechanism also contributes to smoothening payment flows throughout the operating hours of the BOK-Wire+ system. But this has only a limited effect in view of the fact that the settlement of OTC traded securities are concentrated at the end of the afternoon (at 4.00 pm KRX sends its settlement instructions). The settlement of call loans and repo transactions (which are the principal sources of liquidity for FICs) is also concentrated around 4.00 pm due to the settlement cycle (T+0) and the existing market practices. In view of this there is a concentration of settlement transactions towards the closing hours of BOK-Wire+. The Settlement Information System enables participants to change the priorities of their payment instructions. The participants can cancel/revoke a payment instruction which is placed in a queue (article 10 (3) of ROMPSS and articles (20) and (42) of WROMPSS). Revocation and cancellation can only be done with the consent of a pre-arranged funds beneficiary institution. The relevant articles in the ROMPSS and WROMPSS may be suitably amended to emphasize and reflect this position.
Assessment of Principle 7	Observed
Recommendations and comments	The BOK may amend article 10 (3) of ROMPSS and article 42 of WROMPSS suitably to achieve the above objective. An impact study on the impact of differential pricing on payment flows may be undertaken by the BOK.

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 1 An FMI's rules and procedures should clearly define the point at which settlement is final.	**Point of settlement finality** The BOK-Wire + provides for finality of settlement as set out in article 5 of the ROMPSS wherein the various types of settlement service provided by BOK-Wire+ are specified. The ROMPSS and WROMPSS do not explicitly define the point at which settlement is deemed final. The provisions in article 5 are implicit statements regarding the settlement finality being made available in BOK-Wire+. Additionally, the participants can cancel/revoke a payment instruction which is placed in a queue (article 10 (3) of ROMPSS and articles (20) and

	(42) of WROMPSS). Revocation and cancellation can only be done with the consent of a pre-arranged funds beneficiary institution. The relevant articles in the ROMPSS and WROMPSS may be suitably amended to emphasize and reflect this position. Notwithstanding the above, the settlement arrived at in BOK-Wire+ is protected under article 120 of the Debtor Rehabilitation and the Bankruptcy Act and cannot be cancelled or revoked. The provisions of article 120 are also applicable to securities transactions and in view thereof, ensure finality of settlement. **Finality in the case of links** N/A
Key consideration 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.	**Final settlement on the value date** All payments through BOK-Wire+ are settled in real-time during the BOK-Wire+ operating hours. Funds transfer orders stored in queues owing to insufficient balances in participants' current accounts are cancelled at the end of the operating day. There have been no instances of deferral of settlement. **Intraday or real-time final settlement** BOK-Wire+ provides real-time intra-day settlement. Participants are informed through the Settlement Information System which enables them to track their payment instructions and their settlement in the books of the BOK. BOK-Wire+ is a hybrid system where payments stored in a queue are offset either bilaterally or multilaterally with each payment instruction being settled in a gross manner.
Key consideration 3 An FMI should clearly define the point after which unsettled payments, transfer instructions, or other obligations may not be revoked by a participant.	The participants can cancel/revoke a payment instruction which is placed in a queue. Revocation and cancellation can only be done with the consent of a pre-arranged funds beneficiary institution. The relevant articles in the ROMPSS and WROMPSS may be suitably amended to emphasize and reflect this position.
Key conclusions for Principle 8	Settlement of payment transfers in the BOK-Wire+ is achieved in real-time and payments once settled are final and irrevocable. The settlement arrived at in the BOK-Wire+ is protected under article 120 of the Debtor Rehabilitation and the Bankruptcy Act and cannot be cancelled or revoked. However, the ROMPSS and WROMPSS do not explicitly define the point at which settlement is deemed final. The provisions in article 5 are implicit statements regarding the settlement finality in BOK-Wire+. The participants can cancel/revoke a payment instruction which is placed in a queue (article 10 (3) of ROMPSS and articles (20) and (42) of WROMPSS). Revocation and cancellation can only be done with the consent of a pre-arranged funds beneficiary institution. The relevant

	articles in the ROMPSS and WROMPSS may be suitably amended to emphasize and reflect this position.
Assessment of Principle 8	Observed
Recommendations and comments	It is recommended that the relevant articles in the ROMPSS and WROMPSS be suitably amended to emphasize and reflect both the above positions. In view of the above, the BOK may suitably amend the ROMPSS and the WROMPSS to take care of the above requirement.

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 1 An FMI should conduct its money settlements in central bank money, where practical and available, to avoid credit and liquidity risks.	Cash settlement in the BOK-Wire+ happens in central bank money. The BOK does not conduct settlement in multiple currencies. Cash settlement happens only in KRW.
Key consideration 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.	Cash settlement in BOK-Wire+ happens in central bank money.
Key consideration 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, capitalization, 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.	N/A

Key consideration 4 If an FMI conducts money settlements on its own books, it should minimize and strictly control its credit and liquidity risks.	Cash settlement in BOK-Wire+ happens in central bank money. Credit and liquidity risks are limited as outlined in principles 4, 5 and 7.
Key consideration 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 intra-day, in order to enable the FMI and its participants to manage credit and liquidity risks.	N/A
Key conclusions for Principle 9	Cash settlement in BOK-Wire+ happens in central bank money.
Assessment of Principle 9	Observed
Recommendations and comments	-

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.	
Key consideration 1 An FMI's rules should clearly state its obligations with respect to the delivery of physical instruments or commodities.	N/A
Key consideration 2 An FMI should identify, monitor, and manage the risks and costs associated with the storage and delivery of physical instruments or commodities.	N/A
Key conclusions for Principle 10	N/A
Assessment of Principle 10	N/A
Recommendations and comments.	N/A

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.	
Key consideration 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.	N/A
Key consideration 2 A CSD should prohibit overdrafts and debit balances in securities accounts.	N/A
Key consideration 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.	N/A
Key consideration 4 A CSD should protect assets against custody risk through appropriate rules and procedures consistent with its legal framework.	N/A
Key consideration 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.	N/A

Key consideration 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.	N/A
Key conclusions for Principle 11	N/A
Assessment of Principle 11	N/A
Recommendations and comments	N/A

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 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 when finality occurs.	BOK-Wire+ is linked to the securities and the foreign exchange settlement systems and can eliminate principal risk through settlements using a DVP or PVP mechanism. **DVP mechanism for securities settlement** The securities settlement systems (SSSs) in Korea are operated by the KSD. The KSD is a central securities depository and provides book-entry transfers and a centralized depository. It also conducts settlement for floor-traded securities, as well as clearing and settlement for those traded OTC. The cash legs of securities transactions are settled through the accounts held either with the BOK or with commercial banks depending on the type of transaction. When a buyer and a seller enter into an agreement to trade bonds over the counter, they provide notification of the trade details to KSD. KSD then confirms the information and notifies the buyer and seller of final settlement details. Settlement procedures differ depending on the securities concerned. For stocks and bonds traded on the KRX markets, the KRX notifies its members and the KSD of the settlement details. Members are required to transfer funds or deliver securities to KSD's securities settlement account or funds settlement account by no later than 16:00 on the settlement date. Settlement dates are day T+2 for stocks, T+1 for government bonds and T for general bonds. Only when both counterparties to a transaction have delivered their obligations (securities or funds) to the accounts of the KSD, the KSD will transfer the securities and funds to the members to complete settlement (DVP3 scheme).

	Based on this information, on T+2 the parties deliver the securities to their accounts with KSD and transfer the funds to KSD's account with the BOK during BOK-Wire+ business hours (currently 9 a.m. to 5.30 p.m.). Once both parties complete their delivery of the securities and payment of the funds, the KSD initiates simultaneous settlement of the securities and funds under the DVP3 scheme. For bond, certificate of deposit and commercial paper transactions made over the counter, the trading parties must deliver the securities or make payment to the KSD settlement accounts during BOK-Wire+ business hours on the settlement date, in accordance with the notified details. Settlement occurs on day T+1 for bonds and day T for certificate of deposit or commercial paper transactions. As soon as the trading parties have delivered their securities and funds to their securities accounts with KSD and KSD's account with the BOK, the KSD settles the securities and funds—through the parties' securities accounts at the KSD and funds accounts held with the BOK (DVP1 scheme). By implementation of a DVP mechanism linking KSD's SSSs with the BOK-Wire+, principal risk arising from the settlement of securities transactions is substantially eliminated. Also, as final settlement of securities occurs no later than T+2 (i.e. T+2 for stocks and T or T+1 for bonds), the volume of trade outstanding is limited and aggregate market exposure mitigated. **PVP mechanism for settlement of foreign exchange transactions through CLS** KRW as a CLS-eligible currency is settled in the CLS system through the PVP mechanism KRW through direct links between BOK-Wire+ and the CLS system. Conventional foreign exchange transactions, such as spot exchange, forward exchange and swaps, and non-deliverable forward are settled through the CLS system. CLS settlement member banks and third parties in Korea follow the same procedures used worldwide to settle their transactions, while CLS Bank uses its current account with the BOK to receive or discharge KRW funds. The settlement and funding period for Asia-Pacific currencies, including KRW, is between 7 a.m. CET, which is from 2 p.m. to 5 p.m. Korean standard time. To facilitate safe and efficient KRW funds transfers between CLS Bank and its settlement member banks, CLS Bank has been granted direct access to BOK-Wire+. Because BOK-Wire+ does not use SWIFT (the standard communication network for CLS), the BOK has established the "CLS Link System", which converts SWIFT messages to/from the CLS Bank into the proprietary message format of the BOK-Wire+.
Key conclusions for Principle 12	DVP and PVP settlement mechanisms are being used for the settlement of securities and foreign exchange transactions respectively in central bank money in the BOK-Wire+. Adoption of

	these forms of settlement has led to the elimination of principal risk.
Assessment of Principle 12	Observed
Recommendations and comments	-

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 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.	**Participant default rules and procedures** BOK-Wire+ processes funds transfers based on an RTGS mechanism, and the BOK does not have the responsibility for participant's funds transfers. However, in order to mitigate settlement delays and gridlock the BOK operates intraday liquidity provision facilities such as intraday overdrafts and intraday repo transactions, and so participant defaults can occur if the financial institutions using these facilities fail to redeem their borrowings. If a participant fails to redeem its intraday liquidity provided by the BOK, the BOK may dispose of the collateral that the defaulting participant has presented **Use of financial resources** In the case of a participant default, the BOK collects the funds by selling the collateral securities provided in accordance with predetermined rules and procedures. In principle, the BOK sells collateral securities in the financial markets; however if it is not practical to sell them in the markets, the BOK can purchase the collateral securities itself.
Key consideration 2 An FMI should be well prepared to implement its default rules and procedures, including any appropriate discretionary procedures provided for in its rules.	In principle, the BOK sells its collateral securities in the financial markets when a financial institution using the intraday liquidity facilities defaults. However, if it is not possible to sell them in the markets, the BOK can purchase the collateral securities itself. The procedures for collecting loans are specified in the regulations of the BOK and the agreements between the BOK and financial institutions participants in BOK-Wire+.
Key consideration 3 An FMI should publicly disclose key aspects of its default rules and procedures.	With regard to the intraday liquidity facilities, the default rules, procedures and agreements are published on the BOK webpage, and are available to the public.

Key consideration 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.	When the rules and procedures are revised, the BOK reflects the opinions of the participants on the major policy issues and provides guidance to the participants through BOK-Wire+ before the date of effect of the revision. The BOK holds an annual meeting with participants to discuss the procedures of liquidity facilities such as intraday overdrafts, and often exchanges opinions with them in cases of revision of the relevant rules. The BOK obtains feedback from the participants and the relevant agencies when enacting the rules and procedures concerning defaults by financial institutions utilizing its intraday repos.
Key conclusions for Principle 13	The BOK has rules and procedures governing disposal of collateral of a defaulting participant with respect to the intraday liquidity facilities provided by the BOK to mitigate settlement delays and gridlock. These rules and procedures are publicly available on the BOK webpage. In addition, when the rules and procedures are revised, the BOK reflects the opinions of the relevant institutions and provides guidance to participants through the BOK-Wire+ before the date of effect of such revision.
Assessment of Principle 13	Observed.
Recommendations and comments	-

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 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.	N/A

Key consideration 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.	N/A
Key consideration 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.	N/A
Key consideration 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.	N/A
Key conclusions for Principle 14	N/A
Assessment of Principle 14	N/A
Recommendations and comments	N/A

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 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.	BOK-Wire+ is a central bank owned and operated system in accordance with articles 28(10) and 81 of the BOK Act as one of the core functionalities of the MPC of the BOK.

Key consideration 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.	N/A
Key consideration 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.	N/A
Key consideration 4 Assets held to cover general business risk should be of high quality and sufficiently liquid in order to allow the FMI to meet it's current and projected operating expenses under a range of scenarios, including in adverse market conditions.	N/A
Key consideration 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.	In terms of article 2 of the BOK Act, the BOK is a special juridical person having no capital.

Key conclusions for Principle 15	There are no issues of concern
Assessment of Principle 15	Observed
Recommendations and comments	The BOK constantly monitors the risk. As the BOK-Wire+ is a central bank owned system its ultimate objective is to support public interest with the BOK paying attention to financial stability in carrying out its monetary and credit policies as laid down in article 1 (2), together with article 28 (8) of the BOK Act.

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 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.	KSD is the sole CSD in Korea which has been set up under the FSCMA. In accordance with the Act, KSD provides a centralized depository for securities, and securities settlement. The FSC is responsible for its supervision, and KSD requires FSC approval for changes in its articles of incorporation and business rules. In accordance with the BOK Act, the BOK oversees the settlement systems operated by KSD. For purposes of intraday liquidity collateral management and DVP settlements, the BOK-Wire+ and KSD's Safe+ system are connected. Safe+ system is the new system introduced by KSD. The BOK assesses the KSD, every two years in accordance with international standards, and where appropriate requesting revisions of its operating requirements, etc.
Key consideration 2 An FMI should have prompt access to its assets and the assets provided by participants, when required.	Where appropriate the BOK can inquire about details of its collateral deposited with the KSD in real time, and dispose of collateralized securities through the collateral management system linked to BOK-Wire+.
Key consideration 3 An FMI should evaluate and understand its exposures to its custodian banks, taking into account the full scope of its relationships with each.	N/A (There are no separate individual custodian banks with regard to the custody of collateral).

Key consideration 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.	The BOK does not invest the collateral individually.
Key conclusions for Principle 16	The KSD is the sole CSD in Korea established under the FSCMA. In accordance with the Act, KSD provides a centralized depository for securities, and securities settlement. The FSC is responsible for its supervision, and KSD requires FSC approval for changes in its articles of incorporation and business rules. In accordance with the BOK Act, the BOK oversees the settlement systems operated by KSD.
Assessment of Principle 16	Observed
Recommendations and comments	The KSD is assessed once every two years by the BOK as part of its oversight activity. Given the critical nature of the FMI, the BOK could consider assessing the FMI at more frequent intervals.

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 fulfillment of the FMI's obligations, including in the event of a wide-scale or major disruption.	
Key consideration 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.	**Identification of operational risk** The framework for management of risks arising from the use of BOK-Wire+ are provided in Chapter 2 of the ROMPSS and, separately from it, in the agreements on use of the system between the BOK and the operators of payment and settlement systems. Article 12 of the ROMPSS enables BOK to prescribe standards for IT equipment, communication protocols, message delivery and business procedures. Article 13 of the ROMPSS specifies the duties of participants and payment system operators which include maintaining sufficient balances in their current accounts, and maintaining the hardware and software necessary for the use of BOK-Wire+ and have in place a business continuity plan. Article 14 clauses (1) and (2) of the ROMPSS detail the measures for ensuring

	business continuity and provides powers to the Governor to guide all participants and linked payment system operators to establish and implement measures for their business continuity. Article 40 (1) of the ROMPSS enjoins upon linked payment system operators to notify the BOK in case of any changes to the regulations, business procedures and IT systems which may affect the operation of BOK-wire+. In addition article 40 (2) stipulates such payment system operators to inform the BOK of any emergency situations such as system failure, disaster, terrorist attack etc. Article 41 of the ROMPSS enables BOK in an emergency situation to recommend to the payment system operators and participants to effect necessary changes in their procedures including the temporary suspension of a participant. More details are provided in articles 11 and 12 in Chapter 2 of the WROMPSS regarding the measures to be taken for ensuring business continuity and responding to system failure. The management framework for risks related to deferred net settlements is separately provided in article 8 read with Chapter 3 Management of Settlement Risk in the ROMPSS. Participants and operators causing any risks to the system are induced to properly manage their risks through the imposition of sanctions as laid down in article 43 of the ROMPSS. Comprehensive operational risk-management plans such as the RCSA (risk control self-assessment) and KRI (key risk indicator) processes have been established. Under the RCSA and the KRI, each risk factor and control measure for monitoring is defined. The Information Committee consists of a deputy governor and the relevant department heads, and carries out the decision-making tasks related for example to IT risk management measures and operational issues. **Management of operational risk** Articles 11 and 12 of the WROMPSS outline the measures to be taken for ensuring business continuity. These include: (i) situation-specific response procedures; (ii) composition and operation of an emergency response organization; (iii) conditions and procedures for inputs of agency business, manual operations; (iv) carrying out simulation exercises; (v) setting up emergency contact systems with participants and payment system operators; and (vi) procedures for reporting. Article 12 of WROMPSS enjoins upon participants and payment system operators to immediately notify BOK of any

	system failures of BOK-Wire+ or matters deemed to be system failures and initiate procedures in accordance with the measures laid down under article 11. **Policies, processes, and controls** Prevention control such as separation of duties, detection control such as transaction monitoring, and calibration control such as backups have been applied in the BOK-Wire+ system, in accordance with the relevant guidelines laid down in the . The Regulation on Organization and Personnel Management provide the detailed rules and regulations on all issues concerning human resources management in the BOK. The change and quality management systems for the approval, tracing, validation and execution of the system change process have been constructed and are operated in accordance with the regulations.
Key consideration 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.	**Roles, responsibilities, and framework** Matters concerning important risk management related to BOK-Wire+ are decided on by or reported to the MPC in accordance with article 28 of the BOK Act. The framework for management of important risks is stipulated in the ROMPSS, WROMPSS and the sub-regulations of the ROMPSS and the sub-regulations of BOK-Wire+ IT requirements. These are all documented. The frameworks for management of the risks arising from use of BOK-Wire+ are provided in Chapter 2 of the ROMPSS. The ROMPSS regulations are enacted and revised by the MPC, while the WROMPSS are formulated with the approval of the Governor. The sub-regulations of the ROMPSS and the BOK-Wire+ IT guidelines are formulated by the respective director generals of the departments concerned. Further, an annual report is submitted to the MPC on the operation and management of the BOK-Wire+ which provides details of operational risk management including business continuity plans. The Information Committee headed by the Deputy Governor in-charge of Information Technology, outlines the roles and responsibilities of the deputy governor and other employees for operational risk management of the BOK-Wire+ system including internal controls and audits, and information security system management.

	Review, audit, and testing The division of the BOK in charge of overseeing BOK-Wire+ issues daily and quarterly monitoring reports, assesses the risk management frameworks every two years in accordance with the PFMI, and makes recommendations if necessary. The audit department of the BOK also monitors the BOK-Wire+ system. The information committee reviews the operational risk-related systems, policies and procedures, and compliance with the procedures is validated through the regular internal audits. In addition to regular internal audits, the BOK-Wire+ receives an IT vulnerabilities diagnostic evaluation and an ISO20000 (IT service quality management) post certification review every year.
Key consideration 3 An FMI should have clearly defined operational reliability objectives and should have policies in place that are designed to achieve those objectives.	The objective of BOK-Wire+ operation is safety and efficiency, and the quantitative and qualitative objectives (such as system utilization rate, the maximum number of disruptions, etc.) are defined in the IT Service Management Guidelines. To improve BOK-Wire+ services, periodic inspections and assessments of the IT system and services (Plan-Do-Check-Act) are carried out. ISO 2000 certification concerning the reliability of these processes has been obtained by the IT department.
Key consideration 4 An FMI should ensure that it has scalable capacity adequate to handle increasing stress volumes and to achieve its service-level objectives.	BOK-Wire+ operations have been stable, with lower rates of system utilization seen on both a daily average basis and during periods of concentration. The usages of the main computing system and computerized equipment are monitored in real-time, and if the daily peak trading volume approaches the system capacity limits, less important application processes are held back in a queue in accordance with the Capacity Management Guidelines. The IT systems are managed in line with the provisions of the Management Availability Guidelines, the Capacity Management Guidelines, the Disability Management Guidelines, and reports on system operational status are published regularly under these guidelines.
Key consideration 5 An FMI should have comprehensive physical and information security policies that address all potential vulnerabilities and threats.	**Physical security** The Regulation on Safety Management contains the details of the physical security measures that are required to be taken. These include physical access control measures for facilities, buildings and computer systems, fire protection, and other controls.

	Internal audits are carried out periodically twice a year and inspection of compliance is also carried out. **Information security** Sub-regulations framed by the Information Committee provide the details regarding measures to be taken for information security. Vulnerability diagnostic services have been carried out external professional organizations annually since 2004. To strengthen enterprise-wide data security, a data loss prevention system is applied in every user system, and internal documents can be accessed by approved personnel only. Encryption algorithms for transactions using the BOK-Wire+ are set using international standards.
Key consideration 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.	**Objectives of business continuity plan** The objectives of the BOK-Wire+ BCP are the prevention of IT system and business suspension risk caused by IT system disorders, disasters, or business disruptions. The stability of payments by the BOK and BOK-Wire+ participants is promoted and ensured through the maintenance of business continuity in any situation. The RTO is set for 2 hours. **Design of business continuity plan** The BOK-Wire+ BCP is divided into two parts, one being the precautionary measures against perceived risks and the other the recovery plans and emergency responses in accordance with detailed scenarios. In the recovery plans, there are several emergency scenarios involving physical disasters (technical failures, natural and artificial disasters) and human disasters (such as disease epidemics). Recovery and restoration procedures are prepared for each type of emergency case, and broken down step-by-step. The BOK-Wire+ business hours are 9 a.m. to 5.30 p.m., and so even if an extreme situation occurs completion of transactions within the day is ensured through the BCP and alternative arrangements. Major system failures and abnormal actions of applications are detected in real time, and when unusual events occur notification is made to personnel by a real-time text message.

	If data losses are expected from a system disaster, the BOK carries out reconciliation with participants to recover the data that has been lost. In cases of emergency, the emergency system (emergency response committee comes into operation, to ensure efficient decision-making and emergency response/business recovery, and the contact points between the BOK and participants are used to notify participants on alternate arrangements. **Secondary site** In the case that the main office is not accessible or available due to disaster, the BOK's Gangnam branch is designated as the first backup site, and if both Headquarters and the Gangnam branch are unavailable, the secondary alternative site begins operation. The secondary alternative site (IT backup center) is a hot-site (system standby), and its resources are checked periodically. Fax and manual operations are part of the BCP. **Review and testing** On-site BOK-Wire+ BCP training is carried out once a year, simulated training is done twice a year, and secondary site resource inspection takes place every other month. Any deficiencies discovered through the BCP training, or suggestions from participating departments, are reflected in establishment of a supplement to the BCP. The framework for management of risks arising from the use of BOK-Wire+ are provided in Chapter 2 - of the ROMPSS and, separately from it, in the agreements on use of the system between the BOK and the operators of payment and settlement systems. Articles 11 and 12 of the WROMPSS outline the measures to be taken for ensuring business continuity. These include: (i) situation-specific response procedures; (ii) composition and operation of an emergency response organization; (iii) conditions and procedures for inputs of agency business, manual operations; (iv) carrying out simulation exercises; (v) setting up emergency contact systems with participants and payment system operators; and (vi) procedures for reporting. Article 12 of WROMPSS enjoins upon participants and payment system operators to immediately notify BOK of any system failures of BOK-Wire+ or matters deemed to be system failures and initiate procedures in accordance with the measures laid down under article 11.

Key consideration 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.	**Risks to the FMI's own operations** Through diversification of communication lines, the BOK-Wire+ is prepared for any communication delays or disorders, and to maintain high quality of communication service level agreements are entered into with telecommunication operators. The main computing buildings (including the backup center) have self-generators and uninterruptible power supplies, in preparation against the risk of power outages. The normal status of the communication lines and their traffic situations, and of the power supply lines are monitored in real-time. **Risks posed to other FMIs** The BOK runs an FMI Operation Council, consisting of the director generals of other FMIs, which consults regularly on issues related to operational risk factors.
Key conclusions for Principle 17	To manage operational risk, the BOK has established comprehensive operational management guidelines covering technology, risk factors, human resources, monitoring, control and periodical testing. It has a RTO of 2 hours. The BCP for the BOK-Wire+ is developed in line with the ROMPSS, WROMPSS and the relevant sub-regulations and deals with 12 potential scenarios.
Assessment of Principle 17	Observed
Recommendations and comments	The BCP is found to be adequate in tackling operational risk and ensuring the continuity of operations of BOK-Wire+. The BCP scenarios also take into account the non-availability of the systems of operators of FMIS like the KRX, KSD and the KFTC (retail payment operator) on a system-by-system basis. However, it is desirable to develop a more holistic approach taking into account a disaster scenario when the operations of other FMIs are disrupted (see also principle 3).

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 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.	**Participation criteria and requirements** Article 6 of the ROMPSS states that institutions eligible to become members of BOK-Wire+ shall be those institutions which maintain a current account with BOK and comply with the standards set forth by the Governor. Appendix 5 of the WROMPSS provides the detailed BOK-Wire+ participation standards. For banks, comprehensive financial company and securities finance company the capital adequacy ratio against risk-weighted assets should be over 8 percent. With regard to financial investment company the net capital ratio should be over 150 percent. For insurance companies the RBC ratio should be over 100 percent. For other institutions not covered by these financial solvency standards, the director general responsible for the payment and settlement system can specify the requirements. The monthly average usage should be above 50 transactions for one year after participation. A total of 4 personnel should be exclusively devoted to BOK-Wire+ operations at the member's end. These criteria allow for fair and open criteria for participation in the BOK-Wire+. **Access to trade repositories** N/A
Key consideration 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 endeavor to set requirements that have the least-restrictive impact on access that circumstances permit.	**Justification and rationale of participation criteria** The participation requirements for BOK-Wire+ take into account the needs of the financial markets in Korea, while at the same time ensuring the safety and efficiency of BOK-Wire+ keeping in view the financial stability mandate of the BOK. Given that all systemically important payment systems settle in central bank money through BOK-Wire+, the participant access requirements are justified. Participant requirements are risk based. For payment system operators desirous of executing final settlement amongst its participants in BOK-Wire+, the BOK evaluates the safety and efficiency of the payment system concerned before deciding on its application as laid down in article 7 of the ROMPSS. **Least restrictive access** Participants satisfying the participation criteria may access BOK-Wire+ without any restrictions.

	Disclosure of criteria The criteria for participation and suspension and cessation of membership are stipulated in the ROMPSS and WROMPSS and the same are publicly disclosed on the BOK webpage.
Key consideration 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.	**Monitoring compliance** The director general of the payment and settlement systems department conducts an annual assessment of the participants in terms of article 6 of the WROMPSS. Based on the assessment review, participants may be asked to devise plans for complying with the participant requirements, or could be advised to withdraw from BOK-Wire+. **Suspension and orderly exit** Based on the annual assessment review, participants may be asked to devise plans for complying with the participant requirements, or could be advised to withdraw from BOK-Wire+. The criteria for participation and suspension and cessation of membership are stipulated in the ROMPSS and WROMPSS and the same are publicly disclosed on the BOK webpage.
Key conclusions for Principle 18	The BOK-Wire+ has fair and open access criteria for participation, which comprehensively consider each participant's risk management capability, the stable and efficient operation of BOK-Wire+, and the possibility of systemic risk.
Assessment of Principle 18	Observed
Recommendations and comments	-

Principle 19: Tiered Participation Arrangements An FMI should identify, monitor, and manage the material risks to the FMI arising from tiered participation arrangements.	
Key consideration 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.	**Tiered participation arrangements** Article 5 (6) of the WROMPSS permits indirect participation. It enables institutions that have not joined BOK-Wire+ to use it through other participants. Indirect participants are usually institutions that cash settle their stock market transactions in the KOSPI and KOSDAQ markets. Indirect participants should submit applications for participation (or withdrawal) to the BOK. Currently there are 12 indirect participants in the BOK-Wire+.

	Risks to the FMI The risks from indirect participants to BOK-Wire+ are minimal, because transactions of indirect participants are limited to the funds available in the account of the indirect participant.
Key consideration 2 An FMI should identify material dependencies between direct and indirect participants that might affect the FMI.	The BOK identifies the individual the BOK-Wire+ transactions that indirect participants put through direct participants and therefore can gauge the amounts that are being settled in the BOK-Wire+. Further, direct participants can put through transactions on behalf of indirect participants limited to the funds available in the account of the indirect participant.
Key consideration 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.	The BOK can identify the individual BOK-Wire+ transactions that indirect participants conduct through direct participants. The value of transactions put through by indirect participants in the total settlement value of the BOK-Wire+ is small.
Key consideration 4 An FMI should regularly review risks arising from tiered participation arrangements and should take mitigating action when appropriate.	The BOK identifies and monitors the settlement values of indirect participants in real time, and the risks due to indirect participation in BOK-Wire+ are presently small.
Key conclusions for Principle 19	The BOK is able to identify and monitor the transactions of indirect participants in real time. The risks of indirect participation in BOK-Wire+ are small because volumes from indirect participants are low and limited to the funds they have available in their accounts with the direct participant.
Assessment of Principle 19	Observed
Recommendations and comments	It is not clear how the BOK monitors that direct participants are putting through transactions on behalf of indirect participants which are limited to the availability of funds in the indirect participants account with the direct participant. The BOK may consider seeking a periodical statement to this effect from the direct participants.

Principle 20: Financial Market Infrastructure Links An FMI that establishes a link with one or more FMIs should identify, monitor, and manage link-related risks.	
Key consideration 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.	N/A
Key consideration 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.	N/A
Key consideration 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.	N/A
Key consideration 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.	N/A
Key consideration 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.	N/A

Key consideration 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.	N/A
Key consideration 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.	N/A
Key consideration 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 fulfill its obligations to its own participants at any time.	N/A
Key consideration 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
Key conclusions for Principle 20	N/A
Assessment of Principle 20	N/A
Recommendations and comments	N/A

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 1 An FMI should be designed to meet the needs of its participants and the markets it	BOK-Wire+ was developed to address the liquidity needs of the participants. Further as non-bank participants became members in the BOK-Wire+ system, the system of intraday repo was introduced to take care of their intraday liquidity needs.

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.	Consultative committee meetings with participants are held on a periodical basis (once every 6 months). All major policy issues, design changes, implementation of standards etc are discussed in those meetings. The feedback obtained is used for further improvements to the system. The hours of operation of the BOK-Wire+ are 9 a.m. to 5.30 p.m. from Monday to Friday. The hours of operation of the system can be extended by BOK. The BOK-Wire+ closing times were extended seven times during the year 2011 due to IT failures at participants' systems. The BOK-Wire+ enables two types of payment instructions "Urgent" and "Normal". Provided there is sufficient balance, urgent payment instructions are settled immediately on a gross basis. In the event of insufficient balance, the payment instructions are held in a queue till sufficient balances are available or the offsetting process can be initiated. A simultaneous bilateral settlement process is usually used for normal payment instructions whenever the counterparty's payment instruction is received or is settled through a multilateral offsetting mechanism every 30 minutes as a liquidity saving measure.
Key consideration 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.	The goals and objectives of the BOK-Wire+ are to provide real-time intraday settlement in central bank money in a safe and efficient manner for all the systemically important payment systems and markets. These goals and objectives are enunciated in the ROMPSS, WROPSS and the sub-regulations thereof. The operations of BOK-Wire+ are submitted on an annual basis to the MPC in terms of article 44 of the ROMPSS. BOK Wire+ is also evaluated on a regular basis according to measurable objectives set by referencing for example the IT Service Management Guidelines for service provision. BOK-Wire+ recovers its costs from the participants and payment system operators in terms of article 9 of the ROMPSS. It has a differential pricing structure for payment instructions inputted into the system, thereby encouraging participants to submit their payment instructions early.
Key consideration 3 An FMI should have established mechanisms for the regular review of its efficiency and effectiveness.	The observance of stipulated settlement procedures is examined and evaluated in regular reports, such as the report on BOK-Wire+ operations and the monitoring report. Efficiency and effectiveness are also review daily during monitoring activities. In addition, in accordance with the international standards, an evaluation of BOK-Wire+ as to its overall safety and efficiency is carried out every two years.

Key conclusions for Principle 21	The operational objectives stipulated in the relevant regulations on the BOK-Wire+ have been fulfilled. The BOK-Wire+ is operated efficiently, and its system design has been developed to reflect the needs of the participants and the financial markets.
Assessment of Principle 21	Observed
Recommendations and comments	-

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 1 An FMI should use, or at a minimum accommodate, internationally accepted communication procedures and standards.	**Communication procedures** The BOK-Wire+ uses TCP/IP, the Internet standard, as its communication procedure with the participants. **Communication standards** The BOK-Wire+ uses international messaging service providers such as SWIFT for processing of transactions linked with CLS bank. The SWIFT messages are converted using a converter for their processing and settlement in the BOK-Wire+. Proprietary message formats are used in the BOK-Wire+. A review could be undertaken in the future to migrate to ISO 20022 message standards.
Key conclusions for Principle 22	The BOK-Wire+ uses the TCP/IP protocol Internet standard for its major processes of communication with participants, and international messaging service providers such as SWIFT in cases of transactions linked with the CLS Bank.
Assessment of Principle 22	Observed
Recommendations and comments	As indicated the review to migrate to ISO 20022 message standards may be initiated and completed.

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 and fees and other material costs they incur by participant in the FMI. All relevant rules and key procedures should be publicly disclosed.

Key consideration 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.	**Rules and procedures** The ROMPSS and the sub-regulations thereof stipulate the structure and the means of operation, including the tasks and business procedures, of the BOK-Wire+. **Disclosure** For an emergency, the relevant regulations stipulate necessary process, such as extensions of the BOK-Wire+ operating hours and process to be taken by participant, and BCP for participants is released to participants. Prior to the effect of amendment of the regulation and the sub-regulations, the BOK announces to the participants the proposed amendment/s through an official document or the consultation committee of participants. It is also disclosed to the public through the webpage of the BOK. In addition, the BOK should make the relevant information available in a language commonly used in financial markets in addition to the domestic language. Major changes are also described in the payment and settlement systems report, which is published annually.
Key consideration 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.	Participants' rights, obligations and risk management procedures are stipulated in the ROMPSS and its sub-regulations, and the specific structure of the system is explained in detail in manuals and guidebooks provided to participants.
Key consideration 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.	To facilitate participants' understanding of the BOK-Wire+, the BOK provides them with relevant regulations, manuals and guidebooks and gives advice through the regular interview visits. The BOK also provides adequate information through the occasional consultation committee of participants, and in case of important issues, such as reconstruction of BOK-Wire+, through an explanatory meeting for all participant institutions.

Key consideration 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.	Pursuant to the regulations and the policy of pre-notification for primary policy making related to the payment systems, and in order to secure pricing transparency, the BOK should acquire extensive opinions before setting the BOK-Wire+ fees. The BOK should also discuss the proposed fees with the consultation committee of participants. Before setting fees, the BOK should conduct surveys of participants on reform of the fee level and framework and hold explanatory meetings to collect extensive opinions from participants. The BOK should set fees in consideration of the results of these surveys and meetings.
Key consideration 5 An FMI should complete regularly and disclose publicly responses to the CPSS-IOSCO Disclosure framework for FMIs. An FMI also should, at a minimum, disclose basic data on transaction volumes and values.	Among the responses to the CPSS-IOSCO disclosure framework for FMIs, the regulations and business procedures are disclosed individually through the webpage of the BOK, and the assessment of the BOK-Wire+ is included in the annual payment and settlement systems report released to the public. The BOK plans to use the disclosure framework published by the CPSS-IOSCO in December 2012. Statistics on BOK-Wire+, including the monthly transaction values and volumes, are disclosed through the webpage of the BOK. The payment and settlement systems report published annually also includes analyses of the BOK-Wire+-related statistics.
Key conclusions for Principle 23	The ROMPSS and its sub-regulations are disclosed through the webpage of the BOK and, to facilitate participants' understanding of BOK-Wire+, the BOK provides them with manuals and guidebooks. The BOK plans to use the disclosure framework published by the CPSS-IOSCO in December 2012.
Assessment of Principle 23	Partly Observed.
Recommendations and comments	To facilitate the understandings of stakeholders, including participants, the BOK plans to use the disclosure framework published by the CPSS-IOSCO in December 2012. In addition, the BOK should also make the relevant information and data it discloses, in a language commonly used in financial markets in addition to the domestic language.

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.	
Key consideration 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.	N/A
Key consideration 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.	N/A
Key consideration 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.	N/A
Key conclusions for Principle 24	N/A
Assessment of Principle 24	N/A
Recommendations and comments	N/A

DETAILED ASSESSMENT OF OBSERVANCE OF PRINCIPLES—KRX-CCP

<table>
<tr><th colspan="2">Principle 1. Legal Basis

An FMI should have a well-founded, clear, transparent, and enforceable legal basis for each material aspect of its activities in all relevant jurisdictions.</th></tr>
<tr><td>Key consideration 1

The legal basis should provide a high degree of certainty for each material aspect of an FMI’s activities in all relevant jurisdictions.</td><td>Material aspects and relevant jurisdictions

Material aspects for the KRX-CCP are:
• Legal basis for the CCP;
• Settlement finality and arrangements for DVP;
• Netting;
• Novation;
• Rights and interests of participants and clients in financial instruments;
• Rights and interests of the KRX to use and dispose of collateral; and
• Default procedures.
Relevant jurisdictions for the KRX-CCP:

As the CCP is active in Korea the Korean jurisdiction applies. The CCP has no links with FMIs in other jurisdictions.

With regard to non-local clearing members, a third country financial institution which intends to apply for KRX membership has to establish a local entity or a branch to get a business license from FSC as a financial investment trader or financial investment broker. After that, the third country entity can apply for KRX membership and should comply with the membership requirements. There are currently 12 non-local clearing members in the securities market, 10 in the bond market and 9 in the derivatives market. They represent jurisdictions from France, Germany, Japan, Malaysia, the Netherlands, Singapore, U.K. and U.S.

With regard to collateral the U.S. jurisdiction is relevant as KRX accepts government securities from the US to cover collateral requirements.</td></tr>
</table>

	The legal basis for each material aspect • Legal basis for CCP. Chapter VII of the FSCMA describes the organization and responsibilities of the KRX, in particular the articles 377, 378, and 393. The FSCMA specifies the business scope of a CCP including transaction confirmation, debt acquisition, confirmation of settlement, settlement guarantees and default procedures in the securities market and the derivatives markets. • Settlement finality and arrangements for DVP. The Debt Rehabilitation and Bankruptcy Act [10] (articles 120 and 336) specifies that contracts for which the CCP becomes the counterparty cannot be removed, terminated, cancelled or disclaimed due to the bankruptcy procedures of one of the KRX members to ensure conclusion of clearing and settlement procedures in line with the rules of the KRX markets. The market regulations further specify that the claims of the KRX and its participants have priority over other creditors with respect to the payment of fidelity guarantee money, member margin and joint fund contributions. The market regulations also specify the DVP procedures for different types of clearing members. • Netting The Debt Rehabilitation and Bankruptcy Act (articles 120 and 336) protects netting as it specifies that transaction contracts for which the CCP becomes the counterparty cannot be removed, terminated, cancelled or disclaimed due to the bankruptcy procedures of one of the KRX members. Netting for securities markets is also specified in the market regulations. The protection of netting arrangements includes CNS (continuous net settlement). Settlement of securities that are not delivered on the specified day are netted together with the settlement positions of the next day. • Novation and the moment of liability. • Novation and the moment of liability are specified for the

[10] Act No.8863, 29. February 2008.

	securities market in the KOSPI regulation articles 72 and 73; KOSDAQ articles 28 and 29; and DM business regulation articles 93 and 94. • Rights and interests of participants and clients in financial instruments. • Customers' assets are protected by law in the event of a participant's default under FSCMA articles 74 and 75 which prescribe a separation between the participants and its customer's cash and securities deposits. • Rights and interests of the KRX to use and dispose of collateral. • The KRX has the right to appropriate collateral deposited by a participant as margin or contribution to the joint compensation fund or else to cover losses following a default of that participant according to article 397 of the FSCMA. • Default procedures. The FSCMA specifies that the KRX is responsible for follow up measures on settlement failure (articles 377). The regulations specify when a clearing member should be suspended from trading, and some actions the CCP should undertake. The regulations specify that the CCP can use buy-in procedures to ensure settlement of securities obligations between clearing members.
Key consideration 2 An FMI should have rules, procedures, and contracts that are clear, understandable, and consistent with relevant laws and regulations.	The CCP activities of the KRX are stipulated in three market business regulations, which are the KOSPI market business regulation, KOSDAQ market business regulation and the DM market business regulation. These rules and regulations are based on the FSCMA, in particular article 393. Every set of market business regulations has additional enforcement rules that further specify details related to the role of the KRX as a CCP. The business regulations are amended if needed, taking into account any comments from market participants resulting from market consultations. The FSCMA article 412 requires that the KRX obtains a prior approval of the FSC for amending the existing market regulations. A team composed of legal experts, which consists of three in-house lawyers and an independent auditor, reviews the adequacy of the legal provisions.
Key consideration 3	The KRX is a self regulatory organization responsible for

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.	surveillance of trading, self resolution of disputes and disciplinary measures against participants if they breach relevant rules. All market regulations, enforcement rules and guidelines of thr KRX are made public on its Internet homepage and various publications, both in Korean and English (www.krx.co.kr). The KRX publishes updated rulebooks of its markets on an annual basis.
Key consideration 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.	**Enforceability of rules, procedures and contracts** In general there's a high certainty that the KRX regulations, procedures and contracts are enforceable in the Korean jurisdiction. A non-local financial institution which intends to apply for KRX membership has to establish a local entity or a branch to get a business license from the FSC as a financial investment trader or a financial investment broker. The local entity is subject to Korean acts, rules and regulations. The probability that any remaining cross-border risk will materialize is considered very low by the legal experts of the KRX. U.S. securities deposited as collateral are held on an account of the KSD at a US custodian. The use of US collateral is legally protected as the collateral is pledged to the KRX. The legal experts of the KRX deem the probability of loss of collateral very low in case of default of the foreign custodian. **Degree of certainty for rules and procedures** There is no precedent case that any actions taken by the KRX in accordance with its regulations can be voided, reversed or subject to stays. Occasionally, listed firms and investors have filed lawsuits against the KRX over application of KRX rules and regulations. However, no court decision has affected the application of KRX's rules and regulations.
Key consideration 5 An FMI conducting business in multiple jurisdictions should identify and mitigate the risks arising from any potential conflict of laws across jurisdictions.	The KRX does not conduct business in other jurisdictions than the Korean jurisdiction.
Key conclusions for Principle 1	The legal basis for the KRX-CCP is generally sound and enforceable. The FSCMA and the KRX market regulations sufficiently describe the organization and responsibilities of the

	KRX. The Debt Rehabilitation and Bankruptcy Act provides for a firm statutory foundation for netting, set-off and closing out of positions. There's a high certainty that the KRX regulations, procedures and contracts are enforceable in the Korean jurisdiction. A third country financial institution which intends to apply for KRX membership has to establish a local entity or a branch to get a business license from the FSC as a financial investment trader or financial investment broker. There is room to improve the legal framework in the normal course of business. The regulatory framework could be further improved by increasing its clarity. The relevant provisions for CCP clearing are currently comingled with concepts related to the KRX trading activities. The KRX regulations could make better use of the internationally used concepts, in particular the concepts used in the PFMI. Finally, as the KRX currently has not developed a recovery plan yet the regulatory framework has no explicit provisions that support recovery activities.
Assessment of Principle 1	Observed
Recommendations and comments	It is recommended to explicitly distinguish between the trading and CCP activities in the FSCMA. The KRX regulations could make better use of the internationally used concepts, in particular the concepts used in the PFMI. The KRX could improve the disclosure of its laws and regulations to its clearing members to support them to assess risks related to the use of the CCP. It is recommended to improve the public disclosure of laws and regulations in English. The KRX has not yet developed a recovery plan. As part of the drafting of this recovery plan the KRX should establish rules, procedures, and contracts related to its operations that are enforceable when the KRX is implementing its plans for recovery or orderly wind- down. Where relevant, the laws and regulations should address risks resulting from foreign participants in the case of the KRX is being wound down.

Principle 2: Governance An FMI should have governance arrangements that are clear and transparent, promote the safety and efficiency of the FMI, and support the stability of the broader financial system, other relevant public interest considerations, and the objectives of relevant stakeholders.	
Key consideration 1 An FMI should have objectives that place a high priority on the safety	The FSCMA stipulates that the KRX should be established to fix and stabilize fair prices in transactions of securities and exchange-traded derivatives as well as to facilitate the stability and efficiency of other transactions (article 373).

and efficiency of the FMI and explicitly support financial stability and other relevant public interest considerations.	The objectives of KRX, both stipulated in the FSCMA as well as publicly announced on its website, do not contain safety and efficiency objectives for the clearing and settlement of securities and derivatives markets. The KRX does not specify how it will take into account public interests in operating the CCP. The objectives generally express KRX's aim to become the leading capital market in Northeast Asia. In addition, the objectives express KRX's aim to further market credibility, investor protection and confidence in the organization.
Key consideration 2 An 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, at a more general level, the public.	**Governance arrangements** The KRX ownership structure: • Treasury stock 4.62 percent; • Members (36 firms) 88.17 percent; and • Market-related organizations (3 firms) 7.21 percent. The KRX was demutualized when the KRX was converted into a stock company in 2005. Currently, not all KRX members are shareholders. Appendix 1 contains a list of all KRX shareholders. The KRX is governed by the FSCMA, the act of public institutions and the commercial act that prescribes that the KRX should have articles of incorporation, as well as its own regulations. The FSCMA prescribes the board of directors, the executives of the KRX, their qualifications, as well as the different board committees. It prescribes that a majority of board members shall be non-executive. The FSCMA also contains provisions to prevent conflicts of interests at the level of KRX staff. The KRX is a company established under the FSCMA, with trading of its shares being restricted pursuant to article 406 of FSCMA. Share ownership of the KRX is limited to 5 percent of the total number of shares with voting rights, with some exceptions. When a shareholder intends to sell its holdings, it should acquire a prior approval of the board of the KRX, pursuant to article 58 of the articles of incorporation. This is to prevent conflicts of interest, which may hamper the stable functioning of the capital market. After its incorporation as a stock company subject to the commercial act of January 2005, KRX was designated as a public institution due to its monopolistic income structure (the only exchange in Korea), in accordance with the act of public institutions. Therefore, its governance framework such as budget, personnel affairs, and business plan are under control of the government.

	However, with the revisions of the FSCMA in April 2013, which allow for the establishment of multiple trading venues, KRX's monopoly can be challenged, requiring a review of KRX being a public institution. The articles of incorporation, the regulation for the board of directors operation, and the regulation for the audit committee operations further specify governance arrangements. **Disclosure of governance arrangements** The governance arrangements are disclosed in the law and published on the website of the KRX in various regulations. The most recent composition of the board is published on the KRX website, including the names of independent board members.
Key consideration 3 The roles and responsibilities of an FMI's 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 conflicts of interest. The board should review both its overall performance and the performance of its individual board members regularly.	**Composition of the board** The articles of incorporation and the regulation on the operation of the board of directors describe matters concerning the board. The board is composed of the chairman, the chairman of the market oversight commission, 5 senior executive directors and 8 non-executive directors. The chairman of the board is also the chairman and CEO of the KRX. The chairman is appointed by the President of the Republic of Korea upon recommendation of the FSC. The senior executive directors are the chairman of the audit committee, the president of the management strategy division, the president of the KOSPI market division, the president of the KOSDAQ division and the president of the derivatives market division. The chairman of the audit committee is appointed by the President of the Republic of Korea, following nomination by the nomination committee and upon recommendation of the Minister of strategy and finance. The chairman of the market oversight commission is appointed by the FSC, following nomination by the nomination committee. The presidents of the KOSPI, KOSDAQ and DM divisions and the president of the management strategy division are appointed by the chairman of the KRX and approved by the general shareholders' meeting. The non-executive directors comprise five independent directors, representing public interests and three directors representing the investment dealing companies or investment brokerage companies. The non-executive directors are appointed by the FSC. The FSCMA stipulates that at least one senior non-executive

director should have extensive knowledge and experience in the areas of operation and management of KRX and corresponds to any one of the criteria specified in the act on the management of public agencies.

The president of the management strategy division is responsible for the risk management committee and the risk management department.

Role and responsibilities of the board

The board shall make the decisions on the matters stipulated in the laws and decrees and the articles of incorporation, the matters delegated to it by the general meeting of shareholders and the basic policies for corporate management and the material matters related to the business execution. The meeting of the board shall be convened at least once in every three months.

The board is responsible for:

- Establishment of the business objectives, budget and operational plans.
- Establishment, amendment and abolition of regulations relating to the operation and business of the KRX.
- Acquisition, disposal and transfer of the principal assets.
- Leasing of major assets and borrowing of long-term cash loans.
- Investments in and donations to other corporations;
- Establishment of a branch office, business office or field office in Korea and abroad.
- Use of financial reserves.
- Matters to be referred to the general shareholders' meeting.

  Matters that may have material impact to the KRX's business.
- Additionally, the matters that are stipulated in relevant laws, the article of incorporation and the KRX regulations.

Board committees

The board decides on the establishment, operation and termination of the board committees and the appointment and

	dismissal of the members of the board committees. The committees are composed of members of the board. The following board committees have been established: • The market committee, divided into: (a) KOSPI Market Committee; (b) KOSDAQ Market Committee; and (c) Derivatives Market Committee. • The market committees have the authority to formulate, and amend the respective market business regulations, listing regulations and disclosure regulation; to prepare the business plan of the respective markets and undertake an in-depth review of the budget related thereto; to approve the usage of reserve funds; to deliberate the matters related to the market operations, and make the decisions on the matters delegated by the board. • Remuneration committee: The remuneration committee shall determine the compensations of the chairman, the chairman of market oversight division and executive directors within the officers' compensation limit established at the general meeting of shareholders and may establish the guidelines necessary for setting the compensation. The remuneration committee shall also determine the guidelines for retirement benefit for the executive directors and obtain the approval at the general meeting of shareholders. • Audit committee: The audit committee shall audit the operations and accounts of the KRX. Risk management committee: The risk management committee shall establish the policies essential for the risk management, set and manage the level of risk and spell out the matters concerning the development and operation of the risk management system. The risk management is in charge of decision making on risk management policies, setting and management of risk limits, and building the company wide risk management framework. The committee is regularly updated by the risk management department on outstanding issues. All decisions made by the committee are escalated to the board for endorsement. **Review of performance** Pursuant to article 3 of the regulation on operation of the board of directors, the board shall supervise the duties and functions of the

	directors and directors may request the chairman of the KRX to present a report on the duties and performance of other directors, executive officers or employees to the board. Directors shall present a report on the progress of his/her official duties to the board at least once in every 3 months. The non-executive directors' meeting is convened every 2 months to expand non-executive directors' participation and enhance oversight on management activities overall.
Key consideration 4 The board should contain suitable members with the appropriate skills and incentives to fulfill its multiple roles. This typically requires the inclusion of non-executive board member(s).	The articles of incorporation specify the requirements for the non-executive board members. An independent director representing the public interests shall fulfill the following requirements: • Is not engaged in the business of investment dealing or investment brokerage or in any related business; and • Has good understanding of the operations of securities and derivatives markets. The independent director should in addition fulfill one of the following requirements: • Is able to represent the public interest and enhance investor protection and has over ten years of work experience in relevant areas; • Holds a doctorate or higher degree in the field of law, economy, management or the fields related to securities and derivative products and has over ten years of working experience in a university or certified research institution or; • Is a certified lawyer or accountant who has over ten years of working experience in the legal or accounting field in a government office, law office or accounting company. Board members representing the investment dealing companies or investment brokerage companies shall be the CEO of the investment dealing companies or investment brokerage companies that are the members of the KRX. A person who falls under the disqualification clauses specified in the FSCMA and the act on public institutions shall be prohibited to become a director of the KRX.

Key consideration 5 The roles and responsibilities of management should be clearly specified. An FMI's management should have the appropriate experience, a mix of skills, and the integrity necessary to discharge their responsibilities for the operation and risk management of the FMI.	**Roles and responsibilities of management** The management consists of the executive board members, i.e. the KRX chairman, the chairman of the market oversight commission, and five senior executive directors. The senior executive directors are the chairman of the audit committee, the president of the management strategy division, the president of the KOSPI market division, the president of the KOSDAQ division and the president of the DM division. The duties of the management are specified in article 23 of the articles of incorporation. The chairman shall represent the KRX and be responsible for the overall management of business. The president of the management strategy division, presidents of market divisions and chairman of the market oversight commission shall assist the chairman, and shall accomplish the functions of the concerned division that he/she is in charge of. **Experience, skills and integrity** The management is subject to the provisions specified in the FSCMA and the act on public institutions. Executives of the KRX should meet rigorous qualification criteria. An executive director should have been a member of the senior civil service, or have served as a grade Ⅱ or higher public official, in a field related to finance or the economy or a person who has worked for financial institutions (including foreign financial institutions) for 15 years or longer in total (FSCMA article 356 of the enforcement decree). The regulations do not specify any further requirements for the executive directors, except that the principal shareholders of the investment dealing companies or investment brokerage companies cannot be appointed as executive director. **Risk management framework** The board decides, among other things, on the formulation, amendment and abolition of the regulation on the operation of the risk management committee. The risk management committee shall make the decisions on each of the following matters:

Key consideration 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.	• Policy decisions on risk management issues. • Enactment or amendment of the regulations or guidelines related to risk management. • Matters related to the setting and management of risk limits or loss limits. • Measures to identify and manage crisis situations. • Matters related to the establishment and operations of risk management systems. • Matters to be escalated to the board. **Authority and independence of risk management and audit functions** The risk management department monitors risk of the business departments and the company as a whole. It reports to the strategy and planning department under the management strategy division. The risk management team consists of five experts with a legal and/or financial background. The risk management committee consists of the chair, who is a senior executive director and the president of the management strategy division, and 2 non-executive directors, pursuant to the regulation on operations of the risk management committee. The two non-executive directors should be a financial expert and a legal expert respectively. Meanwhile, the clearing and settlement department, which falls under the DM business department, should comply with risk management policies and perform risk management activities related to clearing and settlement business. It is responsible for the identification; monitoring and management of risks related to the clearing and settlement of securities and derivatives transactions as part of the company wide risk management system and report the results to the risk management department regularly. Article 35 of the articles of association specifies the composition of the audit committee. The audit committee consists of one executive director and two non-executive directors. At least one member of the audit committee shall be a specialist in accounting or finance. The chairman of the audit committee shall be an independent director representing public interests. The internal audit office is under the supervision of the audit committee.

Key consideration 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.	**Identification and consideration of stakeholder interests** Decisions on material issues related to the CCP, such as strategy, and regulation, are made by the board, as well as the shareholders' general meeting. The KRX operates the clearing and settlement committee (6 members from member firms and universities) and the functional conference on clearing and settlement (11 members from member firms) to collect opinions of market participants. The FSCMA article 412 requires that the KRX obtains a prior approval of the FSC for amending the existing market regulations. In case of major changes to rules or operations the KRX invites all clearing members to so-called explanatory briefings. The KRX plans to adopt a standard procedure to provide clearing members with a prior notice in case of rule changes. Although the majority of shareholders are KRX members, not all KRX members are shareholders. The KRX does not have a regulation to manage conflicts of interest between the members and shareholders. **Disclosure** Major decisions are disclosed on the KRX website, and via press releases and publications in the Pusan Ilbo published in Busan Metropolitan City and the Seoul Shinmun published in Seoul Metropolitan City.
Key conclusions for Principle 2	The governance arrangements of the KRX are transparent and the roles and responsibilities of its board and management are clearly described and publicly available. Non-executive directors are appointed to represent public interests. The KRX has established a risk management committee and a risk management department to identify, monitor and management companywide risks as well as CCP related risks. The risk management department reports to the board and the board endorses major decisions. The governance arrangements do however contain some gaps and issues of concern that should be addressed in a defined timeline. The risk management committee is, although independent of the business departments, chaired by an executive director who is also responsible for strategy and planning related issues, and therefore not fully independent from business related matters. The number of staff of the risk management team and the clearing and settlement department responsible for management of risks is small compared to the scope of their responsibilities. Finally, the objectives of the KRX do not place a particular high priority on the

	safety and efficiency of the KRX-CCP and do not explicitly support financial stability.
Assessment of Principle 2	Broadly Observed
Recommendations and comments	It is recommended to address the identified gaps and shortcomings in a defined timeline. First, it is recommended that the CCP activities of the KRX are more explicitly addressed within the KRX organization. In particular the KRX should explicitly and publicly state its objectives for the KRX-CCP, addressing the safety and efficiency of its operations and support for the financial stability in Korea. This is important as the functioning of the CCP may affect multiple financial institutions and markets in Korea. Also, the chair of the risk management committee should be chaired by an individual who is independent of the FMI's executive management, preferably by a non-executive director. It is also recommended to publish the risk management regulation on the KRX website. In addition, for the safety of the CCP it is essential that the number of staff in the KRX responsible for risk management is increased to allow them to manage companywide and CCP risks in a proactive way. They should be able to familiarize themselves with the PFMI report and have sufficient independence and authority to ensure compliance with the PFMI.

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 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 the FMI. Risk-management frameworks should be subject to periodic review.	**Risks that arise in or are borne by the FMI** The KRX applies a company-wide risk management framework to identify, measure, monitor and manage the four main risks that it has identified, which are credit, market, liquidity and operational risks. The risk management committee determines every year the overall company-wide risk limit and limit per type of risk based on input from the risk management department. The risk management department receives its input from the various departments that identify risks using risk self assessments. Key performance indicators (KPIs) are used to evaluate the departments' performance.

	Risk management policies, procedures and systems The KRX introduced the risk management regulation in April 2009. The regulation specifies the risks to be managed, responsibilities of different units involved in risk management, and the principles and procedures for the management of risk. The policies and procedures related to the risk management committee are covered by the regulation for the risk management committee operation. Principles and procedures for risk management are further described in other relevant regulations and guidelines. The risk management department supports the risk management committee and reports on the actual risks compared to the ex ante risk limits set by the risk management committee and other important issues related to risk management. The role of the risk management department is defined in article 7 of the risk management regulations and specifies the duties of the risk management department: • Execution of the Committee resolutions; • Enterprise-wide risk measurement, monitoring, evaluation and reporting; and • Management and calculation of proper equity capital scale **Analysis and reporting of management activities, affecting finance and risk; and** • Businesses associated with other risks except for the subparagraphs 1 to 4. **Review of risk management policies, procedures and systems** The risk management department prepares an annual risk management plan, which is submitted to the risk management committee and contains proposal for further improvement of the risk management policies, procedures and systems. The risk management committee evaluates the feasibility of policies on a quarterly basis or more frequent if needed. The internal audit office conducts an annual surveillance on the adequacy of risk management framework. **Risk management systems** The KRX has developed and introduced the settlement risk management system for the exchange-traded products in

	December 2010. KRX plans to extend this management system to OTC-traded products in 2014. It has also introduced an operational risk management system in January 2013. • Settlement Risk Management System (operational since December 2010). The settlement risk management system measures, monitors and manages credit risk and liquidity risk from defaults of participants. The main objectives of the system are to identify a potential member default risk in advance and manage risk exposures and financial resources to enable continuous provision of clearing and settlement services in stressful market conditions. It calculates risk exposures and evaluates settlement risk on a daily basis. The system is connected with the KRX clearing and settlement system and data vendors via interfaces. It automatically receives information to calculate risk exposures and evaluate the settlement risk management indices. • Operational Risk Management System (January 2013) The operational risk management system measures, monitors and manages operation risk. Operational risk is the possibility that the KRX will face losses due to improper or erroneous internal procedures, personnel, systems and external events, including business risk, IT risk, legal risk and reputational risk. • Its main objectives are to prevent and control a variety of operational risks in an efficient manner. Key risk indicators (KRIs) and KRI limits are automatically extracted. Risk control and self assessment reports and KRI trends are automatically generated. All departments and executives in the KRX take part in the assessment of operational risk. The system collects and evaluates RCSA and KRI values on a quarterly basis.
Key consideration 2 An FMI should provide incentives to participants and, where relevant, their customers to manage and contain the risks they pose to the FMI.	The KRX provides its trading and clearing members with real time information on their exposures. The KRX has also introduced incentives for early settlement, such as penalties on delayed settlements. The KRX provides it's trading and clearing members with opportunities to enhance their understanding of risk management by organizing workshops and seminars on risk management for trading and clearing members. The KRX has also initiated a task force for risk managers working within trading and clearing members.

	The CCP collects member margins from participants in proportion to their daily risk exposure in the derivatives market. It also requires each member to contribute to the joint compensation fund for both the securities market and the derivatives market in proportion to the member margin ratio of the previous year.
Key consideration 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.	**Material risks** Risks that the KRX bears from other entities: • The KSD, as the only securities depository institution in Korea, is offering settlement services in the securities market and depository and management services of substitute securities for margin collateral in derivatives market, so the KRX is exposed to custody risk and operational risk associated with the KSD to some extent. • Cash payment in the securities market is settled through the BOK, so KRX is exposed to operational risk in relation to the BOK. • Cash payment in the derivatives market is settled through commercial banks, so the KRX is exposed to credit risk, liquidity risk, and operational risk associated with commercial banks. Risks that the KRX poses to other entities: Participants of the KRX are exposed to the KRX as a CCP, as the KRX is the counterparty of all participants and a failure of KRX may poses credit risk, liquidity risk and operational risk to participants. The KSD has a vertical relationship with the KRX, since it performs securities settlement in the securities market and depository and management services of substitute securities in the derivatives market. Thereby, the KSD is exposed to operational risks posed by the KRX. **Risk management tools** The KRX has established criteria for banks to become settlement banks. The KRX monitors compliance regularly. Regarding other FMIs the KRX continuously cooperates with the KSD and BOK and shares information that is relevant to identify, monitor and mitigate risks. In case a system failure occurs in the KSD, the KRX has the opportunity to modify the settlement deadline and settlement date taking into account the impact of such a delay on the stability of the system.

Key consideration 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.	**Scenarios that may prevent an FMI from providing critical operations and services** The KRX has not developed recovery plans that contain scenario's that may potentially prevent it from providing critical operations or options for recovery. Subsequently no recovery strategies are developed. However, for potential extreme cases, where the damage cannot be covered by the currently available financial resources, KRX plans to establish rules and regulations required for additional loss bearing by member firms, handling procedures of the KRX, and amendment of relevant regulations, in consultation with the regulatory authorities and member firms (manual for handling a settlement default; article 107 of the DM business regulation). **Recovery and orderly wind-down plans** The KRX is working on a resolution scheme for orderly arrangements together with the FSC to manage the event of unexpected bankruptcy of the CCP.
Key conclusions for Principle 3	The KRX has developed a companywide risk management framework, consisting of policies, tools, governance arrangements and default procedures for managing credit, liquidity, operational, and market risks. The risk management framework has recently been implemented and requires business departments and the market oversight department to identify, monitor and manage its risks. In addition to this bottom-up approach the KRX board decides on risk management limits. The risk management framework is reviewed on an annual basis and includes risks related to external stakeholders, such as settlement banks, the KSD and the BOK. The risk management framework is regularly assessed through independent audits. The KRX has not started with the development of plans for recovery or orderly wind down. The KRX should decide which of its operations are critical to continue in times of crisis. The KRX should also develop crisis scenarios that go beyond the default procedures and business continuity plans. The scenarios may cover extreme but plausible events, such as the default of a large participant that is part of a financial group that provides multiple services to the KRX, such as settlement and custody activities. The lack of such a plan is an issue of concern, given the size of systemic importance of the KRX-CCP and the impact of a potential failure of the KRX on the financial stability in Korea.
Assessment of Principle 3	Broadly Observed

Recommendations and comments	The KRX should develop a recovery plan in line with the requirements stated in the PFMI and the other relevant documentation provided by the standard setting bodies CPSS and IOSCO. The plan should (i) identify critical operations of the FMI; (ii) contain scenarios that may potentially prevent the KRX from providing critical operations to the markets it serves; and (iii) strategies to support recovery of its critical operations. The plan should be developed in close cooperation with the FSC as well as the BOK and regularly reviewed and updated.

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 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 KRX framework to manage credit risk consists of: • Risk management policy, regulations and guidelines. • The settlement risk management system as a tool to measure, monitor and reduce credit exposures. • A governance structure dedicated to handle credit risk, including the risk management committee and the risk management department. • Escalation tools and default procedures. *Risk management policy, regulations and guidelines* The risk management regulation specifies the risks to be managed, responsibilities of different units involved in risk management, and the principles and procedures for the management of risk. Principles and procedures for risk management are further described in other relevant regulations and guidelines:

	• Regulation on asset management; • Guideline for the management of the joint compensation funds (JCFs); • Guideline for the management of the settlement reserves; • Guideline for the use of financial resources for providing liquidity; and • Guideline on margin management. *Systems* The KRX operates the settlement risk management system, a collateral system in the clearing and settlement system and a margining system COMS. In addition, the KRX is able to monitor the settlement process on a real time basis through its EXTURE system. • The main functions of settlement risk management system are the management of risk from a potential participant's default by monitoring the financial condition of the members. • Management of financial resources to ensure completion of settlement, by calculating the maximum settlement amount per member. • Management of potential losses, by calculating the market risks of settlement positions. • Management of margin rates on derivatives trading by measuring the volatility for each product. • Management of intraday risk by estimating the intraday gains and losses on open positions. For the DM the KRX calculates the margins by using the COMS which determines margin requirements per individual risk management account. *Governance* The clearing and settlement department is responsible for the provision of clearing and settlement services to participants as a CCP. This department is in charge of managing credit risk, which includes regular analyses of the credit management framework. The department initiates improvements to the framework if needed.

	The risk management department and the risk management committee review the enterprise-wide risk management framework including the credit risk management quarterly or more frequent if needed. The internal audit office verifies the adequacy of the risk management framework on an annual basis or occasionally and suggests improvements. *Default procedures* In case a clearing member does not fulfill its obligations the KRX will start its default procedures as described in principle 13. In case a clearing member does not deliver its securities the CCP will activate a buy-in procedure to purchase securities on behalf of a failing member (KOSPI 75-10). The failing clearing member shall pay to the KRX the loss caused by the settlement delay.
Key consideration 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.	The KRX's operation as a CCP exposes it to credit risk: • First, the KRX may face losses related to funds that will no longer be received as originally defined, due to default of one or more of its participants. • Also, the KRX may face losses due to default of the issuers of collateral that is posted with the KRX. The management of credit risk consists of: • Monitoring compliance of clearing members with participation requirements. • Monitoring of exposures using the settlement risk management system. • Collection of initial and variation margin for derivatives positions. • Collection of joint compensation fund (JCF) for securities and derivatives market.[11]

[11] The joint compensation fund should not be confused with fidelity guarantee money and the good faith deposit. Fidelity Guarantee Money is a fund to guarantee the repayment of debt which is likely to be incurred as a result of transactions on the securities market or the derivatives market pursuant to Article 395 of the FSCMA. A KRX member should deposit an amount of KRW 1 million for both of the equity market and the derivatives market. The good faith deposit means collateral which participants may collect from their customers to ensure the fulfillment of their obligations. Participants are free to determine the rate and collection method of the good faith deposit. Finally, the KSD introduced a settlement guarantee fund (KRW 50 billion) to secure the stability of cash settlement. All members

(continued)

	• Maintenance of settlement reserves. • Conducting stress tests to determine potential future credit exposures in stressful market conditions. [12]
Key consideration 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.	N/A
Key consideration 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	**Coverage of current and potential future exposures to each participant** For the derivatives contracts the settlement risk management system supports the KRX to monitor its credit exposures towards its members on a daily basis. For each member's derivatives account KRX determines the 'value at risk in normal circumstances' (calculated by utilizing a VaR model) and the 'value at risk in emergency situations' (calculated through stress tests) on a daily basis.

of the KSD taking part in the institutional settlement segment for stocks are obliged to contribute to the settlement guarantee fund of KSD.

[12] An additional tool to reduce credit risk is the net debit cap work developed by the KSD. The net debit cap limits the securities that the participant is entitled to receive based on available funds in the cash account and the envisaged settlements.

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.	In case the settlement risk management indicator (see principle 18) of a member falls below a preset threshold, KRX closely monitors the financial resources and settlement capability of such a member to reduce potential losses to the CCP. In addition, the risk management department receives the settlement risk management index of participants regularly. **Composition of financial resources** The FSCMA and the KRX policies specify the composition of the CCP's financial resources to cover current and potential future credit exposures. For the securities market: • Joint compensation fund (contribution defaulter); • Joint compensation fund (contribution other members); and • Capital of the KRX, including the settlement reserves. For the derivatives market: • Member margin; • Joint compensation fund (contribution defaulter); • Joint compensation fund (contribution other members); and • Capital of the KRX, including the settlement reserves. *Member margin* The KRX is collecting margins on settlement position at 99.7 percent confidence level to cover credit exposure (the guideline on margin management). *Joint Compensation Fund* FSCMA article 394 stipulates that every KRX member should contribute to the KRX joint compensation fund in order to compensate for losses following the default of a clearing member. The KRX has established separate joint funds for the securities market and the derivatives market. The total size of the joint compensation fund for the securities and the derivatives markets is described in the membership regulation and should be KRW 200 billion for each market. The contribution of a clearing member is calculated on a quarterly basis. The KRX can

	require a full replenishment in case the joint compensation fund is used to cover the losses following a clearing member's default. The contribution of a clearing member to the joint compensation fund for the securities market is determined as the sum of the following: • Basic contribution of KRW 1 billion. • The multiplication of the ratio [of the average daily trading value of the concerned clearing member to the total average daily trading value of all clearing members contributing to the joint compensation fund for one year period retroactive from the end of the previous quarter] by the difference resulting from subtracting the total of the basic contribution and other contributions from the total value of the joint compensation fund of the securities market. The contribution of a clearing member to the joint compensation fund for the derivatives market is determined as the sum of the following: • Basic contribution of KRW 1 billion. • The multiplication of the ratio [of the average daily margin value of the concerned clearing member to the total average daily trading value of all clearing members contributing to the joint compensation fund for one year period retroactive from the end of the previous quarter] by the difference resulting from subtracting the total of the basic contribution from the total value of the joint compensations fund of the derivatives market. *Additional financial resources* Additional financial resources to cover losses are comprised of the own assets of the KRX, including the settlement reserves. The KRX deposits a part of its retained earnings as settlement reserves as an additional cushion to cover losses caused by a participant's default pursuant to article 54 of the articles of incorporation. **Risk profile and systemic importance in multiple jurisdictions** At present, KRX does not clear products with more-complex risk profiles, but KRX is planning to provide clearing service for OTC KRW-IRS from June 2014 and considering other OTC instruments like CDS which has a more-complex risk profile.

	Supporting rationale and governance arrangements The clearing and settlement department conducts stress tests on member's settlement positions on a daily basis. The results of the daily stress tests are stored and forwarded to the risk management department on a quarterly basis. Pursuant to article 7 of the risk management regulation, the risk management department calculates and manages an adequate amount of capital, based on the results of the stress testing as further explained in key consideration 5. The risk management department reports its findings and suggestions to the risk management committee for verification. If the risk management committee decides that the current size of capital is insufficient the KRX may propose to the board to raise the amount of the settlement reserves or the joint compensation fund.
Key consideration 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	**Stress testing** The KRX conducts daily stress tests (99.99 percent confidence level) to determine the adequate size of financial resources. The objective is to maintain sufficient financial resources to cover losses following the default of the participant who generates the largest credit exposure. The risk management department of the KRX compares the largest credit exposure in stressful market conditions with the current amount of financial resources for settlement (margins, joint compensation fund, settlement reserves and other resources) in order to check the adequacy of the current amount of financial resources. When market volatility increases or liquidity decreases, the clearing and settlement department immediately updates the stress test results. Upon receipt of the results, the risk management department appraises the sufficiency of resources and determines whether to expand or not. The financial resources currently held by KRX at the end of 2012 are sufficient to cover the value at risk in the event of default of the participant with the largest exposure in recent years. **Review and validation** The KRX regularly reviews the adequacy of the scenarios. In case the measured value exceeds the pre-set value in an existing scenarios or any abrupt market emergency occurs, the KRX adds a new test scenario based on the new value or adjusts existing scenarios.

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.	In setting scenarios, the KRX considers decreasing market liquidity, crisis period when the price and volatility of major variables (stock prices, foreign exchange rates and interest rates) should be sharply fluctuated. The KRX validates its risk management model every year and develops an improvement plan based on the findings. In 2012, the KRX checked the adequacy of settlement risk management index of participants and improved some system functions. The internal audit office occasionally verifies the adequacy of risk management model and, if necessary, recommending its improvements. The KRX is planning to introduce back- test and sensitivity analysis to validate the margin calculation methods in 2013.
Key consideration 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.	The daily stress tests are based upon various scenarios, such as historic emergencies, price volatilities, and shifts in market factors and clearing periods. The KRX measures the volatilities of the risk factors for the stress test (stock price, interest rate, FX rate, etc) on a daily basis. In case the measured value exceeds the pre-set value in existing scenarios or any abrupt market emergency occurs, KRX adds a new test scenario based on the new value or adjusts existing scenarios. KRX takes the following historical crisis scenarios into account: the financial crisis in 1997, the 9-11 terrorist attacks in 2001, the sub-prime mortgage crisis in 2007 and the Lehman Brothers' default in 2008. The scenario with the highest historical volatility appears to be the Lehman Brothers crisis, with a simultaneous decrease of the KOSPI200 index by 26.5 percent and an increase of the U.S. dollar by 3 percent. The KRX uses the Lehman Brothers scenario to calculate credit exposures in extreme market conditions. Also, to measure credit exposures in stressful market conditions, the KRX calculates losses that may occur during the liquidation of the position in case of the default of the participant that would potentially cause the largest credit exposures to the KRX.
Key consideration 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	**Allocation of credit losses** The KRX has established explicit rules and procedures to handle the case of settlement default by members (manual for handling settlement default; article 107 of the DM business regulation).

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.	**Replenishment of financial resources** In cases where joint compensation fund has been used up due to the non-fulfillment of settlement obligations following the execution of securities or exchange-traded derivatives trades, the KRX can require participants to make additional contribution according to the decisions of the board pursuant to article 23 of the membership regulation. Also in cases where settlement reserves have been fully used, the KRX may deposit more funds by getting an approval from the board.
Key conclusions for Principle 4	The KRX has identified various sources of credit and liquidity risks related to its CCP activities, i.e. from guaranteeing settlement and its investment book. For that purpose the KRX has developed the settlement risk management system that monitors credit exposures per clearing account in real time. For the derivatives market credit risks are in general properly identified and monitored. The KRX manages credit risks in the derivatives market by collecting margin, joint compensation fund contributions and by allocating its settlement reserves to cover credit losses. The KRX uses daily stress testing to determine the sufficiency of its financial resources available in the event of a clearing member's default in extreme but plausible market conditions. The KRX has defined a risk management waterfall for the use of financial resources in case of credit losses. The legal and regulatory framework supports this framework. The KRX has started to develop a comprehensive risk management framework for the securities market, as volumes are large and the KRX is exposed to credit losses between the trading and settlement day. Also, as the size of the joint compensation fund is defined in the regulations it is difficult for the KRX to adapt the fund to accommodate increased exposures in the securities market. The KRX does not stress test the sufficiency of the joint compensation fund for the securities market. Several other features of the credit risk management framework are however not in line with the PFMI requirements. The KRX does currently not conduct back testing or sensitivity analysis to measure the adequacy of its margin model, although the KRX has developed plans to introduce them in the autumn of 2013. The credit risk management models, including the margin models, are not validated by an independent entity, such as its regulators or an external expert, such as an academic or consultancy bureau. The concept of affiliated members is not yet considered in the credit risk

	management framework of the KRX. The risk management waterfall does not yet reflect the requirement of the PFMI that part of the KRX capital should be taken before the financial resources of surviving clearing members can be used (skin the game).
Assessment of Principle 4	Partly Observed
Recommendations and comments	By its nature a CCP concentrates the counterparty credit risk in a market, which may cause systemic disruptions in the case of a default of the CCP. A CCP should therefore adopt a solid risk management framework to manage credit risks related to all markets it serves. It is recommended that KRX accords a high priority to addressing the shortcomings in its current credit risk management framework. First, it is recommended to reform the credit risk management framework for the securities market, by collecting risk-based collateral (margin). The KRX may also reconsider the current design of its joint compensation funds, for example by removing the fixed size requirement of the fund in its regulations to better address the need for increased funds in case of increased exposures. In any case, the contribution of the joint compensation fund should be based on the exposures of a particular clearing member. This approach may replace the current determination of the clearing member's contribution to the fund, which is currently based on its transaction volumes. The KRX is encouraged to continue with its planned reforms regarding the introduction of back testing, sensitivity analysis and the skin in the game concept. The KRX should in addition ensure that its credit risk management model and in particular its margin model are reviewed at least annually by an independent party. A CCP should have its valuation models validated under a variety of market scenarios by a qualified and independent party to ensure that its model accurately produces appropriate prices, and where appropriate, the CCP should adjust its calculation of initial margin to reflect any identified model risk. Finally, the KRX should ensure that its credit risk calculations take into account not only the individual clearing members, but also its affiliates.

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 1 An FMI should generally limit the assets it (routinely) accepts as collateral to those with low credit, liquidity, and market risks.	The KRX has specified the assets it accepts as collateral to cover the requirements for the joint compensation fund and derivatives margin: *Joint compensation fund* Eligible collateral consists of cash, government bonds or monetary stabilization bonds, listed in the KOSPI market. For every clearing member the value of the bonds shall not exceed half of the amount of the clearing member's total contribution to the fund. The bonds are kept in the clearing member's account of the KSD and are pledged to the KRX. *Derivatives margin* Eligible collateral consists of domestic and foreign currencies as well as domestic securities and foreign government bonds (DM market regulations in articles 88 and 128 and its enforcement rules article 92). The eligible foreign currencies are: • U.S. Dollar; • Japanese Yen; • European Union Euro; • British Pound; • Hong Kong Dollar; • Australian Dollar; • Singapore Dollar; • Swiss Franc; and • Canadian Dollar. Eligible domestic securities are: • Stocks listed on the KOSPI market and the KOSDAQ market; and • Bonds listed on the KOSPI Market. Eligible foreign government securities are:

	• Short-term U.S. treasury Bills; • Mid-term U.S. treasury Notes; • Long-term U.S. treasury bonds; and • Other foreign securities. The KRX discloses the foreign currency valuation and the foreign security valuation through the electronic information delivery medium operated by the KRX and on its homepage. The KRX considers stability, liquidity as well as convenience in management and valuation when determining which assets it accepts as collaterals, which means collateral with low credit, liquidity and market risk. The KRX does not accept other collateral on an exceptional basis. The KRX mitigates possible specific wrong-way risk (DM regulation 89).
Key consideration 2 An FMI should establish prudent valuation practices and develop haircuts that are regularly tested and take into account stressed market conditions.	**Valuation practices** The KRX converts the prices of the foreign currencies into Korean currency on a daily basis based on the basic exchange rate of the same day or the previous day (in the case of US dollars). KRX has the discretion to limit the types of foreign currencies accepted, or change the valuation parameters. For foreign securities the KRX determines the basic market price of foreign securities by averaging the market prices for each issue that the global information and communication service provider provides consecutively in the recent five trading days. The KRX has the discretion to limit the types of foreign securities accepted, or change the valuation parameters. The KRX marks to market all collateral types on a daily basis, except bonds. Bonds are marked to market on a weekly basis as the KRX considers that price volatility of bonds is relatively small and bond prices are bought from external data providers. **Haircutting practices** The KRX sets haircuts, taking into account the credit and liquidity risk for the different asset classes: • 20–40 percent for listed stocks, including ETFs and DRs;

	• 5–20 percent for listed bonds; • 5 percent for foreign currency; • Treasury bills with maturity of 1 year or less: 8 percent; • Treasury notes with maturity of 10 years or less: 12 percent; and • Treasury bonds with maturity of 10 years or more: 16 percent. To validate whether haircuts are adequately set, the KRX monitors price volatility, market liquidity and other variables every day. In case where volatility increases continuously or market liquidity decreases abruptly, KRX may adjust haircuts in accordance with articles 92, 92–2 and 130 of the enforcement rules of the DM business regulation and double check the appropriateness of the adjustment through consultation with FSC. The KRX does not stress-test haircuts.
Key consideration 3 In order to reduce the need for pro-cyclical 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 KRX realizes that frequent adjustment of haircuts in accordance with market circumstances (decreasing haircuts when market stress is low and increasing when market stress is high) may bring about pro-cyclicality which amplifies market volatility. Therefore, the KRX sets haircut ratios in a conservative way, reflecting historical price volatility in stressful circumstances.
Key consideration 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.	The KRX accepts a range of different types of collateral including nine foreign currencies, listed stocks, bonds, exchange traded funds (ETFs) and depository receipts, to avoid concentrated holdings. The listed bonds comprise of government bonds (approximately 60 percent of the total deposited listed bonds) and corporate bonds (approximately 40 percent). There were no U.S. government securities deposited as collateral at the end of February 2013. Currently there is no provision on collateral concentration in KRX's regulations, but the KRX is planning to provide a function for monitoring the weight of each asset class in the next generation's clearing and settlement system (scheduled to be launched in February 2015), which will enable the KRX to identify collateral concentration and take countermeasures if needed.

Key consideration 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.	The KRX has amended its relevant regulations to designate U.S. government bonds as acceptable collateral as of March 18, 2013. For that purpose the KRX has opened foreign currency accounts at the KSD and an international bank, which acts as a custodian bank for U.S. government securities. To ensure access to cross-border collateral the KRX accepts US government securities that are regarded as risk-free assets among cross-border assets. For the certainty of claiming rights on US government securities and the convenience of disposal, the KRX has opened a link account at KSD so that the ownership is transferred to the KRX as a mortgaged property.
Key consideration 6 An FMI should use a collateral management system that is well-designed and operationally flexible.	**Collateral management system design** The KRX monitors the collateral that is posted to ensure that the collateral meets the applicable acceptance criteria. Code numbers of acceptable asset classes are registered in the clearing and settlement system and only registered assets can be deposited. So collaterals are automatically validated at the moment of deposit. Securities are deposited at the KSD and cash and foreign currencies are deposited in settlement banks. Systems of the KRX, KSD and settlement banks are linked to one another, so it's possible to pay, withdraw or replace collaterals upon members' demand and monitor the overall collateral status. There's no reuse of collateral. Member's collateral margin is available only for guaranteeing the repayment of debt to KRX in derivatives transactions, and the reuse of collateral for other purposes is strictly prohibited by law. Also, has the KRX holds a right of pledge on securities deposited at the KSD it is practically not possible to reuse collateral. **Operational flexibility** Upon request of a member, an immediate withdrawal or deposit of collateral is possible. The collateral management system accommodates changes in the ongoing monitoring and management of collateral. In case of changes in monitoring and management of collateral, the clearing and settlement department analyzes requirements for the change and specifies modifications for the system. Based on change requests from the clearing and settlement department, the IT department reviews technological implementation plan and adjusts the system.

	Staff of the clearing and settlement department performs actual payment, withdrawal and replacement of collateral. Operation and management of the system are conducted by IT experts in the IT management department. In order to secure the operational continuity in stress situations, the KRX established a BCP manual and executes BCP drills 3 times a year in accordance with the manual.
Key conclusions for Principle 5	The KRX has established clear policies regarding eligible collateral and has tools to set and enforce conservative haircuts. The KRX accepts a broad range of assets as collateral, including domestic and foreign cash, listed bonds, US government bonds and listed securities. In practice, the majority of collateral is deposited in government bonds. Collateral is marked to market on a daily basis, except for bond securities which are marked to market on a weekly basis. The collateral arrangements do not contain concentration limits.
Assessment of Principle 5	Broadly Observed
Recommendations and comments	It is recommended that the KRX addresses the following issues in a defined timeline. First, to avoid concentration of more risky assets such as securities, it is recommended that the KRX develops a concentration limit policy. In addition, the KRX should mark to market its bond collateral on a daily basis and implement stress tests to assess the adequacy of haircuts.

Principle 6: Margin A CCP should cover its exposure to its participants for all products through an effective margin system that is risk-based and regularly reviewed.	
Key consideration 1 A CCP should have a margin system that establishes margin levels commensurate with the risks and particular attributes of each product, portfolio, and market it serves.	**Description of margin methodology** The KRX does not calculate margins for the securities markets of KOSPI and KOSDAQ. For the DM the KRX calculates the margins by using the Composite Optimized Margin System (COMS) which determines margin requirements per individual risk management account, which includes individual customers. KRX's COMS margin system is a mixed pre-and post-margin system. The pre-margin is deposited only by customers. Customers with the exception of qualified institutional investors must deposit the customer margin with their clearing member before submitting an order. A trading member cannot submit the customers' order unless the required margins are deposited.

	The margin methodology is documented in the DM business regulations, in particular annex 18, and the guideline on margin management. **Credit exposures** In case of a participant's default, the KRX is responsible for taking over the payment obligations of the default participant and completing settlement as the CCP. The KRX may face replacement cost risk, which is the risk that the counterparty to a transaction will default before final settlement has occurred. The resulting exposure is the cost of replacing the original transaction at current market prices. Due to worsened market conditions the CCP may face replacement cost. The new price may differ from the original price, due to unfavorable market developments, causing a loss to the CCP. The KRX has identified the main determinants for credit risk, which are a participant's default and market volatility. Other determinants are the composition of positions and the correlation among positions. When the underlying assets within a product group show similar movements, credit exposures can be reduced according to the composition of positions, but credit exposures can also increase when correlations among positions rise steeply in stressful market conditions. The KRX manages credit risk by requesting its members to deposit margin, based on the size and composition of their positions (see key consideration 3). **Operational components** The clearing member has to deposit its own margin as well as its customers' margin at one of the six settlement banks for cash collateral or at the KSD for securities collateral. Customers' margin or pre-margin has to be deposited before the transaction can take place. Post-margin is deposited by clearing members and institutional investors at noon on T+1. In case of a delay in the margin deposit, the clearing and settlement department reports this to the market oversight division as a violation of KRX's regulations. The market oversight division can take disciplinary actions. In case where a participant has failed to deposit the margin amount, the KRX may declare a non-fulfillment of settlement, or default, and start the default procedures as described in article 107 of the DM business regulation.

Key consideration 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.	**Sources of price data** Margin calculations are based on the end of day price data provided by the KRX trading systems. In case the end of day price data is not available, the KRX calculates the theoretical prices in accordance with the relevant regulation (article 96 of the DM business regulation and the enforcement rules). In order to secure the continuity of operations in emergency situations, including the use of KRX systems as data source for margin calculations, the KRX has established a secondary IT site as a backup solution in a geographically remote area. Data is fully synchronized with the primary site. Bond prices are obtained from several external data providers. **Estimation of prices** If the end of the day closing prices of futures and options are not available the KRX will use the most recent prices. If these prices are not available the prices used for margin calculations will be based on the theoretical prices derived from the price of the nearest month contract. If prices of the nearest month are not available, the theoretical price will be determined using the same futures with expiration months further into the future. However, if these settlement prices are also not available, the theoretical settlement price of futures will be used. The calculation of the theoretical settlement price of futures is comprehensively described in the enforcement rules. The theoretical prices are calculated based on the equations that are proved theoretically by researchers and widely used in the financial market. In addition KRX uses an analysis based on historical price data (closing execution price, the value weighted average price and the theoretical price). The KRX has the discretion to deviate from these rules in case of abnormal trading or otherwise deemed necessary for the safe and efficient functioning of the market.
Key consideration 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	**Initial margin model** To determine the level of initial margin per account and per position the KRX constitutes portfolios by product group. A product group is composed of products with underlying assets that have comparable historical price movements, for example a stock index product group, a stock group, interest rate group, currency product group, and commodity product group.

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 sub-portfolio 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 destabilizing, procyclical changes.	The margin requirements are determined by applying virtual scenarios regarding potential price movements to the net position per product group to determine the largest potential loss per scenario using VAR. The KRX has determined 42 virtual scenarios based on potential price and volatility changes. The KRX calculates the estimated loss per scenario and regards the largest amount of estimate loss as the potential future exposure. Therefore, KRX collects the largest amount of estimated loss as margin. The margin amount is determined per product group based on the maximum net loss, calculated with a 99.7 confidence level and using a 2-day close-out period. The KRX upgraded its margin requirements in October 2010. Specifically, for the calculation of margins for options, the level of option volatility is now taken into consideration in addition to the changes in the prices of the underlying assets. As a result, the scenarios used for calculating volatility margins are now based on both price changes in the underlying assets and option volatility. **Closeout and sample periods** The liquidation period/close out period for all product groups is set at 2 days. The close-out period is based on an agreement between the KRX and its participants, rather than a quantitative analysis. The KRX does not diversify between more and less liquid products. During stressful market conditions, the close out period can be increased more than 2 days. To address a potential increased close-out period during stressful market conditions, KRX assumes a close-out period of more than 5 days in its historical stress test scenarios. To reduce the need for pro-cyclical adjustments the confidence level is set at 99.7 percent using price data from sample periods of 20, 60, 120, 250, 1000 days. To reflect both current volatility and past market volatility, KRX determines margin rates using both short-time periods (20, 60 days) and long-time periods (120, 250, 1,000 days). In case of a lack of data, for example for new products that don't have a volatility history, the KRX may use simulated data along with historical data. **Pro-cyclicality and specific wrong-way risk** As outlined in the guideline for the margin rate management, KRX is able to adjust margin rates conservatively in case of changing price volatilities in underlying assets and domestic and foreign market circumstances. Wrong way risk is addressed by KRX in accordance with article 89 of the DM business regulation.

	The KRX considers the trade-off between prompt liquidation and adverse price effects. In case of the liquidating of a defaulter's position, KRX discusses the method of quoting with the potential buyer of the position and requests that party to submit quotes bilaterally to protect the market from adverse price effects.
Key consideration 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.	**Variation margin model** Future positions following transactions on the DM are marked to market on a daily basis. The KRX collects variation margin at noon on T+1. Pursuant to articles 97 and 98 of the DM business regulation, KRX calculates the variation margin as the settlement difference for today's transaction prices and the settlement difference for the previous day's open interests. The settlement difference for today's trade is calculated by marking-to-market of today's trade, and the settlement difference for previous day's open interests is calculated by marking-to-market of previous day's open interests. The KRX calculates the amount of option premium margin on a daily basis. On component of the calculation is the mark to market of the open option positions to the closing execution price.
Key consideration 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 authorized to offer cross-margining, they must have appropriate safeguards and harmonized overall risk-management systems.	**Portfolio margining** The KRX identifies and measures its potential future exposure at the product and portfolio level. The margin calculation takes into account the correlation between products in a product group, which reduces the height of the margin requirements. The CCP allows for offsets or reductions in required margin across cleared products. After converting and standardizing the delta for the open interest within the same product group, margin reduction is determined by multiplying the quantity possible to offset by the margin per contract and price correlation coefficient. Regarding the portfolio level, after constituting portfolios by product group of which components have similar historical price movement, the KRX calculates the potential future exposure by subtracting the margin reduction amount from the sum of the largest amount of estimate loss per product. **Cross-margining** Currently, the KRX does not offer cross-margining since there is no link with another CCP.

	Robustness of methodologies The KRX constitutes portfolios by product group in taking account of correlations between products and monitors correlations continuously. In stressful market conditions, when price volatility may fluctuate strongly, there is a possibility that the margin amount cannot cover the realized loss. Therefore, the KRX is monitoring and measuring market volatility and may adjust the margin rates reflecting current market conditions if needed. Also the KRX conducts stress tests on a daily basis to measure credit exposures in stressful market conditions.
Key consideration 6 A CCP should analyze and monitor its model performance and overall margin coverage by conducting rigorous daily back testing – 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.	**Back testing and sensitivity analysis** The KRX plans to introduce daily back testing of its margin model in 2013. The objective is to enable the calculation of actual profits and losses of positions and analyze whether the margin model sufficiently covers the losses. The KRX does not conduct any sensitivity analysis, but is planning to do so starting August 2013, together with the introduction of margin model back testing. **Margin model performance** The margin adjustment council (comprised of executives and directors of the DM division) verifies the appropriateness of the margin rates. Following the approval of the FSC, the KRX discloses the margin rates to its participants.
Key consideration 7 A CCP should regularly review and validate its margin system.	The KRX reformed its margin system in October 2011 and is planning an overall validation of the margin model, which will result in the introduction of back testing in 2013. The DM business regulation will be amended to allow for intraday margin calculations to be introduced in 2014. Also the KRX is planning to review the introduction of give-up arrangements, omnibus accounts and cross-margining between the listed derivatives market and the OTC market in 2015. The clearing and settlement department will provide a proposal on the adjustment of current margin rates to the margin adjustment council.

Key conclusions for Principle 6	For the derivatives market the KRX covers its credit exposures to its clearing members through a margining system called COMS, which is based on internationally used margin models. The margin model is risk based and comprises both initial and variation margin. The initial margin is determined per product group based on the maximum net loss, calculated with a 99.7 confidence level and using a 2-day close-out period. The scenarios used for calculating volatility margins are based on both price changes in the underlying assets and option volatility. The KRX allows for offsets in a conservative way. Currently, the KRX does not have the operational capacity to make intraday margin calls. As recommended in principle 4 the KRX needs further improvements to its margin framework to comply with the PFMI, in particular in relation to back testing and sensitivity analysis and by obtaining an independent review and validation of its model on an annual basis.
Assessment of Principle 6	Broadly Observed
Recommendations and comments	A main recommendation is to continue with developing plans to introduce intraday margin arrangements. A CCP should have the authority and operational capacity to make intraday initial margin calls, both scheduled and unscheduled, to its participants. In addition, the close-out period of 2 days should be better substantiated for the individual products that are cleared by KRX. The appropriate close-out period may vary among products and markets depending upon the product's liquidity, price, and other characteristics. The CCP should also consider and address position concentrations, which can lengthen close-out timeframes and add to price volatility during close outs.

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 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 KRX's liquidity risk arises when clearing members, or other stakeholders, such as settlement banks and liquidity providers, cannot settle their payment obligations on due date. In terms of all relevant currencies, liquidity risk of KRW arises when cash payments in the securities market and the derivatives market are not settled by the deadline and liquidity risk of foreign currencies arises when final delivery of FX derivatives in the derivatives market is not settled by the deadline.

	If participants fail to fulfill their payment obligations, the KRX needs to ensure completion of settlement by using its own liquidity resources. Also the KRX may also face liquidity needs from its settlement banks and liquidity providers if they fail to perform as expected. Because cash payments in the securities market and the derivatives market are settled in KRW, and the final delivery of FX derivatives in the derivatives market is settled in foreign currencies (USD, JPY, EUR), the KRX may face liquidity risk in all these currencies. In order to estimate potential liquidity needs, the KRX monitors members' securities delivery and cash payments on a real-time basis. To finalize the settlement process even in case where a certain liquidity provider or a settlement bank fails to perform as expected, the KRX has opened lines of credit with various institutions (KSFC and three commercial banks with a credit ratio of at least 8 percent). For FX derivatives KRX has opened a FX credit line with the Korea Exchange Bank. To ensure the sufficiency of the amount of credit lines and other liquidity resources, the available credit lines and the use of liquidity resources are designated as management indicators in the enforcement rules of the risk management regulation, which means that information about the credit lines is included in the quarterly reporting of the clearing and settlement department to the risk management department. The risk management department analyzes the management indicators, reports its findings to the risk management committee, which verifies and approves the final result.
Key consideration 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.	On a daily basis, settlement obligations of members are calculated by a dedicated system and the KRX monitors on real-time basis the members' securities delivery and cash payments via its clearing and settlement system. If needed, the KRX supplies the liquidity (using the credit line) to ensure fulfillment of settlement obligation. The KRX calculates and notifies the settlement amount to participants automatically through the clearing and settlement system on a real-time basis. This system and the systems of settlement banks are connected by interfaces. So if a certain participant deposits its money to the KRX's bank account, the system of the settlement bank automatically notifies the clearing and settlement system, enabling KRX to monitor settlement and funding flows on a real-time basis.

Key consideration 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.	N/A
Key consideration 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	**Sufficient liquid resources** The KRX has sufficient liquid resources, which are in the form of credit lines, the settlement reserves and the joint compensation fund. The credit lines are all committed credit lines. The KRX determines the amount of liquid resources in KRW using both the largest historical aggregate payment obligation derived from historical stressful market conditions and the extreme value of payment obligation calculated by the extreme value theory[13] and GPD (generalized pare to distribution). In case of foreign currencies, the KRX does not determine the amount of liquid resources because the final delivery of FX derivatives occurs monthly and the payment amount in foreign currencies is low compared to the payment amount in KRW. The KRX can borrow foreign currencies quickly through the FX credit line at the Korea Exchange Bank if needed. The largest historical aggregate payment obligation as well as the payment obligation calculated by the extreme value theory were well below the available liquid resources. The KRX monitors and measures the largest aggregate payment obligation everyday and calculates the extreme value of payment

13 Extreme value theory is a kind of stress test dealing with the extreme deviations from the median of probability distributions. It is used to model the tails of another distribution using extreme values beyond a certain threshold value.

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.	obligation monthly. **Risk profile and systemic importance in multiple jurisdictions** N/A
Key consideration 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.	**Size and composition of qualifying liquid resources** In case of a sudden liquidity need the KRX will use its credit lines. The KRX has spread its credit line over various settlement banks, being the Korea Securities Finance Corporation (KSFC) and 3 commercial banks with a sufficiently high capital ratio. In addition the KRX has access to the cash collateral and securities collateral of the settlement reserve and joint compensation fund. The collateral is deposited at commercial banks that meet the deposit bank selection criteria. The deposited funds are invested in KTBs and MSBs. **Availability and coverage of qualifying liquid resources** In case of a participant's default, the KRX can access the credit lines and other financial resources on the same day.
Key consideration 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	**Size and composition of supplemental liquid resources** The KRX has no supplemental liquid resources. **Availability of supplemental liquid resources** The KRX has no supplemental liquid resources. The KRX does have access to the intraday credit facility of the BOK.

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.	
Key consideration 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.	**Use of liquidity providers** In order to secure the smooth operation of liquidity providing tools during stress events, the KRX uses criteria to select the financial institutions where its assets are deposited and monitors the performance of such financial institutions (article 3 of the enforcement rules of the regulation on asset management). The liquidity provider should have a capital amount of more than KRW 8.0 trillion, a capital ratio of at least 10 percent, and a delinquency rate of less than 4 percent. The KRX monitors the compliance of the liquidity providers with these criteria by checking the financial statement of each liquidity provider posted on the financial statistics website of the FSS (http://fisis.fss.or.kr). **Reliability of liquidity providers** The KSFC is a corporation owned by banks, securities companies, the KRX, KSD and others to help fund the development of the Korean capital Market. The credit rating of KSFC is AAA. The capital ratios of the depositing banks are relatively high. The maturity of the credit lines varies from 6 to 12 months. The KRX reviews the credibility of its liquidity providers near the expiration day of each credit line to decide whether to renew the liquidity arrangement or not.
Key consideration 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.	The KRX uses central bank money for the cash settlement of exchange-traded stocks and government bonds. For that purpose the KSD, not the KRX, maintains a central bank current account.

Key consideration 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.	**Stress test program** On a daily basis the KRX calculates the amount of liquidity it may need in emergency situations using the extreme value theory. On a monthly basis the KRX calculates the extreme value of a potential payment obligation based on the daily measurement of the largest aggregate payment obligation. On a quarterly basis the risk management department reviews the sufficiency of liquid resources, using input from the clearing and settlement department. **Stress test scenarios** The KRX determines the amount of liquid resources in KRW using both the largest historical aggregate payment obligation derived from historical extreme market situations and the extreme value of payment obligation calculated by the extreme value theory and GPD. **Review and validation** The KRX conducts annual mock tests using default scenarios to verify the adequacy of the liquidity management framework.
Key consideration 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	**Same day settlement** The guideline for the use of financial resources for settlement provides for rules and procedures to enable same-day settlement. In case liquidity is needed to enable the settlement of the cash leg KRX should first use the settlement reserve. In case liquidity is needed for the settlement of the cash leg the KRX should first use

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.	government bonds. For all other purposes the credit line should be used first. **Replenishment of liquidity resources** The guideline for the use of financial resources for settlement defines the replenishment process of financial resources and the responsibilities of surviving participants.
Key conclusions for Principle 7	The KRX does have an effective framework for the management of liquidity risks, consisting of a guideline for the use of financial resources for settlement and access to credit lines that are sufficiently large. The KRX is able to identify, measure and monitor its settlement and funding flows on an ongoing basis. The KRX stress tests its liquidity needs both daily and monthly and reports its findings on a quarterly basis to the risk management committee. KRX does not stress its liquidity needs for foreign currencies, as settlements in foreign currencies are low. If needed the KRX can draw on an FX credit line with one of its liquidity providers. The liquidity providers need to comply with specific criteria set out in the KRX rules. The KRX does not rely on central bank money; however, its largest liquidity provider has a public profile and a triple A credit rating.
Assessment of Principle 7	Observed
Recommendations and comments	It is recommended that the KRX implements stress testing exercises for foreign currencies in the normal course of its business.

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 1 An FMI's rules and procedures should clearly define the point at which settlement is final.	**Point of settlement finality** In the case of a settlement failure of a market participant, the KRX, as the CCP, guarantees the fulfillment of any settlement obligation. In case of a clearing member's bankruptcy measures taken by the CCP have priority over other claims based on the law and cannot be subject to cancelation, termination, revocation or claims on assets that are kept as margin, joint compensation fund or else under the KRX rules (Debt Rehabilitation and Bankruptcy Act articles 120 and 336).

	A transaction is final at the moment of settlement, which differs per type of instrument: • Stocks: settlements are conducted on a real time basis from 9 a.m. on the settlement day (T+2). • Government bonds: settlement is made on a real time basis from 9 a.m. on the settlement day (T+1). • Repo and other bonds: settlement is made on a real time basis from 3:00 p.m. on the trading day (T+0). In the event that a book-transfer entry for settlement securities has been made in the KSD securities settlement account and the member securities settlement account, neither the participant nor the KRX may request that such book-transfer entries be cancelled, also not in the case of a bankruptcy of one of the counterparty (KSD regulation article 14-2). Settlement of the cash leg of the securities transaction is conducted in the BOK-Wire+ system of the BOK. Finality is achieved in real-time and payments once settled in cash account of the BOK member. The settlement in the BOK-Wire+ is protected under article 120 of the Debtor Rehabilitation and the Bankruptcy Act and cannot be cancelled or revoked. The rules and regulations do not precisely specify the moment after which the transactions be revoked. For a derivatives transaction the moment of settlement finality is covered by DM business regulation article 103. A transaction is considered final at the moment that the KRX has determined the net obligations of its clearing members.
Key consideration 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.	**Final settlement on the value date** The KRX guarantees the transaction as soon as the transaction details are verified. Novation is followed by the netting of transactions. For stocks and bonds settlement is final on an intraday basis after settlement on T+0, T+1 or T+2. For exchange-traded derivatives a transaction is final at the moment that the KRX has determined the net obligations of its clearing members on T.
Key consideration 3 An FMI should clearly define the point after which unsettled payments, transfer instructions, or	As a rule, in the event that a book-transfer entry for settlement securities is conducted in the KSD securities settlement account, the member nor the KRX may request that such book-transfer entries be cancelled (article 14-2 of the KSD settlement regulation).

other obligations may not be revoked by a participant.	Only when a member temporarily needs to block the book-entry due to extraordinary situations the member may ask the KRX for restriction on delivery. This is an exception case and the member has to report the applicable securities, reasons for suspension, applicable time period, and other relevant information to the KSD. Examples of extraordinary situations are a settlement impasse, which is a temporary settlement deadlock caused by OTC settlement positions related to KRX settlement positions.
Key conclusions for Principle 8	Securities settlements are final as soon as the settlement account has been debited or credited, which occurs real time during the settlement day. Derivatives transactions are final as soon as KRX has determined the net obligation per clearing member, following a transaction. The Debt Rehabilitation and Bankruptcy Act protects the KRX against any insolvency proceedings following the bankruptcy of a clearing member.
Assessment of Principle 8	Observed
Recommendations and comments	The KRX can improve its DM regulations to specify the point after which member's obligations may not be revoked by a clearing member. The KRX may do so in the normal course of its business.

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 1 An FMI should conduct its money settlements in central bank money, where practical and available, to avoid credit and liquidity risks.	The cash leg of transactions in stocks, government securities and repos are settled in central bank money, i.e. the BOK-WIRE+ system. Retail transactions in bonds are settled in commercial bank money. Cash payments following derivative transactions are also settled in commercial bank money, including the delivery of foreign currencies following transactions in FX derivatives. Cash deposits of collateral are also conducted in commercial bank money. The main reason for not using central bank money is that not all clearing members have access to the BOK-WIRE+ system. For retail bonds central bank money is not provided, because the settlement risk of this market is considered low, its market size is small and settlement takes place on the same day as the transaction date (T+0). For derivatives commercial bank money is considered more convenient. The KRX uses commercial banks (Shinhan bank, Woori bank, Nonghyup bank, Korea exchange bank) for the cash settlement of transactions.

	Government bonds are settled on T+1 central bank money. The KRX has improved the settlement procedures by providing intraday liquidity through repos since February 2012. This stimulates financial institutions to settle their transactions processed through the BOK-Wire+ earlier during the day. The intraday repo scheme, combined with the earlier start of the daily settlement window (3 p.m. → 9 a.m.) has contributed to a more timely completion of settlements.
Key consideration 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.	The KRX only uses commercial banks for settlement and custody services that have a capital ratio of at least 8 percent. All settlement banks that KRX uses for the retail bonds and derivatives market comply with that requirement. In case of the retail bond market and the derivatives market the capital ratios of the settlement banks comply with that requirement. The KRX indirectly controls and monitors settlement banks using the FSS reporting on capital ratios on a monthly basis. The KRX cancels a contract (terminates the designation as a settlement bank) with a settlement bank if: • The capital adequacy ratio falls below 8 percent; and • The FSC has recommended the management improvement or requested the management improvement or ordered the management improvement or taken an emergency measure. Settlement bank designations in the DM market, which previously could only be revoked if a bank's capital ratio had fallen below 8 percent, can now also be revoked if a bank receives a disciplinary sanction in the form of a management improvement recommendation or restrictions placed on its lending and deposit-taking activities by the FSC.
Key consideration 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, capitalization, access to liquidity, and operational reliability. An FMI should also monitor and manage the	The KRX has established the selection criteria for settlement banks, which are stipulated in its regulations (article 75.2 of the KOSPI regulation, article 101–2 of the KOSPI regulation enforcement rules and article 104 of the DM business regulations and article 111 of the DM business regulation enforcement rules). DM business regulations article 104–2 requires that the KRX shall monitor and manage the risks related to settlement. In addition, the clearing member has a requirement to notify the KRX of any settlement difficulties. In practice the clearing and settlement department monitors on a monthly basis the credit rating of the settlement banks and reports these to the risk management departments.

concentration of credit and liquidity exposures to its commercial settlement banks.	In case of serious malfunctioning of a settlement bank the KRX has contingency plans for transferring settlement payments to another settlement bank which functions well or to BOK WIRE+.
Key consideration 4 If an FMI conducts money settlements on its own books, it should minimize and strictly control its credit and liquidity risks.	N/A
Key consideration 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.	The KRX's legal agreements with its settlement banks state that when transfers occur, that transfers are final when effected, and that funds received are transferable. Settlement finality is legally secured by article 14-2 of the KSD regulation on settlement service for securities. Received funds are transferable intraday in real time.
Key conclusions for Principle 9	The KRX conducts its money settlements for the securities market in central bank money, except for retail bonds, which are settled on T+0 in commercial bank money. Money settlements in the derivatives market are settled in commercial bank money because the majority clearing members active in derivatives trading do not have direct access the BOK-Wire+. The KRX makes use of six commercial banks to settle cash following derivatives transactions. The KRX has a limited set of criteria to select its settlement banks. Banks should be regulated and supervised and have a capital ratio of 8 percent. The KRX does not impose additional requirements, such as creditworthiness, access to liquidity and operational reliability. It monitors compliance with these criteria on a monthly basis. The contracts between the KRX and its settlement banks do not contain an expiration date.
Assessment of Principle 9	Observed
Recommendations and comments	As long as the KRX makes use of commercial bank money it should increase its requirements for settlement banks and monitor compliance with these requirements regularly. It may also consider including an expiration date in its contracts with the settlement banks to provide incentives to the settlement banks to continue to provide adequate services and reduce risks.

	The KRX is encouraged to further investigate ways to replace commercial bank money arrangements by central bank money arrangements and to limit its exposures towards its settlement banks, i.e. by using central bank money for the settlement of derivatives payments.

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.	
Key consideration 1 An FMI's rules should clearly state its obligations with respect to the delivery of physical instruments or commodities.	Gold derivatives are eligible for physical delivery. The KRX guarantees the delivery of gold to the buying clearing members and the payment of cash to the selling clearing member. The settlement and delivery of foreign currency is identical to the settlement and delivery of other derivatives settled in cash. The DM business regulations and enforcement rules specify processes, procedures and controls to monitor and manage physical delivery risks (DM business regulations article 61–2 and articles 33–45 of the related enforcement rules). Annex 18 of the enforcement rules specifies the calculation of physical delivery margin, which should cover any losses that the KRX may suffer in its role as CCP. The regulations further specify that gold is delivered in bars of 1,000 gram with the purity level higher than 99.99 percent, on which the name of refinery or brand name, weight, purity and manufacturer's serial number are engraved. On the last trading day the buying and selling clearing members shall inform the KRX of the transaction details, within thirty minutes after the closing of the market on the last trading day. This enables the KRX to calculate the final settlement payments. The sellers should inform the KRX on whether the gold bar is imported or not, and whether it is tariff-free or not. Buyers should inform the KRX on whether the receiver is a person eligible for the exemption from the taxation. The KRX notifies the clearing members and warehouse operators of the final settlement quantity of gold futures traded per offer and bid for each derivatives account, as well as other details of delivery and receipt. The KRX nets the quantities and allots the physical delivery quantities to the delivering and receiving clearing members. The receiving clearing member shall deliver the specified payment to the KRX. The delivering clearing member deposits the gold bars at the account of the KRX at the designated warehouse, which is currently the KSD. On its turn the KRX conducts the payments to the clearing

	members who delivered the gold bars and the gold bars to the clearing members that exercised their options or that held futures. When the gold bar has been deposited to the KRX account the warehouse operator shall notify the KRX of the details of deposition, including the name of refinery and brand name of gold bar deposited. The gold bar will only be delivered to the receiving clearing member after approval of the KRX.
Key consideration 2 An FMI should identify, monitor, and manage the risks and costs associated with the storage and delivery of physical instruments or commodities.	The KRX acts as CCP in the delivery process and is as such exposed to the default of one of the counterparties during the delivery process. To cover potential losses KRX collects physical delivery margin in addition to the initial and variation margin related to the transactions on the DM market, see Annex 18 of the DM regulation enforcement rules. In addition, KRX checks the existence of member's gold account before it is allowed to participate in the gold market. The main risk that the KRX has identified regarding storage and delivery of the gold bars is the risk of destruction or damage of the bar. Article 37 of the DM regulation enforcement rules specifies that the KRX is protected against any loss or expenses related to such damage. Either the clearing member or the warehouse operator (i.e. the KSD) can be held responsible.
Key conclusions for Principle 10	The DM business regulations and enforcement rules specify processes, procedures and controls to monitor and manage the delivery process and associated risks related to the physical delivery of gold derivatives. The KRX requests the deposit of physical delivery margin to cover potential losses in case one of the counterparties is not able to fulfill its obligations in the delivery process. In addition, rules and procedures are in place to protect KRX against any losses related to the damage of gold bars.
Assessment of Principle 10	Observed
Recommendations and comments	The DM rules and regulations can be improved by more explicitly specifying the KRX's role as CCP in the delivery process.

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.	
Key consideration 1 A CSD should have appropriate rules, procedures, and controls,	**Safeguarding the rights of securities issuers and holders** N/A

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.	**Prevention of the unauthorized creation or deletion of securities** N/A **Periodic reconciliation of securities issues** N/A
Key consideration 2 A CSD should prohibit overdrafts and debit balances in securities accounts.	N/A
Key consideration 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.	N/A
Key consideration 4 A CSD should protect assets against custody risk through appropriate rules and procedures consistent with its legal framework.	N/A
Key consideration 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.	N/A

Key consideration 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.	N/A
Key conclusions for Principle 11	N/A
Assessment of Principle 11	N/A
Recommendations and comments	-

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 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 when finality occurs.	The KRX has established different DVP arrangements for different markets: • Exchange traded securities; and • Transactions conducted on the KOSPI and KOSDAQ markets are settled on T+2 according to a DVP model 3 arrangement. Securities and cash are exchanged using an account of the KSD as intermediary account, ensuring the conditionality between the final settlement of one obligation upon the final settlement of the other (KOSPI, article 75.2). • Exchange traded corporate bonds. The KRX is eliminating principal risk in the corporate bond market (corporate bonds, fractional bonds and retail bonds) by applying a DVP model 3 arrangement that nets securities per member and per ISIN and nets cash per member, with settlement on T+0. • Exchange traded government securities. • In the Korean treasury securities market, KRX mitigates principal risk through a DVP 3 arrangement, netting both securities and cash per member and per issue, with settlement on T+1. The KRX nets on a bilateral basis to avoid large settlement amounts.

	• OTC traded stocks by institutional investors. • For transactions between brokers and institutional investors the KSD applies a DVP model 2 arrangement with settlement on T+2. Securities are settled intraday (during the cycle) and cash payments are netted and executed at the end of the day. • OTC traded stocks. The KSD applies a DVP model 3 arrangement with settlement on T+2. • OTC traded bonds. The KSD applies a DVP model 1 arrangement, with settlement on T+1. • Derivatives market. In the DM upon expiration (for futures) and the exercise of rights (for options) the settlement members deliver the net settlement cash and net settlement underlying asset to the KRX. It is stipulated in the settlement business regulation of the KSD that settlement of an obligation can be made only if all the other linked obligations are settled (articles 18, 19, 19–8, 19–9, 22–5, 22-6 of the KSD settlement business regulation). The finality of the final settlement of the obligation has a legally bound enforceability under the FSCMA and KSD's settlement business regulations.
Key conclusions for Principle 12	The KRX eliminates principle risk by applying DVP arrangements for the settlement of the different products that it clears. The arrangements ensure final settlement with conditional final settlement of one obligation upon the final settlement of the other. Different DVP models are used to ensure efficiency and accommodate the needs of different markets and different market participants.
Assessment of Principle 12	Observed
Recommendations and comments	-

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 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.	**Participant default rules and procedures** Default rules are described in the FSCMA and the KOSPI, KOSDAQ and DM business regulations at a high level. Further details are described in the KRX guidelines. In addition, the KRX has developed a default management manual that describes the practical steps to be taken by the KRX and its stakeholders in the event of a default. The FSCMA stipulates the use of member's collateral such as member margin, joint compensation fund, and the settlement reserve in case of a member's default (articles 394 and 395 of the FSCMA). Measures to be taken in the event of default of a securities market member are stated in the KOSPI market business regulation (article 76). The measures to be taken in the event of default of derivatives market member (both trading member and settlement member) are specified in DM business regulation (articles 107 and 108). Considerations for determination of default are mentioned in the enforcement rules of the KOSPI market business regulation (article 101-3) and the enforcement rules of the DM business regulation (article 111-2). The risk management waterfall is defined in relevant regulations and guidelines of the KRX (articles 5 and 397 of the guideline for use of financial resources for settlement, article 10 of the guideline for management of default fund, article 25 of the membership regulation, article 5 of the guideline for management of settlement reserve). The KRX declared the default of the Lehman Brothers Securities Seoul branch in September 2008, in accordance with the business suspension order imposed by the FSC. For securities transactions, KRX issued the securities delivery bill against undelivered securities and upon realizing that a few securities couldn't be settled, purchased such securities to complete settlement. For derivatives transactions, the KRX granted Lehman a grace period for the voluntary close-out of open interests. The KRX liquidated the remaining position by offsetting transactions with help of surviving clearing members.

	Use of financial resources The KRX can use dedicated financial resources in case of a clearing member's default: (a) Financial resources of defaulting member (margin, joint compensation fund). (b) Joint compensation fund of the non-defaulting members (c) Settlement reserve, which comprises part of the own capital of the KRX. The KRX is adjusting the order of financial commitments and reviewing the revision of applicable laws and regulations in order to comply with recommendations of PFMI, i.e. that the CCP's capital should be used before the joint compensation fund of the non-defaulting clearing members (skin in the game).
Key consideration 2 An FMI should be well prepared to implement its default rules and procedures, including any appropriate discretionary procedures provided for in its rules.	The KRX has developed the "clearing and settlement manual for the securities market and the derivatives market", which specifies procedures and action to be taken following a clearing member's default. The manual specifies roles, responsibilities, and timelines. At the time of the member's default, the order of actions to be taken by the KRX and others are: • Determination of the necessary actions to manage the default, including internal and external announcements; • Constitution of a crisis task force; • Taking actions on the defaulting member: suspension of all or part of its trading activities, blocking of cash payments, securities, and underlying assets; • Taking follow-up actions such as exercise collateral rights; and • Reporting to the management and the board of the KRX and to the supervisory authorities FSS and FSC. The head of the clearing and settlement department of the KRX determines a default and reports the details to the CEO. In accordance with the plan, the head of the clearing and settlement department takes decisions on the participant default, decides on the commitment of resources, configures the countermeasure team, takes market actions on defaulting members, conducts the resolution of default, and writes the report of results. The KRX

	management is involved in key decisions and monitors the activities of the clearing and settlement department. The KRX has established a comprehensive emergency contact list (with office phone numbers, cell phone numbers, email addresses, and other available means of communication) with all stakeholders, such as regulators, members, linked FMIs and banks. The objective is to allow for immediate communication with relevant stakeholders in case of a crisis. The KRX conducts default drills once a year, and updates the default manual with lessons learned from the drills. The clearing and settlement department, which is in charge of the drill, reports the drill results to the KRX management and ultimately to the board.
Key consideration 3 An FMI should publicly disclose key aspects of its default rules and procedures.	The rules and regulations dealing with default of a market participant, including the procedures are made public via the internet homepage of KRX. Not all guidelines are disclosed in English, e.g., the guideline for use of financial resources for settlement, the guideline for management of default fund, and the guideline for management of settlement reserve.
Key consideration 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.	The KRX conducts the drills together with participants, such as the settlement banks, liquidity providers and the BOK. In addition, the KRX involves the staff of two clearing members of which a default is simulated. The drill checks the readiness of these stakeholders of managing a default in their own specific roles, such as settling transactions, providing liquidity and liquidating the positions of the defaulters.
Key conclusions for Principle 13	The KRX has developed default rules and procedures to manage a participant's default. The KRX has appropriate discretionary power to implement these rules. The rules do include the necessary actions to be taken by the KRX, potential changes to normal settlement practices, the treatment of proprietary and customer transactions and accounts and the existence of other mechanisms that may be activated, such as an auction. The default manual is tested on a yearly basis. Key stakeholders are involved in the testing.
Assessment of Principle 13	Observed
Recommendations and comments	Although the KRX rules and regulations provide the legal basis for the management of a default, some key aspects could be

	articulated in a more extensive way, such as (a) the actions that an FMI can take when a default is declared; (b) the extent to which such actions are automatic or discretionary; (c) potential changes to the normal settlement practices, should these changes be necessary in extreme circumstances, to ensure timely settlement; (d) the management of transactions at different stages of processing; (e) the expected treatment of proprietary and customer transactions and accounts; (f) the probable sequencing of actions; (g) the roles, obligations, and responsibilities of the various parties, including non-defaulting participants; and (h) the existence of other mechanisms that may be activated to contain the impact of a default. The internal plan should be reviewed by management and the relevant board committees at least annually or after any significant changes to the FMI's arrangements.

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 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.	**Customer protection from participant default** A customer's positions as well as its collateral accounts are protected from the default of a clearing member through the segregation of accounts: • The positions of a customer are held in individual accounts in the books of its clearing member. • On its turn the KRX holds the positions of the customers separately from the positions of the clearing members. • Customers' securities collateral is kept in the books of the KSD. The KSD separates the assets of its members from the customers' assets by maintaining individual accounts for every customer. • Customers' cash collateral is held in the books of settlement banks on an account of the KRX. The KRX holds the customers' cash collateral at an (omnibus) account, which is segregated from its own account for its proprietary assets. Also, for every order the participant is required to specify whether the order is on behalf of a customer or for its own proprietary trading.

	Customer protection from participant and fellow customer Default At the level of the clearing member the account structure for both the securities markets and the DM consists of separate accounts for participants and individual customers. **Legal basis** The legal framework supports the segregation of accounts and contains specific provisions specifying that customers' assets are protected against the default of a participant or a fellow customer. The FSCMA and KRX's regulations require that trading and clearing members maintain separate accounts for individual clients and its proprietary accounts (FSCMA articles 74 and 75, KOSPI regulation article 9, DM business regulation articles 65 and 88-5). In the case of the securities market, investment traders or investment brokers should deposit or trust investors' deposits separately (including cash deposits received in connection with the transactions and sale of financial investments products) from their proprietary assets under the FSCMA article 74. Investment traders or investment brokers cannot seize or offset investors' deposit. Investors' deposits which are deposited or trusted to the KSD cannot be used as collateral or be transferred. In addition, investors' deposits which are deposited or trusted to the depository institution should be paid to investors first even if depository institution is dissolved or bankrupt. In the case of securities deposits of investors, in accordance with FSCMA article 61, investment traders or investment brokers should deposit their own securities to KSD without delay. And, investment traders or investment brokers should deposit investor-owned securities to KSD under FSCMA article 75. In addition, the KRX mandates its members to separate orders for proprietary trading and those for brokerage trading in the bidding process under the KOSPI regulation article 9. DM business regulation article 139 specifies: Members are prohibited to use the cash, substitute securities, foreign currency or foreign securities that the customer has deposited for the purposes other than the settlement and deposit of member margin/clearing-member margin, which are related to the trades of the concerned customer, or the purposes specified by the FSC.

Key consideration 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.	The current account structure enables clearing members, the KRX and the KSD to quickly identify positions and collateral of customers. The KRX itself does not directly monitor the individual positions of the customers of its clearing members as this is not allowed by law, i.e. the Act on Real Name Financial Transactions and Guarantee of Secrecy. However, the KRX can access individual customer account information for specific purposes, such as market surveillance, subject to a prior approval of FSC. Also, KRX can summon the defaulting clearing member to transfer the positions and collateral of its customers to another clearing member. As an alternative the KRX can summon another clearing member to take the positions and collateral of the defaulter's customers in its books.
Key consideration 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.	The KRX has portability arrangements in place for the securities and derivative accounts of customers (membership regulation article 14). In case of the default of a participant its customers may select a new participant to whom its positions and collateral accounts will be transferred (article 109 of the DM business regulation and article 113 of the enforcement rules for DM business regulation): In case transfer of collateral and positions to the preferred participant is difficult the KRX has the discretion to designate another participant to take over the position. Before transferring the open interest the customer and its new clearing member shall conclude a legal agreement covering the opening of a derivatives account. The role of the KRX is to intermediate between the customer and its new clearing member. The legal agreement between the customer and its new clearing member has to be submitted to the KRX, which will ensure that the contract contains all pre-specified requirements. As soon as the transfer of the position is executed the customer shall ensure that the collateral representing the member margin will be deposited with its new clearing member. The KRX conducts the transfer of open interests and positions between accounts from 8 p.m. to 9 p.m. after receiving request from members between 3.45 p.m. and 5 p.m.. The KRX also conducts real-time monitoring of positions, and lets members transfer collaterals in conjunction with position transfer.
Key consideration 4	The relevant regulations and procedures are disclosed to participants, customers and the public via internet homepage of

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 KRX and information brochures. The act on real name financial transactions and guarantee of secrecy, which does not allow the KRX to directly monitor customers' positions, is also publicly available.
Key conclusions for Principle 14	Segregation and portability arrangements are in place for the securities and derivatives market. The account structures of the KRX, KSD, settlement banks and clearing members segregate the clearing member's proprietary assets from its customer assets. The segregation and portability arrangements are supported by the legal framework. The relevant laws and regulations are publicly disclosed. Although the KRX is not able to monitor individual client positions during normal business is has the power to ensure the timely transfer of customer accounts from the failing participant to another participant in times of crisis.
Assessment of Principle 14	Observed
Recommendations and comments	The CCP may extend its provisions on portability arrangements for the securities market and use similar rules for the securities market as are currently available for the derivatives market.

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 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.	*Risk management framework* General business risk is one of the risks identified by the KRX. It is therefore included in the company wide risk management framework and is subject to risk limits set by the risk management committee. Each business department is responsible for the identification, monitoring and management of risks related to its own specific business operations. Each business department should report its risk status to the risk management department on a quarterly basis. The risk management department reports a

	comprehensive analysis of enterprise-wide risks to the risk management committee. *KRX's definition of general business risk* The KRX defines general business risks as (1) acquisition/disposition of real estate worth of KRW 10 billion or more, (2) investment/disposition of an amount of KRW 5 billion or more or 30 percent of other entity, (3) investment in a new business with a value of KRW 5 billion or more. In addition, the risks of losses occurring during normal business operations are included in the company wide risk management framework. *New business* General business risk management also entails the management of risks coming from new business plans. Each business division has to submit it plans and proposals for the introduction of new businesses to the risk management committee. The risk management department analyzes the particular risks related to the proposed business and its impact on the financial status of the KRX. The risk management department analyzes business feasibility (financial and non-financial), risk factors, contingency plans of material business decisions and sets risk limits (or permitted level of risk), if necessary. The risk management department reports the results of the analysis to the risk management committee. Based on the analysis the risk management committee conducts the final examination on the proposed business and determines the permissible range of risk. *Capital* Beside the above-stated risk limits, the KRX maintains an appropriate level of liquid assets in accordance with advices of an external professional organization. Financial data is automatically collected on a real time basis. The KRX is subject to external audits on a semiannual and annual basis. In addition, the KRX calculates the adequate capital taking account of clearing and settlement risks measured by stress tests and mid-and long-term financial strategies inclusive of new business plans. The risk management committee has to approve the size of the adequate capital.

Key consideration 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 achieving a recovery or orderly wind-down, as appropriate, of its critical operations and services if such action is taken.	The KRX annual report of 2011 contains the asset statements, detailing the assets and liabilities of the KRX. It shows that the KRX held KRW 2.13 trillion of capital at the end of 2011. Capital was invested in KRW 364 billion of cashable assets including cash and short-term financial products and KRW 893 billion worth of liquid securities. Relevant financial data for end of 2012: • Capital: KRW 2.19 trillion; • Cashable assets including cash and short-term financial products: 518 billion; and • Liquid securities: KRW 730 billion. The KRX holds adequate liquidity (KRW 40 billion) necessary for stable operation of the KRX. The amount was determined, based on calculations and recommendations of an external professional evaluator (Zeroin).
Key consideration 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** The KRX has no plans for recovery and orderly wind-down. **Resources** At the end of 2012, the KRX held liquid net assets with a value of KRW 431 billion (liquid assets: KRW 519 billion, liquid liabilities: KRW 59 billion) which is substantially more than the estimated six months of current operating expenses. Operating estimated expenses for 6 months of operations are KRW 137.5, comprising personnel expenses of KRW 42.9 billion and other expenses of KRW 94.5 billion (based on 2012 data). The KRX does not need to comply with international risk-based capital standards as KRX is not licensed as a bank.
Key consideration 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	Liquid assets of the KRX are composed of cash, cashable assets and short-term financial products, which enables the KRX to liquidate its assets without loss when necessary.

expenses under a range of scenarios, including in adverse market conditions.	
Key consideration 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.	On an annual basis the KRX prepares plans to raise additional capital if needed for the implementation of its mid- and long-term business plans. The board of directors is responsible for decisions related to the KRX business plans, budget, and financial matters such as issuance of new stocks.
Key conclusions for Principle 15	The KRX has a system in place to identify potential general business risks, which includes risks related to the introduction of new products and services. The KRX holds sufficient liquid net assets funded by equity so that it can continue operations and services as a going concern if it incurs general business losses. However, as the KRX does not have a plan for recovery or orderly wind-down, no explicit link is drawn by the KRX between the size of its liquid net assets and the length of time required to maintain its critical operations and services. Assets held to cover general business risk are of sufficient quality and liquidity. The KRX can raise additional equity if needed.
Assessment of Principle 15	Observed
Recommendations and comments	The potential recovery plan of the KRX should link the size of its liquid net assets and the length of time requirement to maintain its critical operations and services. It should also contain a reassessment of the size of the settlement reserves.

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 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.	Collateral deposited with the KRX is held at different entities: • Domestic or foreign cash is transferred by the clearing member to the account of the KRX at one of its settlement banks. • In the case of domestic securities the KRX obtains the right of pledge with regard to these securities. The securities are held at the member's account in the KSD.

	• In the case of foreign securities the member deposits the securities on at the account of the KSD at Citi Bank. The securities will be pledged to the KRX. In accordance to the FSCMA and internal regulations, the KSD segregates its own assets and its participants' proprietary assets and their customers' assets. The holdings of participants and their customers are managed separately in KRX' participant account book, which is a legal ledger. Participants are obliged to manage their own securities separately from their customers'. Participants must keep records of their customers' assets in the investor account book, which is a legal ledger. In the securities market, the settlement bank for foreign securities is selected by the KSD after a prior consultation with the KRX, pursuant to article 75–2 of the KOSPI business regulation. This settlement bank should be a commercial bank with a capital ratio of at least 8 percent. For the maintenance of cash collateral for the securities and derivatives markets, the KRX selects settlement banks among commercial banks with the equity capital ratio above 8 percent. These settlement banks are selected to act simultaneously as a custodian, for keeping cash collateral accounts, as well as a settlement banks, for the settlement of the cash leg of derivatives transactions. The KRX has concluded a contract with every individual settlement bank. The KSD is a signatory of the contract as well. The contract has no termination date and can only be terminated by the KRX when the settlement bank no longer complies with the capital ratio requirement or if the FSC takes regulatory measures against the settlement bank.
Key consideration 2 An FMI should have prompt access to its assets and the assets provided by participants, when required.	The KRX can access its own assets and participants' assets if needed within a day. This is tested during the annual default management drill as explained in principle 13. The custodian banks also participate in the annual operational BCP tests, where the reliability of the operational links is tested as well as the technical functionalities of the clearing and settlement systems. Custody risks are spread as assets are distributed over the different custodians. In case of liquidity problems the KRX may use its credit lines (which are secured for KRW 1 trillion and unsecured for KRW 2.5 trillion).

	The KRX monitors the capital ratio of its settlement banks, alias custodians, on a monthly basis.
Key consideration 3 An FMI should evaluate and understand its exposures to its custodian banks, taking into account the full scope of its relationships with each.	The KRX monitors the concentration of cash and foreign currencies deposited at custodian banks on a daily basis and take measures in case of concentration of cash deposits at a particular bank. The KRX monitors the deposit ratio per custodian to prevent a certain settlement bank from exceeding 60 percent of the total deposits. In case of exceeding the threshold, the KRX transfers a part of deposits in such bank to another settlement bank, thus adjusting deposit percentage per bank. Also, the KRX documented the management procedure of settlement banks in 2011 to prevent concentration of deposit in a specific settlement bank. Accordingly, the KRX monitors and manages collateral deposit weight of each settlement bank not to exceed 60 percent of the total deposit.
Key consideration 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 strategy** The KRX has developed the fund management regulation for proprietary assets and the guideline for asset management for the assets of clearing members and their customers. Assets can only be invested in safe and liquid assets as described in the fund management regulation, the settlement reserve management regulation and the guideline for the management of the default fund. The KRX discloses its investment strategies and resource holdings to the public by publishing the 'KRX clearing and settlement report' annually. The report is not available in English. **Risk characteristics of investments** The risk profile of the investments is low. The fund management regulation specifies that investments in shares are prohibited. The joint compensation fund and the settlement reserve may only be deposited at settlement banks that comply with the selection criteria and invested in government bonds and monetary stabilization bonds. A gain or loss incurred from the member margin deposited with the cash or foreign currency shall be taken into account in the calculation of the margin, both for the own positions of the clearing members as well as for its clients' assets.

Key conclusions for Principle 16	The KRX holds its own and its participants' assets at supervised and regulated entities. KRX selection criteria for custodians and monitoring systems do not ensure that these entities have robust accounting practices, safekeeping procedures, and internal controls that fully protect the assets in custody. The KRX monitors the concentration of its credit and liquidity credit in relation to its custodians. The maximum allowed concentration of settlement flows is set at 60 percent. KRX does not perform tests to determine whether it is able to manage losses following the default of the custodian to which it has the largest exposure. KRX's investment strategy allows only investments in cash, government bonds and monetary stabilization bonds, which supports timely liquidation. The investment strategy is not publicly available in English.
Assessment of Principle 16	Broadly Observed
Recommendations and comments	Selection criteria for custodians of the KRX should ensure that these banks have robust accounting practices, safekeeping procedures, and internal controls that fully protect the assets of KRX and its participants. The KRX should ensure that the foreign collateral held in custody by the foreign bank is protected against claims of the custodian's creditors. The KRX should ensure that the custodian banks have a strong financial position to be able to sustain losses from operational problems or non-custodial activities. The KRX should reconsider the 60 percent cap on the value of assets held by one custodian based on an analysis of its ability to withstand the default of a custodian holding 60 percent of assets. The KRX should also disclose its investment policy in English.

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 fulfillment of the FMI's obligations, including in the event of a wide-scale or major disruption.	
Key consideration 1 An FMI should establish a robust operational risk-management	Clearing systems of KOSPI, KOSDAQ and DM markets were automated in year 1998, year 1996 and year 1999, respectively. Separate clearing systems had been maintained even after the

framework with appropriate systems, policies, procedures, and controls to identify, monitor, and manage operational risks.	incorporation of the KRX through consolidation in year 2005 until the establishment of an integrated clearing system (EXTURE-Clearing) in February 2009. The KRX is not outsourcing operational activities or major businesses to third parties. KRX's framework to identify, monitor and manage operational risk consists of: • Companywide policies and procedures; • Operational risk management system; • Governance (see key consideration 2); and • Contingency plans (see key consideration 6). *Companywide policies and procedures* Early 2013 the KRX introduced the operational risk management regulation to reinforce existing risk management regulation in particular regarding operational risks. The regulation requires that each business division is required to appoint a risk manager. Operational risk is one of the risks identified by the KRX. It is therefore included in the company wide risk management framework and is subject to risk limits set by the risk management committee. Every division of the KRX conducts regular RCSA and determines KRI. The RCSAs and KRIs are reported to the risk management department and the risk management committee. The risk management committee discusses the reports and provides the individual business divisions with recommendations or instructions to improve their risk management. The KRX classifies its operational risk into the following components: • Risks related to business operations; • IT risks; • Legal risks; and • Reputational risks. The KRX defines limits for operational on an annual basis.

	The KRX has internal rules in respect of system management such as the Regulation on Management of IT Business, the Information Protection Regulation and the Enforcement Rule of the Information Protection Regulation and makes policies on system operation and manages system operation risks in accordance with the Regulation on Supervision of Electronic Finance of the FSS. *Operational risk management system* Early 2013 the KRX has introduced the operational risk management system to be able to manage operational risk information in an automated way. The KRX organizes training courses/workshops on methodologies of risk management for its employees periodically. Regarding change management material business decisions are subject to deliberation of the risk management committee and if necessary, the committee makes decisions on additional allocation of capital, suggests recommendation for improvements or refuses the business plan itself. Through such process, the KRX analyzes possible negative impacts caused by change in on-going business and new major business, and mitigates identified risks.
Key consideration 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.	The risk management committee allocates capital on risks, measures and sets a limit per risk type through annual/semiannual risk management plans and determines the method for risk management per risk type. The risk management committee develops major policies for the management of operational risk, determines limits to operational risks (operation, IT, legal and reputational risks) and regularly verifies the operation of risk management systems. The risk management committee is a subcommittee of the board of directors and is composed of the president of the management and strategy division and 2 non-executive directors (1 legal expert and 1 financial expert). The risk management committee takes decisions on behalf of the board, which are reported to the board. The risk management committee receives reports on the status of operational risk management on a quarterly basis. The internal audit office of the KRX validates the adequacy of the risk management framework through annual and special audits. Operational risk management is not subject to external audit, but the internal audit office conducts an audit by hiring an external professional organization.

Key consideration 3 An FMI should have clearly defined operational reliability objectives and should have policies in place that are designed to achieve those objectives.	The KRX has documented a series of procedures including system operation, service continuity, capacity management, incident management, failure control, problem management, change management and release management. Based on specified procedures, the KRX operates and develops its IT systems. For the prevention of fraud by KRX employees, the KRX established the Code of Conduct, the Guideline on Investment in Financial Instruments (for KRX employees), the Code of Ethics, the Guideline on Handling and Management of Important Information and reviews them regularly. To identify KRX employees' violation, malpractices, unfaithful behaviors, the KRX gets tips via the Cyber Tipping Center on its webpage (www.krx.co.kr) or the Anti-Corruption and Civil Rights Commission. Tippers can access to KRX via webpage, email, fax and post. To prevent the potential negative impact of cyber crime acuities the KRX operates IT Quality and Security Team which is dedicated to information security and acquired ISO 27001 (an international certification on information security). The KRX takes inspections of certification organization once every six months.
Key consideration 4 An FMI should ensure that it has scalable capacity adequate to handle increasing stress volumes and to achieve its service-level objectives.	The KRX checks the system capacity on a monthly basis to determine whether the system can accommodate the data increase in all markets and, if needed, increase capacity. The KRX is developing a next generation trading system and a clearing and settlement system, which are scheduled to be operational in February of 2014 and 2015, respectively.
Key consideration 5 An FMI should have comprehensive physical and information security policies that address all potential vulnerabilities and threats.	In accordance with the enforcement rules for the security business regulation of the FSC, the KRX has established the security business regulation and the information protection regulation for comprehensive physical and information security management. **Physical security** Professional guards protect material facilities of the KRX for 24 hours a day. Core facilities such as the IT machine room are designated as restricted area and all those entering such facilities are carefully identified. Unauthorized staff or visitors are obliged to get approval from the Security Management Team. The KRX facilities are protected by CCTV, speed gates, card readers and other technological security devices. The KRX stays in close contact with the police and the army to cope with incidents. Anti-terrorism, blackout and firefighting drills are conducted regularly.

	Information Security The KRX established information protection policies by segment (server, network, and data, terminal) and identifies unauthorized intrusions through a computer emergency response team. Also, systems are operated in a secured IT operation room and system operators can get access to systems only within the operation room. Operating staffs of internal/external systems and information security staffs perform their duties in accordance with the information protection procedure and relevant manuals. The KRX provides security education and trainings to those staffs regularly. Outsourced staffs should sign on 'security covenant' and take part in education programs on KRX security policies. The KRX acquired ISO 27001 in 2009, an international standard certificate on information security, and revises it once every 6 months (the latest revision was in December 2012) by complying with related regulations and procedures.
Key consideration 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.	The KRX has established a BCP to ensure continuity of operations in case of a wide-scale or major disruption. Disaster recovery exercises are conducted every quarter with the entire company to test the appropriateness of secondary site and the BCP measures and procedures. In addition, the clearing and settlement department conducts annual connectivity tests with the operational staff of settlement banks to test the connection to the DR site. So far, the tests have been successfully conducted and no major problems, malfunctions or else have been detected. The KRX has two primary sites, which are located in Seoul and Busan. Both primary sites have established a (hot) secondary site on a distance of approximately 50 kilometers. All KRX trading and clearing systems, including the various risk management modules, are replicated in the secondary sites. In addition, the two primary sites function as each other's (cold) site. The distance between the two primary sites of Seoul and Busan is approximately 500 kilometers. Due to a long distance between the primary and the secondary sites over 500 km, risk profiles of the secondary site are slightly different from those of the primary site (possible natural disasters, artificial calamities, climate, etc). Real time data synchronization is available for each primary site and its secondary site. No real time data synchronization is

	possible between Busan and Seoul due to the large distance. Data loss is however small. The recovery time objective is prescribed in the FSS regulations, which is 3 hours.
Key consideration 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.	The KRX regularly identifies the risks arising from the link with KSD. The KRX maintains and strengthens the business cooperation with linked institutions through activities such as BCP drills, workshops and meetings on payment settlement and working-level meetings. The KRX establishes and maintains a joint responding network with the KSD for business continuity of settlement of transactions and deposit of substitute securities.
Key conclusions for Principle 17	The KRX has an operational risk management framework in place consisting of systems, policies, procedures, and controls to identify, monitor and manage operational risks. Its procedures ensure scalable capacity adequate to handle increasing stress volumes. The KRX recently developed policies for physical and information security policies. The KRX has a BCP in place, as well as a secondary and third site. The BCP is regularly tested. The RTO is 3 hours, which allows for same day settlement, but is not fully in line with the prescribed RTO of 2 hours by the PFMI.
Assessment of Principle 17	Observed
Recommendations and comments	The KRX, with the FSS, should adapt the regulatory framework to accommodate an RTO of 2 hours in line with the PFMI.

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 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.	**Participation criteria and requirements** A member of the KRX needs to comply with each of following criteria, depending on the category of membership and the type of instruments that the member will clear. (1) Supervisory criteria: a member shall have a license of the FSC to engage in the investment trading or investment brokerage business. (2) Financial criteria. (i) Clearing members:

	• The net capital ratio shall be at least 180/100; • And the equity capital shall be no less than KRW 10 billion. (ii) Non-clearing members: The net capital ratio shall be at least 150/100. (3) Operational criteria: the member shall be equipped with adequate facilities, including the necessary IT equipment. Staff: the member shall have adequate manpower, with necessary expertise and integrity. (4) Social credibility: the member shall have a sufficient social credibility. An entity that has voluntarily withdrawn the membership shall not be admitted as a member before three years have elapsed from the date of such withdrawal. The requirements are described in the FSCMA (articles 387 and 388) and the membership regulation (articles 7, 8, and 23). **Access to trade repositories** N/A
Key consideration 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 endeavor to set requirements that have the least-restrictive impact on access that circumstances permit.	**Justification and rationale of participation criteria** To ensure safe and efficient clearing and settlement the KRX only allows investment traders (or dealers) licensed by the FSC as members. In addition they should meet all the qualification criteria on financial status, social credibility, staff and operational requirements. The KRX examines whether applicants comply with the access criteria in accordance with the membership regulation. The membership criteria are considered by the KRX as the first line of defense. In addition, the KRX collects margins and contributions to the joint clearing funds from members for each market and monitors members' financial status through the risk management system. As the securities and derivatives are highly related, with a significant overlap in membership, the KRX applies the same financial membership criteria to both markets but has different margin schedules in the derivatives market to mitigate risks that are higher than in the securities market.

	Least restrictive access As part of the annual risk management review process the risk management department reviews the appropriateness of the membership criteria in the membership regulation. If needed, the KRX can review and revise the regulation more frequently. **Disclosure of criteria** The participation requirements for clearing members are publicly disclosed in the KRX membership regulations. The regulations are available on the website of the KRX.
Key consideration 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.	**Monitoring compliance** The KRX has established a dedicated team, the member firm service team, under the management strategy division, to manage the membership criteria and detailed information of member firms. More specifically, the team is in charge of examining applicants, monitoring the compliance with the membership criteria; take actions against non-complying members, withdrawal/conversion of membership and other matters related to the membership criteria. The KRX determines a settlement management index for every participant, based on its net capital ratio, settlement resource GAP and credit ratings. This index is a tool that is internally used to monitor the soundness of the clearing member. In case the index value is decreasing the head of the clearing and settlement department will contact the clearing member. All participants should submit their financial information (statement of financial position, income statement, their net capital ratio and short-term liquidity ratio) to the KRX on a monthly basis. In addition, the clearing member should report any changes in the shareholder base or board and management immediately. The membership team analyzes the information on a monthly basis and reports its findings to the risk management committee. Participants of the KRX are obliged to submit to the KRX the reports on net capital ratio, business reports, financial statements and any other documents on the financial status stipulated in the enforcement rules. The member regulation specifies that in cases where the net capital ratio or net worth falls below or may possibly fall below the requirements, the concerned member shall report this to the KRX within three trading days from the day it has occurred. The three days provide the member with a grace period so that the member can take actions to increase its capital.

	In cases where a member has been identified as an insolvent financial institution or insolvency-threatened financial institution by the FSC or the deposit insurance committee, or a member has been requested to take timely corrective measures or has been informed of the stay of timely corrective measures pursuant to the FSCMA and the 'Act on the structural improvement of the financial industry', the concerned member shall report this immediately to the KRX. In addition, the member regulation specifies that the member should report, among other things, the following: • Inability to fulfill payment obligations; • Potential bankruptcy commencement of rehabilitation ; • procedures or company dissolution; • Revocation or suspension of license for investment trading; or • investment brokerage business; • Cases where there has been a change of business objectives, change in capital stock, merger, business closure, or transfer or acquisition of entire business or an important part of business; and • And other issues that may have a material impact on the business of the clearing member. The KRX may request the concerned member to implement corrective measures or may take disciplinary measures. **Suspension and orderly exit** Procedures for suspension and orderly exit are publicly disclosed in the KRX membership regulations and comprise: • Revocation of the license for investment trading or investment brokerage business or closure or transfer of the business; • Dissolution of the member's business; • Expulsion from KRX's systems; • Suspension of membership; and • Fines.

	The KRX stipulates disciplinary measures against its members in the membership regulation and monitors compliance with it via the risk management system.
Key conclusions for Principle 18	The access criteria of the KRX allow for fair and open access to its services based on reasonable risk-related participation requirements. The KRX has publicly disclosed procedures for facilitating the suspension and orderly exit of a participant that no longer meets the participation requirements.
Assessment of Principle 18	Observed
Recommendations and comments	-

Principle 19: Tiered Participation Requirements An FMI should identify, monitor, and manage the material risks to the FMI arising from tiered participation arrangements.	
Key consideration 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.	**Tiered participation arrangements** The KRX has stipulated the measures and procedures to manage the default associated with indirect participants in the KOSPI market business regulation and the DM business regulation. These regulations stipulate that the member should prepare a service agreement for its customers (indirect participants) specifying the obligations of customers such as compliance with the relevant laws, decrees, margin calls and other regulations governing the relationship with the member or the KRX (articles 78, 84, 87 and 89 of the KOSPI market business regulation and Part 5 of the DM business regulation. **Risks to the FMI** Since the default of an indirect participant may cause the default of a direct participant, the KRX stipulates members' obligation to manage their customers' default risk such as collection of customer margin and procedures for handling the default of customer in the KOSPI market business regulation and DM business regulation.
Key consideration 2 An FMI should identify material dependencies between direct and indirect participants that might affect the FMI.	KRX monitors the quantity of open interests and margin deposits per individual account to identify customer accounts with significant settlement volume in the DM. The current legal framework does not allow the KRX to monitor directly indirect participants' settlement capability, access to detailed information, nor conduct periodic examination (article 4

	of the 'Act on real name financial transactions and guarantee of secrecy'). Because the settlement payments and settlement securities of members are determined by netting, it is difficult for the KRX to identify the settlement volume per individual account.
Key consideration 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.	In the case of the DM, the KRX is able to identify indirect participants with significant settlement volume. The KRX will alert the direct participants (members) about these extraordinary settlement obligations of indirect participants (customers). The KRX is not able to do so in the securities market.
Key consideration 4 An FMI should regularly review risks arising from tiered participation arrangements and should take mitigating action when appropriate.	The KRX calculates and imposes margins per individual, per account in the derivatives market on a daily basis and monitors open interests on a real time basis, thus managing risks from indirect participants. The KRX puts strict limits on open interest of member firms for prevention of default risks in the derivatives market and unfair trading such as price manipulation by excessive position holders. (Article 154 of the DM business regulation). In addition, members should refuse to accept entrustments that raise the quantity of net open interests higher than the position limit (article 124 of the DM business regulation).
Key conclusions for Principle 19	KRX's regulations regulate the relationship between its participants and its indirect participants. The KRX is also able to regularly identify indirect participants responsible for large positions in the DM market. The current legal framework does not allow the KRX to monitor settlement positions of customers. Subsequently, the KRX is not able to monitor positions at that level.
Assessment of Principle 19	Broadly observed
Recommendations and comments	The KRX should increase its possibilities to identify risks from tiered participation in the securities market.

Principle 20: Financial Market Infrastructure Links An FMI that establishes a link with one or more FMIs should identify, monitor, and manage link-related risks.	
Key consideration 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.	N/A
Key consideration 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.	N/A
Key consideration 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.	N/A
Key consideration 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.	N/A

Key consideration 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.	N/A
Key consideration 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.	N/A
Key consideration 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.	N/A
Key consideration 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 fulfill its obligations to its own participants at any time.	N/A
Key consideration 9 A TR should carefully assess the additional operational risks related	N/A

to its links to ensure the scalability and reliability of IT and related resources.	
Key conclusions for Principle 20	-
Assessment of Principle 20	-
Recommendations and comments	-

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 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.	When introducing new and amended parameters, rules and regulations, and designing post-trading arrangements for new products, the KRX collects the opinions and requirements of its clearing members via public hearings. At least three times a year the KRX collects the opinions of the industry and market participants by convening the committee on clearing and settlement, composed of external experts and industrial representatives and a working-level council. The objective of these sessions is to identify emerging market needs and requirements. The new clearing and settlement system EXTURE+, including a comprehensive risk management system, was developed in response to the needs of participants.
Key consideration 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.	The KRX is the sole, legal exchange and CCP for exchange-traded securities and derivatives in Korea. The FSCMA stipulates that the objective of the establishment of the KRX is "to secure stability and efficiency of the capital market" (article 373). On an annual basis the KRX submits a business performance assessment report to the government, which is part of an annual comprehensive evaluation program on public institutions by the government. The report contains an assessment of every aspect of a public company's business performance efficiency based on preset parameters. The assessment comprises the management of the company, its staff and remuneration, business achievements including a profit-loss status. The report also contains audit opinions from the national assembly and the national audit office, based on an on-site inspection and survey results on customer satisfaction.

	The KRX as a CCP has determined the number of settlement delays during the year as the parameter for its evaluation of the efficiency of its clearing and settlement services. The maximum number of delays for each market is 5. As settlement delay scarcely occurred in recent years, the KRX is going to further decrease the maximum number of delays to 3.
Key consideration 3 An FMI should have established mechanisms for the regular review of its efficiency and effectiveness.	The FSC has established a market efficiency committee in order to review matters regarding the reduction of transaction costs on the securities markets and the DM. If the KRX intends to change its commissions or invest more than the amount prescribed by Presidential Decree, the KRX needs to obtain the concurrence of the market efficiency committee. Necessary matters regarding the composition and operation of the market efficiency committee are prescribed by Presidential Decree. The Presidential Decree is a supplementing regulation to specify the provisions in FSCMA. The FSCMA article 414 stipulates the establishment and objectives of the market efficiency committee. The Presidential Degree article 368 stipulates details about the organization and operations of the committee. The efficiency, timeliness and stability of clearing and settlement systems of the KRX are assessed by the audit committee once a year. In addition to the internal audit, the KRX, as a public organization, is subject to external audits by the FSS and the board of audit and inspection. This includes customer satisfaction, compliance with laws and regulations, and efficiency and effectiveness of services. The market efficiency committee is a consultative committee established by the FSC, which aims to promote efficient operations of the KOSPI, KOSDAQ and DM markets. The committee is comprised of maximum seven members with expertise in finance, law, accounting an IT and chaired by the FSC. The committee has to approve all changes in the transaction fees of the KRX as well as investments of KRW 10 billion or more in computer systems and its ancillary facilities, including software and hardware. In addition to the regular audits of the audit committee the KRX established the clearing and settlement committee, which consists of member representatives and academics to evaluate the adequacy of the clearing and settlement rules, risk management activities and the appropriateness of investor protection measures. This committee convenes at least 3 times per year. In addition to the customer satisfaction survey of KRX's customers (member firms, related institutions, etc), which is conducted by the ministry of strategy and finance every year (see above on the

	business performance assessment) the KRX conducts its own customer satisfaction survey through telephone surveys twice a year. Based upon test results, the KRX awards a price to the department that is most valued by its customers.
Key conclusions for Principle 21	The KRX has arrangements in place to consult its participants and the markets it serves on a regular basis and address the needs of its participants in the design of its services. The KRX is subject to government audits that aim to ensure the efficiency of KRX's operations. Its fees and investments are subject to approval of a market efficiency committee. The KRX has established mechanisms for the regular review of its efficiency and effectiveness, such as customer satisfaction surveys.
Assessment of Principle 21	Observed
Recommendations and comments	-

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 1 An FMI should use, or at a minimum accommodate, internationally accepted communication procedures and standards.	**Communication procedures** The KRX uses a proprietary communication network for the exchange of data with its clearing members, the KSD and the BOK. **Communication standards** The KRX uses a proprietary message protocol (KRX access protocol) for data communication with its members. The message protocol used between the KRX and KSD was co-developed by them and a proprietary protocol (BOK message protocol) is used for data communication between the KRX and BOK. Conversion of the KRX access protocol into an internationally accepted communication standard, such as SWIFT, is technologically possible but costly. The KRX maintains an ISO-20000-1:2005 certification on its system (EXTURE).
Key conclusions for Principle 22	KRX does not use internationally accepted communication procedures and standards for communication with its clearing members, settlement banks, the KSD and the BOK. Conversion into internationally accepted communication procedures and standards is technically possible, but costly.

Assessment of Principle 22	Broadly Observed
Recommendations and comments	It is recommended to adapt the internationally accepted communication network and procedures to eliminate manual interventions in clearing and settlement processing, reduce risks and increase efficiency by allowing for full straight through processing.

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 and fees and other material costs they incur by participant in the FMI. All relevant rules and key procedures should be publicly disclosed.	
Key consideration 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.	**Rules and procedures** The KRX has adopted rules, regulations and guidelines with relevant information for participants to understand their risks. The rules do not always clearly distinguish between trading and clearing activities as the KRX offers trading and CCP services in the same legal entity. **Disclosure** Various rules and regulations and guidelines of the KRX are published on the websites of the KRX, the FSC and others. The English versions of several key regulations and guidelines are not available on Internet.
Key consideration 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.	The KRX website contains information on the KRX organization, board, rules and regulations, markets as well as its objectives. Several publications, such as the KRX annual report are available as well. The rules and regulations contain key information on KRX's governance structure. The KRX website contains some descriptions of the risk management and operational systems, but a comprehensive document describing the systems is missing. KRX's rules and regulations contain high level rights and obligations of participants.

Key consideration 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.	In order to enhance the public and investor's understanding about market access and clearing and settlement operations, KRX provides contact information on its website. KRX informs market participants of amendments of the rules, regulations operational procedures through press releases. KRX regularly organizes workshops and seminars on specific topics.
Key consideration 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.	The KRX publicly discloses its fees, such as the transaction charges, and service fees on its website. Fees are determined by the board of KRX, after consulting the committee on market efficiency. The market participants are informed of any changes. Fee tables can be downloaded from the KRX website. Trading fees and clearing fees are separately specified by product (equity, bond, derivatives).
Key consideration 5 An FMI should complete regularly and disclose publicly responses to the CPSS-IOSCO Disclosure framework for FMIs. An FMI also should, at a minimum, disclose basic data on transaction volumes and values.	The KRX has completed the CPSS-IOSCO Disclosure framework, which is published on its website since July 2013. The KRX disseminates the statistical data via its Internet homepage.
Key conclusions for Principle 23	The KRX has disclosed its rules and regulations on its Korean website. Various rules and regulations are available in English as well. The website also contains statistics and various descriptions of the risk management and operational systems. The KRX has recently disclosed responses to the CPSS-IOSCO Disclosure framework for FMIs, which enables participants to appropriately assess the risks they incur by participating in the CCP. The KRX provides ad hoc training and information to its clearing members. Fees are also publicly disclosed.
Assessment of Principle 23	Observed
Recommendations and comments	It is recommended that the KRX discloses all its rules, regulations and guidelines on its website in English. The clarity of laws and regulations can be improved by a clear separation between clearing and trading activities of the KRX and by adopting the concepts addressed by the PFMI (see also principle 1).

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.	
Key consideration 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.	N/A
Key consideration 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.	N/A
Key consideration 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.	N/A
Key conclusions for Principle 24	N/A
Assessment of Principle 24	N/A
Recommendations and comments	N/A

DETAILED ASSESSMENT OF OBSERVANCE OF RESPONSIBILITIES

Responsibility A: Regulation, Supervision, and Oversight of FMIs
FMIs should be subject to appropriate and effective regulation, supervision, and oversight by a central bank, market regulator, or other relevant authority.

Key consideration 1 Authorities should clearly define and publicly disclose the criteria used to identify FMIs that should be subject to regulation, supervision, and oversight.	**BOK regulation and oversight** In terms of article 81 (1) of the BOK Act, the BOK in order to promote the safety and efficiency of the payment system as a whole, has the powers to determine all matters pertaining to the payment systems that it operates, which is the BOK-Wire+, which is the only payment system operated by the BOK. For this purpose, in terms of article 81 (4), the BOK may require participating institutions to provide any relevant materials. Article 35 (1) of the ROMPSS classifies payment systems into systemically important payment systems (SIPS) and other payment and settlement systems depending on their settlement values and nature of settlement. Article 35 (2) of the ROMPSS defines SIPS as "a system" whose normal operations if interrupted, may cause widespread shock to the financial system in Korea and abroad and could cause a system collapse. Under the provisions of this article, BOK-Wire+ is identified as a SIPS which is subject to oversight by the BOK. Article 37 of the ROMPSS prescribes the PFMI as the standard for assessments of the BOK-Wire+. The BOK-Wire+ is the real time gross settlement system with a hybrid module in which all systemically important payment systems settle their balances. This ensures that all systemically important payment systems settle in central bank money. The BOK Act as well as the ROMPSS are available on the website of the BOK. **FSC and FSS regulation and supervision** The FSCMA specifies that the KRX and the KSD are subject to regulation and supervision of the FSC. Articles 373–414 contain provisions related to the KRX, with articles 410-414 prescribing the supervision by the FSC and FSS. The law is publicly disclosed on Internet, e.g. (www.fsc.go.kr). Articles 294–323 contain provisions on the KSD, with articles 305–307 prescribing the supervision by the FSC. The FSCMA specifies the purpose of the regulation and supervision by the FSC: 'The purpose of this FSC Act is to contribute to the growth of the national economy by establishing the FSC and the FSS to promote the advancement of the financial industry and the stability of financial markets, establish sound credit order and fair financial transaction practices, and protect depositors, investors, and other financial consumers.'

<table>
<tr><td></td><td>The FSCMA further specifies that the purpose of the FSCMA is to contribute to the development of the national economy by facilitating financial innovation and fair competition in the capital market, protecting investors, fostering the development of the financial investment business, and heightening the fairness, reliability, and efficiency of the capital market.

FSCMA article 410 stipulates that the objective of supervision of the KRX by the FSC is to ensure the protection of investors and sound trade practice.</td></tr>
<tr><td>Key consideration 2

FMIs that have been identified using these criteria should be regulated, supervised, and overseen by a central bank, market regulator, or other relevant authority.</td><td>BOK regulation and oversight

Pursuant to article 35 of the ROMPSS, the BOK has classified and conducts oversight over the following FMIs:

• Check clearing system, Interbank Remittance system, and Electronic Banking system operated by the KFTC;

• Institutional settlement system of bonds operated by the KSD;

• KOSPI market settlement system and KOSDAQ market settlement system operated by the KRX and KSD;

• DM settlement system operated by the KRX; and

• CLS system operated by the CLS Bank.

The legal basis for the oversight of BOK over FMI operators such as the KRX and the KSD is provided under provisions of the BOK Act (article 81(2) and (3)) and ROMPSS (articles 33 and 42). As laid down in the ROMPSS, the BOK assesses the FMIs under its oversight framework on a biennial basis. Where the KRX and KSD are concerned the BOK conveys the results of the assessment to the FSC.

FSC and FSS regulation and supervision

Pursuant to the FSCMA, the FSC regulates and supervises the KRX and KSD. The regulation and supervision of the KRX includes the CCP activities of KRX. As one of the authorities for the supervision of non-profit organizations set up under Civil Act, the FSC also supervises the KFTC.

Where the FSC is the government organization responsible for the regulation and supervision of the KRX it may have the governor of the FSS inspect the business, financial status, books, documents or</td></tr>
</table>

	other materials related to the KRX. The governor of the FSS has to report the result of the inspection to the FSC. In case the KRX is found to violate any rules the governor shall provide the FSC with an opinion on how to takes actions in response to such violation (see FSCMA article 410). There is regulatory overlap between the FSC and BOK regarding the regulation, supervision and oversight of KSD, KRX and KFTC. However, currently there is no cooperative oversight framework in place between the BOK and FSC. There is a need to establish a consultative and cooperative framework in the form of a Memorandum of Understanding having a sound legal basis to ensure effective coordination between the BOK and FSC where their roles as regulators overlap (see responsibility E).
Key conclusions for Responsibility A	FMIs in Korea are subject to regulation and oversight of the BOK and subject to regulation and supervision of the FSC/FSS. The legal underpinning of the responsibilities suggests overlap as both regulators are responsible for financial stability and have responsibilities related to the KRX and the KSD.
Assessment of Responsibility A	Observed
Recommendations and comments	A consultative and cooperative framework in the form of an MOU needs to be put in place to ensure effective coordination between the BOK and FSC where their roles as regulators overlap.

Responsibility B: Regulatory, Supervisory, and Oversight Powers and Resources Central banks, market regulators, and other relevant authorities should have the powers and resources to carry out effectively their responsibilities in regulating, supervising, and overseeing FMIs.	
Key consideration 1 Authorities should have powers or other authority consistent with their relevant responsibilities, including the ability to obtain timely information and to induce change or enforce corrective action.	**BOK's powers to obtain timely information and induce change** As the system owner and operator, the BOK faces no constraints in obtaining information regarding BOK-Wire+. A real-time information monitoring system helps BOK to access all information regarding BOK-Wire+. The real-time information monitoring system enables BOK to assess the BOK-Wire+'s various functionalities, performance in terms of system capabilities, payment behavior of participants and liquidity usage in the system. Article 43 of the ROMPSS empowers the BOK governor to "impose sanctions on a participant in BOK-Wire+ or a payment system operator, such as a verbal warning, a requirement of corrective measures, a partial or overall suspension of access to BOK-Wire+, or a cancellation of relevant agreements."

	Thus the BOK, has the powers to induce changes as well as take necessary corrective measures including imposing sanctions as far as the BOK-Wire+ is concerned. An instance where these powers were exercised was when the KDS was served an official notice of warning when the operating hours of the BOK-Wire+ had to be extended on account of problems at the KSD's end. The legal basis for the oversight of BOK over FMI operators such as KRX and KSD is provided under provisions of the BOK Act (article 81 (2), (3)) and ROMPSS (article 33 and 42). While BOK may request these FMIs to take measures for the improvement of their operating rules and to provide related information, it has no powers to ensure that its suggestions are implemented, nor is BOK able to confirm the authenticity of the submitted information and ascertain whether only selective information has been submitted by these entities. **FSC's powers to obtain timely information and induce change** Pursuant to its legal powers under the FSCMA the FSC has sufficient powers to obtain information and induce changes. The KRX needs to obtain approval of the FSC in case the KRX intends to establish, amend or repeal their articles of incorporation, membership rules, business rules and other regulations on business. In addition, the FSS on behalf of the FSC, may carry out on-site inspections and as such collect relevant information. If needed the FSC may take the following measures against the KRX (article 411): • Suspend all or a part of its business for up to six months; • Order a transfer of contract; • Order correction or suspension of the conducted violation; • Order KRX to publicize or disclose the measures taken due to violation; • Institutional warning or other institutional measures; and • Other measures to correct or prevent violation. The FSC may take the following measures against the executives of the exchange: dismissal, suspension of duties for up to six months, a disciplinary warning, a general warning or other measures to correct or prevent violation of the rules (article 411).

	The FSC may take the following measures against an employee of the exchange: dismissal, suspension of duties for up to six months, salary reduction, reprimand or warning or other measures to correct or prevent violation of the rules (article 411). The FSC may, if it finds that the transactions of securities cannot be normally made because of a natural disaster, war, economic conditions or other severe incidents, order a change in opening hours of the KRX, suspend trading, close the exchange or take other necessary measures.
Key consideration 2 Authorities should have sufficient resources to fulfill their regulatory, supervisory, and oversight responsibilities.	**BOK's resources** The BOK endeavors to effectively fulfill its oversight responsibilities through a dedicated oversight division in the payment and settlement systems department. The division is comprised of seven skilled and experienced persons, with relevant knowledge which is regularly updated through training courses both domestic and overseas. There are no constraints on the BOK in terms of its resources for fulfilling its oversight responsibilities, as the BOK endeavors to secure sufficient resources to this end through measures such as the following: • Securing of sufficient human resources through periodic adjustment of employees by the planning and coordination department and self-assessments of human resource appropriateness by the payment and settlement systems department. • Recruitment of experts from the private sector is also done. Currently, there are three experts in Information Technology from the private sector working in the payment and settlement systems department. • Annual plans with budget allocations are made inclusive of budget allocation for training courses and foreign business meetings. **FSC's and FSS's resources** The FSC's resources for the regulation and supervision of the KRX and the KSD consist of one senior expert and one KRX staff member that is seconded by the KRX to the FSC. Duties of the FSC staff are currently to ensure compliance of the KRX and the KSD with the PFMI, adopt the regulations related to the OTC derivatives clearing project of the KRX, work with foreign authorities on the

	equivalence status of the Korean jurisdiction and Korean FMIs acceptance by foreign jurisdiction. In addition the FSC staff is responsible for the supervision of the FSS and the establishment of task forces made up of external experts. The FSS has three teams responsible for supervision and examination of the KRX, i.e. a department responsible for the supervision of the securities market (5 staff members), a department responsible for the supervision of the derivatives market (4 staff members) and the examination department (5 staff members). Reporting to the FSC is centralized at the level of the executive directors. The FSS hires financial, legal and IT experts from the market. **Legal protection** The BOK, FSC and FSS staff, carrying out duties related to regulation, supervision and oversight, receive protection through the Civil Act and the Criminal Codes if they comply with the relevant laws properly.
Key conclusions for Responsibility B	The powers of the FSC and FSS are considered sufficient. The powers of the BOK are considered not to be effective. While the BOK may request other FMIs than the BOK-Wire+ to take measures for the improvement of their operating rules and to provide related information, it has no powers to ensure that its suggestions are implemented, nor is the BOK able to confirm the authenticity of the submitted information and ascertain whether only selective information has been submitted by these entities. The resources of the BOK and FSS are considered sufficient. The resources of the FSC are considered insufficient. Although the FSC staff is has good knowledge and is effective in its activities the work load is considered too large for one staff member, especially given that staff members rotate every two years. The seconded KRX staff brings appropriate knowledge, however, may prevent the FSC from preparing independent opinions.
Assessment of Responsibility B	Broadly Observed
Recommendations and comments	There is a need to amend the existing statute to empower the BOK to effectively discharge its oversight responsibilities including the powers to obtain authentic information and to be able to oversee that its observations/findings are implemented by the FMIs and the ability to impose sanctions when required. The FSC should extend the number of staff members responsible for KRX related matters to allow for a proactive and complete

	analysis of the compliance of the KRX CCP with the relevant laws, regulations and the PFMI.

Responsibility C: Disclosure of Policies with Respect to FMIs Central banks, market regulators, and other relevant authorities should clearly define and disclose their regulatory, supervisory, and oversight policies with respect to FMIs.	
Key consideration 1 Authorities should clearly define their policies with respect to FMIs, which include the authorities' objectives, roles, and regulations.	**BOK** Pursuant to article 81 of the BOK Act and article 3 of the ROMPSS, the BOK oversees systemically important FMIs to promote safety and efficiency of the payment and settlement system as a whole. **FSC/FSS** The FSCMA specifies that the purpose of the FSCMA is to contribute to the development of the national economy by facilitating financial innovation and fair competition in the capital market, protecting investors, fostering the development of the financial investment business, and heightening the fairness, reliability, and efficiency of the capital market. FSCMA article 410 suggests that the objective of supervision of the KRX by the FSC is to ensure the protection of investors and sound trading practices.
Key consideration 2 Authorities should publicly disclose their relevant policies with respect to the regulation, supervision, and oversight of FMIs.	**BOK** The BOK's policies with respect to FMIs, including its objectives, roles and regulations, are clearly defined in the BOK Act, the ROMPSS and the WROMPSS. Article 35 (2) of the ROMPSS defines SIPS as "a system" whose normal operations if interrupted, may cause widespread shock to the financial system in Korea and abroad and could cause a system collapse. Under the provisions of this article, the BOK-Wire+ is identified as a SIPS which is subject to oversight by the BOK. Article 37 of the ROMPSS prescribes the PFMI as the standard for assessments of the BOK-Wire+. All these are publicly disclosed on the BOK website. In addition, the BOK also publishes the payment and settlement systems report on an annual basis. Additionally, the BOK should make the relevant information and data it discloses, in a language commonly used in financial markets in addition to the domestic language on its website and

	complete and publicly disclose the CPSS-IOSCO disclosure framework. **FSC/FSS** The FSC's mandates for regulation and supervision of FMIs are reflected in the FSCMA under which the KRX and the KSD were established, and it discloses them publicly through official publications, press releases, and its Internet webpage (www.fsc.go.kr).
Key conclusions for Responsibility C	The BOK discloses its policies publicly with respect to all FMIs including the BOK-Wire+. The FSC and FSS objectives are publicly disclosed in the FSCMA. The FSC and FSS lack a dedicated site for FMIs, in particular the CCP activities of the KRX.
Assessment of Responsibility C	Broadly Observed
Recommendations and comments	The BOK should make the relevant information and data it discloses, in a language commonly used in financial markets in addition to the domestic language on its website. The FSC and FSS should provide dedicated information on FMIs on its websites.

Responsibility D: Application of the Principles for Financial Market Infrastructures Central banks, market regulators, and other relevant authorities should adopt the CPSS-IOSCO Principles for financial market infrastructures and apply them consistently.	
Key consideration 1 Authorities should adopt the CPSS-IOSCO Principles for financial market infrastructures.	**BOK regulation and oversight** The BOK has adopted the PFMI. Article 37 of the ROMPSS says that the BOK "shall use the Principles for Financial Market Infrastructures as a standard for assessment, and assess the safety and efficiency of payment systems taking their specific characters into account." **FSC/FSS regulation and supervision** On June 19, 2012, the FSC publicly announced its support for the use of the PFMI as a tool to promote the safety and efficiency of clearing and settlement infrastructure in its press release headlined "Policy Response to Announcement of PFMIs of the CPSS and IOSCO."

Key consideration 2 Authorities should ensure that these principles are, at a minimum, applied to all systemically important payment systems, CSDs, SSSs, CCPs, and TRs.	**BOK regulation and oversight** The PFMI are applied by BOK to all FMIs including the BOK-Wire+ as the assessment standards under article 37 of the ROMPSS. Article 35 of the ROMPSS identifies the various SIPS. Pursuant to the revised article 35 of the ROMPSS the BOK must provide official notification to the FMIs if it decides to change the scope of FMIs designated as subject to its oversight framework. The notification should include information on the reasons of the designation and the obligations of the newly designated FMIs. **FSC/FSS regulation and supervision** The FSC intends to adapt the regulations under the FSCMA in accordance with the PFMI. The FSC, together with the FSS, is in the process of approving regulations for OTC derivatives trading and clearing. Regulations for exchange traded stocks, bonds and derivatives have not yet been adapted to reflect the PFMI.
Key consideration 3 Authorities should apply these principles consistently within and across jurisdictions, including across borders, and to each type of FMI covered by the principles.	**BOK regulation and oversight** Pursuant to articles 35 and 37 of the ROMPSS, the BOK classifies systemically important and other payment and settlement systems including the BOK-Wire+, and assesses them in accordance with the PFMI. To prevent conflicts of interest arising from its simultaneous operation and oversight of BOK-Wire+, the operations and oversight units are in different departments of the BOK. While the oversight unit is located in the payments and settlement system department, the operations are located in the IT department. The department report to different deputy governors. Given the lack of power at the side of the BOK with regard to the FMIs that are regulated and supervised by the FSC (see responsibility B) and the lack of a formal cooperation agreement (see responsibility E) the BOK is not able to ensure that the PFMI are applied consistently within the Korean jurisdiction. **FSC/FSS regulation and supervision** The FSC intends to apply the PFMI consistently to the KRX and the KSD; however, the relevant regulations for exchange traded stocks, bonds and derivatives have not been adapted to reflect the PFMI.
Key conclusions for Responsibility D	The BOK and the FSC have both publicly announced their support for the PFMI. The BOK has implemented the PFMI as the oversight

	framework for BOK-WIRE+. For other systems where there is a regulatory overlap with the FSC and given BOK's lack of powers to see that its decisions are implemented by other FMIs, the application of PFMI as the oversight framework is incomplete. The FSC intends to adapt the regulations under the FSCMA in accordance with the PFMI. The FSC, together with the FSS, is in the process of approving regulations for OTC derivatives trading and clearing. Regulations for exchange traded stocks, bonds and derivatives have not yet been adapted to reflect the PFMI.
Assessment of Responsibility D	Broadly Observed
Recommendations and comments	It is recommended that adequate powers are provided to the BOK. It is recommended to update the regulations under the FSCMA in line with the PFMI.

Responsibility E: Cooperation with Other Authorities Central banks, market regulators, and other relevant authorities should cooperate with each other, both domestically and internationally, as appropriate, in promoting the safety and efficiency of FMIs.	
Key consideration 1 Relevant authorities should cooperate with each other, both domestically and internationally, to foster efficient and effective communication and consultation in order to support each other in fulfilling their respective mandates with respect to FMIs. Such cooperation needs to be effective in normal circumstances and should be adequately flexible to facilitate effective communication, consultation, or coordination, as appropriate, during periods of market stress, crisis situations, and the potential recovery, wind-down, or resolution of an FMI.	At the domestic level the BOK and the FSC have cooperation agreements at the highest level of the organizations. The senior deputy governor of the BOK is a member of the FSC. The vice chairman of the FSC may attend and state opinions at the meetings of the MPC. The above cooperation framework has been put in place to discuss broader policy issues such as the monetary policy of the BOK and the financial policies of the FSC. In practice this high level cooperation does not discuss issues related to regulation, supervision, and oversight of FMIs. In terms of article 90 of the WROMPSS, the BOK has set up an FMI operations council. The membership of the council comprises the heads of the relevant departments in the BOK, KFTC, KRX and the KSD. The council meets twice a year. Issues related to operations of the respective FMIs and the implementation of the PFMI are discussed. During periods of market stress, the government including the FSC and the BOK support each other in fulfilling their respective responsibilities through high level meetings held on an ad hoc basis. Under articles 65 and 80 of the BOK Act, before making decisions to provide emergency credit to financial institutions and for-profit enterprises during periods of severe market stress, the BOK must hear the opinions of the government.

	At an international level the BOK conducts cooperative oversight activities related to the CLS system with foreign central banks as a member of the CLS oversight committee. The FSC has a framework for cooperation with foreign regulators and supervisors of securities and derivatives markets as a member of the IOSCO multilateral memorandum of understanding concerning consultation and cooperation and the exchange of information.
Key consideration 2 If an authority has identified an actual or proposed operation of a cross-border or multicurrency FMI in its jurisdiction, the authority should, as soon as it is practicable, inform other relevant authorities that may have an interest in the FMI's observance of the CPSS-IOSCO Principles for financial market infrastructures.	The FSC can identify any actual or proposed cross-border or multi-currency service of the KRX and the KSD, through its power to approve FMIs' regulations concerning the clearing and settlement business. The BOK regularly monitors the activities of FMIs, which may help the BOK to identify any cross-border or multi-currency service of an FMI in Korea. There are currently no cross-border or multi-currency services provided by FMIs in Korea.
Key consideration 3 Cooperation may take a variety of forms. The form, degree of formalization and intensity of cooperation should promote the efficiency and effectiveness of the cooperation, and should be appropriate to the nature and scope of each authority's responsibility for the supervision or oversight of the FMI and commensurate with the FMI's systemic importance in the cooperating authorities' various jurisdictions. Cooperative arrangements should be managed to ensure the efficiency and effectiveness of the cooperation with respect to the number of authorities participating in such arrangements.	**Form of cooperation** Any cooperation between the FSC and BOK in relation to FMIs is informal and only at a technical level. The formal high level cooperation between the FSC and BOK does not address FMI-related issues. There is no formal cooperation between the BOK and FSS either. **Efficiency and effectiveness of cooperation** The current lack of formal cooperation at a more technical level does not enable the BOK to properly conduct its oversight activities. There is no crisis management arrangement in place that allows for efficient and effective cooperation in terms of crisis. The KRX has to respond to the requirements of two different authorities, whose roles could be overlapping. The FSC cannot benefit from specific knowledge that is obtained by the BOK in its role as overseer, for example information obtained during international meetings or during the FMI operations council, which is initiated by the BOK.
Key consideration 4 For an FMI where cooperative arrangements are appropriate, at least one authority should accept	The BOK is the oversight authority for the BOK-Wire+ as well as for the systemically important retails payment systems operated by the KFTC. The FSC is the leading authority for the FMIs operated by the KRX and the KSD. The FSC is also responsible for the supervision of the general business of KFTC (based on article

responsibility for establishing efficient and effective cooperation among all relevant authorities. In international cooperative arrangements where no other authority accepts this responsibility, the presumption is the authority or authorities with primary responsibility in the FMI's home jurisdiction should accept this responsibility.	37 of Civil Code) to ensure that it is run as a non-profit corporation. The lead overseer for the CLS system is the Federal Reserve Bank of New York. The BOK is a member of the CLS oversight committee.
Key consideration 5 At least one authority should ensure that the FMI is periodically assessed against the principles and should, in developing these assessments, consult with other authorities that conduct the supervision or oversight of the FMI and for which the FMI is systemically important.	Pursuant to the ROMPSS, the BOK assesses the FMIs under its oversight framework on a biennial basis and conveys the results of assessment to the FSC. No information is available as to whether there is any consultation between the regulators on the implementation of the recommendations of the assessments carried out by the BOK. The FSC periodically assesses matters regarding operations of the FMIs through the FSS's inspections of the KRX and the KSD.
Key consideration 6 When assessing an FMI's payment and settlement arrangements and its related liquidity risk-management procedures in any currency for which the FMI's settlements are systemically important against the principles, the authority or authorities with primary responsibility with respect to the FMI should consider the views of the central banks of issue. If a central bank of issue is required under its responsibilities to conduct its own assessment of these arrangements and procedures, the central bank should consider the views of the authority or authorities with primary responsibility with respect to the FMI.	Considering that the value of foreign currency denominated payment and settlement by domestic FMIs is trivial until now, the BOK focuses on assessing KRW denominated payment and settlement and on the related liquidity risk management procedures. The FSC, which is the regulatory and supervisory authority for the KRX and KSD approves these organizations' regulations regarding payment and settlement in both the Korean won and foreign currencies, as well as their related liquidity risk management procedures. In the case of the CLS system, assessment by the BOK is substituted for by the regular CLS system assessment of the Federal Reserve Bank of New York, under the related cooperative oversight framework set up among central banks.
Key consideration 7 Relevant authorities should provide	No such mechanism has been put in place by the regulators.

advance notification, where practicable and otherwise as soon as possible thereafter, regarding pending material regulatory changes and adverse events with respect to the FMI that may significantly affect another authority's regulatory, supervisory, or oversight interests.	
Key consideration 8 Relevant authorities should coordinate to ensure timely access to trade data recorded in a TR.	N/A
Key consideration 9 Each authority maintains its discretion to discourage the use of an FMI or the provision of services to such an FMI if, in the authority's judgment, the FMI is not prudently designed or managed or the principles are not adequately observed. An authority exercising such discretion should provide a clear rationale for the action taken both to the FMI and to the authority or authorities with primary responsibility for the supervision or oversight of the FMI.	Pursuant to article 46 of the ROMPSS, if an FMI using the BOK-Wire+ for funds settlement violates this regulation the BOK has the power to partially or totally suspend its access to the BOK-Wire+, or cancel the relevant agreements with it. However, there has been no case of the BOK exercising this power to date. The FSC has the comprehensive discretionary power to discourage the use of an FMI, or the provision of services to an FMI. However, there have been no cases of the FSC's exercise of this discretionary power until now.
Key consideration 10 Cooperative arrangements between authorities in no way prejudice the statutory or legal or other powers of each participating authority, nor do these arrangements constrain in any way an authority's powers to fulfill its statutory or legislative mandate or its discretion to act in accordance with those powers.	The FSC and the BOK respect each other's responsibilities for regulation, supervision and oversight, and foreign authorities' powers to fulfill their statutory or legislative mandates or their discretions to act in accordance with those powers.
Key conclusions for Responsibility E	The BOK and FSC do not appropriately cooperate in the regulation, supervision and oversight of the FMIs in Korea, in particular regarding the regulation, supervision and oversight of the KRX and KSD. The cooperation is informal, without formal agreements and arrangements. This impedes the BOK from effectively exercising its oversight duties. The KRX has to respond

	to requirements of two different regulating and supervising authorities that may be overlapping or even contracting. The FSC cannot benefit from specific knowledge that is obtained by the BOK in its role as overseer, for example information obtained during international meetings or during the FMI operations council, which is initiated by the BOK. There are no crisis management arrangements between the authorities to manage a potential financial or operational crisis relating to FMIs in Korea.
Assessment of Responsibility E	Partly Observed
Recommendations and comments	It is recommended to formalize the cooperation between the BOK and the FSC regarding the regulation, supervision and oversight of FMIs. This formal arrangement should enable the cooperation between the BOK and FSC at the appropriate technical level and should improve the efficiency and effectiveness of the regulation, supervision and oversight, in particular in relation to the KRX-CCP and the KSD. Such a cooperative framework could be in the form of an MOU having a sound legal basis to ensure effective coordination between the BOK and FSC where their roles as regulators overlap. It should enable the BOK to ensure that its suggestions are implemented and to confirm the authenticity and completeness of the information submitted by the FMIs. The BOK and FSC should 'speak with one voice' to avoid any inefficiencies in their communication with the KRX and KSD. It should also allow the FSC to benefit from relevant information that is obtained by the BOK during international meetings or meetings with the FMI operations council. The BOK and the FSC should define arrangements regarding the frequency of their information exchange and plan joint meetings with the FSS, the KRX and the KSD. They should also develop a crisis management plan and test such a plan to enable timely and effective cooperation in times of crisis that may affect the safety and efficiency of the FMIs. Any assessments should be shared. Before finalizing an assessment the authorities should consult each other and take comments into account.

THE BANK OF KOREA'S RESPONSE TO THE ASSESSMENT

While the Bank of Korea (BOK) is in agreement with the IMF FSAP Mission Team's overall assessment results in general, the bank wishes to maintain our own views on several items as follows:

Principle 5 (Collateral)

The recommendation to increase the frequency of the haircut methodology review seems to be excessive considering the relevant Key Consideration of the PFMI, which states "An FMI's haircut procedures should be independently validated at least annually."

Principle 19 (Tiered participation arrangements)

The BOK does not consider additional information on indirect participation activities necessary at this time. This is because the bank believes that the risk stemming from indirect participation is very low in the BOK-Wire+ system as only a limited number of small and medium-sized broker/dealers with low settlement volumes are allowed to settle indirectly through direct participants.

Principle 23 (Disclosure of rules, key procedures, and market data)

The rating of "partly observed" has been assigned with prioritized recommendations for Principle 23 due to "insufficient disclosure on FMIs in English language." All of the important documents available in Korean language, however, have also been available through the English-language website of the bank in English language even prior to the assessment exercise (please refer to the links below).

- Payment Systems section of the BOK English-language website: (**URL**) http://www.bok.or.kr/broadcast.action?menuNaviId=648

(Contents) Payment Systems in Korea, Rules and Regulations, Annual Report on Payment and Settlement Systems, Statistics and Publications, New BOK-Wire Development Project, Financial Information Promotion in Korea.

Statistics website (ECOS: Economic Statistics System): (URL) http://ecos.bok.or.kr/
(Contents) Cleared and Dishonored Checks and Bills, BOK-Wire, Bank Giro, Other Payment Systems, Statistics by BIS Standard, Electronic Banking, Daily BOK-Wire Statistics, Credit Cards.

Responsibilities C (Disclosure of policies with respect to FMIs)

As similar to the assessment of Principle 23 above, the assessment of Responsibility C does not seem to be fully reflecting the BOK practice of English documents disclosure. Details of the BOK's oversight policies and procedures are provided in English to the public through in the forms of regulations and annual report on payment and settlement systems.

The Financial Services Commission's Response to the Assessment

The FSC regulates and supervises FMIs in accordance with PFMIs. FMIs such as KRX and KSD are regulated and supervised by the FSC in accordance with the FISCMA and its subordinate laws and regulations which have been adapted to reflect PFMIs. The FSC delegates examination duties to the FSS which examines the KRX and KSD on their compliance with the PFMIs. The FISCMA stipulates the legal basis of the duties, corporate governance and etc. of the KRX and KSD. The KRX is the clearing and settlement institution for securities and derivatives which operates in accordance with the FISCMA as approved by the FSC.

- The KSD is the settlement institution for securities which conducts deposit and settlement business in accordance with Regulation on Settlement Business approved by the FSC.
- The FISCMA provides for governance of the KRX and KSD including qualifications of senior executives and board of directors.
- The KRX accumulates and deposits Joint Compensation Fund and margins, makes repayment for defaulted members and determines repayment order to ensure stability and integrity of transactions.
- The KSD is the central depository institution that conducts business in accordance with the Regulation on Depository Business to minimize risks related to deposits and transfers of securities.
- The FSC regulates, supervises and is reported by the KRX and KSD on their operations.
- The FSC and the BOK closely cooperate with each other based on the legal and institutional framework.
- The Senior Deputy Governor of the BOK is a member of the commissioners of the FSC pursuant to article 4 of the Establishment Act whereas the vice-chairman of the FSC may be present and speak at the Monetary Board in accordance with article 91 of the BOK Act. These enable both institutions to participate in important decision making processes undertaken by each institution.
- The FSC, FSS, MOSF and BOK hold Macroeconomic Financial Meeting both on a regular (at least once every quarter) and irregular basis to analyze and review macroeconomic soundness through information sharing and close cooperation based on the provisions of the Regulation on the Establishment and Operation of Macroeconomic Financial Meeting (Presidential Directive).

In addition, the FSC and the BOK closely cooperate with each other at working level based on the MOU.

The KRX and KSD are providing information requested by the BOK in accordance with the BOK Act, FISCMA and FSC-BOK MOU.

The FSC and BOK are closely working together to meet the international standards and Enhance stability of the clearing, payment and settlement system through the arrangement of

Advancement Committee for the Financial Market Infrastructure.

- The FSC and BOK established Advancement Committee for Financial Market Infrastructure for the purpose of sharing expertise and information on payment and settlement.

- During the Committee held in March 2013, both organizations shared and reviewed self assessment reports produced by the FMIs including the BOK, exchange and KSD.

Although the two organizations closely cooperate, it is clearly stipulated in the FISCMA that the FSC has the authority to supervise the KRX and KSD. Therefore, there is hardly any overlap in the supervision authority on both FMIs.

- The FSC supervises and may impose sanctions on the overall work of the KRX and KSD including the payment and settlement system in accordance with the articles 306–307 and 410–411 of the FISCMA.

- The BOK conducts oversight and may request the operating institution or its supervisory agency to improve the operating standards in accordance with the article 81 of the BOK Act.

Finally, the FSC and FSS both disclose relevant laws, regulations, systems, policies and detailed materials on their web-sites (FSC: www.fsc.go.kr, FSS: www.fss.or.kr).

Appendix. Ownership Structure of the KRX

(as of January 31, 2013)

	Name	Shares Owned	Percentage Owned
1	Kyobo Securities	588,444	2.94
2	Shinhan Investment	632,051	3.16
3	Korea Investment and Securities	640,627	3.20
4	Daishin Securities	644,885	3.22
5	Daewoo Securities	646,107	3.23
6	Shinyoung Securities	602,692	3.01
7	Eugene Investment and Securities	608,185	3.04
8	Hanyang Securities	577,846	2.89
9	Meritz Securities	580,852	2.90
10	Woori Investment and Securities	919,502	4.60
11	Bookook Securities	595,415	2.98
12	Hana Daetoo Securities	577,211	2.89
13	Hyundai Securities	624,190	3.12
14	Hanwha Securities	1,000,000	5.00
15	HMC Investment Securities	574,784	2.87
16	Yuhwa Securities	584,092	2.92
17	TongYang Securities	691,091	3.46
18	SK Securities	572,668	2.86
19	Solomon Investment and Securities	584,493	2.92
20	NH Investment and Securities	571,144	2.86
21	Golden Bridge Investment and Securities	624,851	3.12
22	Samsung Securities	589,347	2.95
23	Dongbu Securities	565,076	2.83
24	JP Morgan Securities(Far East)	645,574	3.23
25	KB Investment and Securities	658,923	3.29
26	Macquarie Securities	565,076	2.83
27	Citigroup Global Market Korea Securities	578,425	2.89
28	Hanmag Securities	13,416	0.07
29	NH Investment and Futures	80,498	0.40
30	BS Securities	80,498	0.40
31	Samsung Futures	80,498	0.40

	Name	Shares Owned	Percentage Owned
32	Woori Futures	80,498	0.40
33	KEB Futures	80,498	0.40
34	Eugene Investment and Futures	80,498	0.40
35	Hyundai Futures	80,498	0.40
36	KR Futures	13,416	0.07
37	Small Business Corporation	606,781	3.03
38	Korea Securities Finance Cor.	424,746	2.12
39	Korea Financial Investment Association	409,732	2.05
40	KRX's Treasury stock	924,872	4.62
	Total	**20,000,000**	**100.00**

Source: KRX Member Firm Services Team.