

## Executive Summary

### [Oversight of Payment and Settlement Systems and Policy Responses]

**1 The Bank of Korea (BOK) effectively carried out its role conducting oversight of payment and settlement systems by assessing financial market infrastructures, conducting joint examinations of participants, and working with international counterparts on cooperative oversight.**

In 2019, the BOK conducted its regular assessments of systemically important payment and settlement systems (SIPSSs) operated by the Korea Exchange (settlement systems for the KOSPI, KOSDAQ and derivatives market) and the payment and settlement systems operated by the Korea Securities Depository (the OTC Bond Settlement System, Inter-Institutional Repo Settlement System and Institutional Stock Investors Settlement System). The assessments were based on the 「Principles for Financial Market Infrastructures (PFMI)」, 「Guidance on Cyber Resilience for Financial Market Infrastructures」, 「Resilience of Central Counterparties (CCPs): Further Guidance on the PFMI」, 「Recovery of Financial Market Infrastructures」 and other standards.

Both organizations were found to be mostly in compliance with the PFMI and other international standards. Nonetheless, the results also suggested that some improvements were needed with regard to liquidity risk and cyber risk in the case of the Korea Exchange (KRX), and with regard to credit risk and operational risk in the case of the Korea Securities Depository

(KSD). The two organizations plan to implement improvement actions, as per the recommendations of the BOK.

The BOK moreover conducted joint examinations of two banks and three financial investment companies to review the adequacy of payment and settlement activities by looking at the status of intraday liquidity management and whether a business continuity plan was in place and kept up-to-date. The examinations found that the recovery time objective (RTO) needed to be shortened, the management system for funds transfer-related operational risk required improvement, and the management of settlement liquidity needed to be strengthened. Appropriate recommendations for improvements were therefore issued to the institutions concerned.

The BOK continued with its efforts to improve the payment and settlement system oversight framework by enhancing the capability for oversight of cyber risks and by expanding the monitoring capacities of the BOK-Wire+. During 2019, the BOK was an active voice in cyber risk discussions at the BIS Cyber Resilience Coordination Centre (CRCC) and participated in cyber simulative exercises. Furthermore, to strengthen capabilities for monitoring and analyzing settlement risk indicators, a plan is in the works to expand the payment and settlement data warehouse that will be part of the next-generation BOK-Wire+.

The BOK also conducted joint international oversight of the CLS system and SWIFT with other central banks in other major economies. The CLS system provides payment-versus-payment (PvP) settlement services for multiple currencies, and SWIFT is the worldwide financial transactions information telecommunications system.

## ② The BOK strengthened its management of net settlement risks as part of a continuous policy effort to enhance the safety and efficiency of payment and settlement systems.

In August 2019, the BOK raised the collateral-to-net debit cap ratio for guaranteeing net settlements of its participants to 70%, from the previous 50%. This action implemented a plan proposed by the BOK in December 2018 to improve the net settlement risk management system by stepping up the management of credit risk arising from deferred net settlements. Going forward, the collateral-to-net debit cap ratio will be progressively raised to 100%.

### Collateral-to-Net Debit Cap Ratio Increase Schedule

Aug. 1, 2019	Aug. 1, 2020	Aug. 1, 2021	Aug. 1, 2022
70	80	90	100

(%)

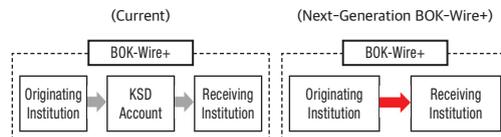
Source: Bank of Korea

The upward adjustment of the collateral-to-net debit cap ratio for guaranteeing net settlements was coupled with a measure to alleviate any resulting burden on banks. Collateral eligibility requirements were eased to include debentures issued by the Korea Development Bank (KDB), the Industrial Bank of Korea (IBK), and other bonds, in addition to existing government bonds and Monetary Stabilization Bonds. The BOK worked closely with net settlement participants to explore solutions that can reduce the strain that the increased collateral requirements may cause.

Meanwhile, the BOK is constructing the next-generation BOK-Wire+ for scheduled launch in the second half of 2020. The develop-

ment of the needed IT systems was completed in 2019. A new simplified method was also developed for the settlements of DvP transactions that are conducted through the real-time gross settlement (RTGS) on a transaction-by-transaction basis. Under this new methodology, settlement funds will be sent directly to transaction counterparties without transiting through a KSD account, and DvP securities transactions will be included among those subject to BOK-Wire+'s simultaneous multilateral settlement procedure. This change is expected to lessen the liquidity burden on participants, as well as increase the efficiency of DvP settlement.

### Improvement of DvP Settlement Method for the Next-Generation BOK-Wire+



Source: Bank of Korea

## ③ The BOK supported innovation and the development of payment and settlement systems by conducting research into crypto-assets, central bank digital currency (CBDC), and distributed ledger technology (DLT), as well as implementing a joint project on bank account-based mobile deposit payment services.

The BOK conducted extensive research into crypto-assets, examining the potential impact of Facebook's Libra, and shared its findings across the industry and with academic experts. Meanwhile, to proactively respond to the international debate concerning CBDC, dedicated CBDC research units, including the Digital Currency Research Team and Section for CBDC Technology,

were established in February 2020.

The BOK continued with its research into the feasibility of applying DLT to payment and settlement systems. In 2019, the BOK followed up on its previous tests of large-value payment systems (2017) and retail payment systems (2018) with completion of a preliminary study into potential applications of DLT for DvP settlement, and commenced a mock test based on the results of this study. Moreover, the BOK organized a seminar on electronic finance in December 2019 where participants discussed the potentiality of DLT and possible directions for regulatory reform that may be required.

The Committee on Financial Informatization Promotion (CFIP), chaired by the senior deputy governor of the Bank of Korea, worked closely with participating financial institutions to ensure the smooth progress of the bank account-based mobile debit payment service project. In 2019, the CFIP launched a working group to decide on technical details, such as settlement standards and processes. After the completion of upgrades to participating financial institutions' IT systems, the mobile debit payment service was deployed in December 2019.

Furthermore, as the chair of the Working Group on Payments and Market Infrastructures (WGP-MI) of the Executives' Meeting of East Asia-Pacific Central Banks (EMEAP), the BOK led discussions among central banks from across the region about ways to improve cross-border payments. Meanwhile, as a member of the BIS Committee on Payments and Market Infrastructures (CPMI), the BOK actively participated in discussions about key CBDC issues and on strengthening the security of large-value settlement systems.

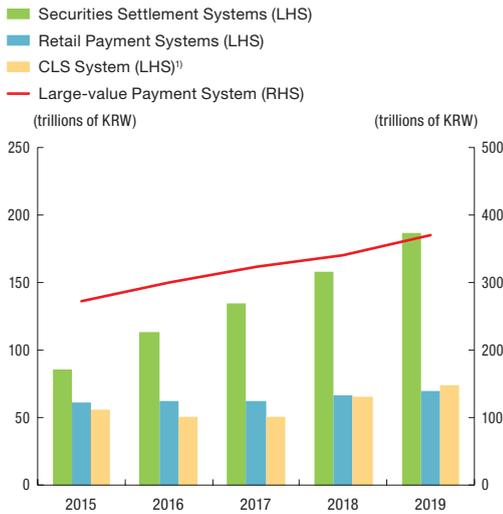
## [Payment and Settlement Trends and Settlement Risk Management]

**④ In 2019, the value of payments and settlements processed through the systems continued on an upward trend, driven mainly by securities settlements by financial institutions and electronic funds transfers by individuals and companies.**

The daily average value of settlements passed through the securities settlement systems amounted to KRW 186.4 trillion, up 18.3% from a year earlier, on an increase in inter-institutional repo transaction. The daily average value of payments processed through the retail payment systems increased 3.7% from the previous year to KRW 69.4 trillion on the steadily rising volume and value of funds transfers via the Electronic Banking System, including internet banking. The daily average value of amounts settled through the CLS system totaled USD 74.3 billion, up 13.6% from a year earlier.

The daily value of settlements processed through BOK-Wire+, the final settler of inter-institutional transactions via securities, retail and foreign exchange settlement systems, amounted to KRW 369.9 trillion, up 8.6% from the previous year.

## Value of Settlements by Major System (daily average)



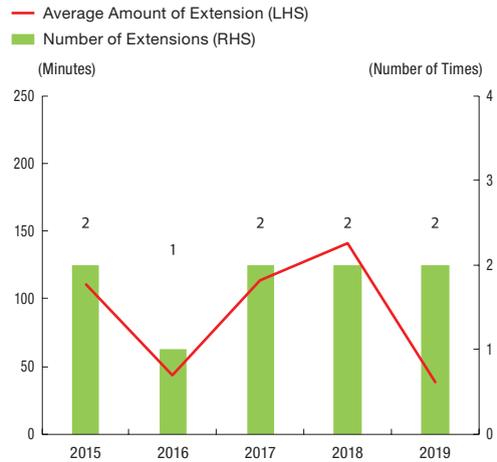
Note: 1) Billions of USD

Sources: Bank of Korea, KFTC, KRX, KSD

### 5 The settlement risks of major payment and settlement systems were managed in a stable manner.

In 2019, final settlement services that BOK-Wire+ provides for funds transfers between participants, securities settlements, retail payments and CLS all operated smoothly. BOK-Wire+'s operating hours were extended twice, both times for repo transactions executed by the BOK for the purpose of liquidity management. The average length of extension was 38 minutes, considerably shorter than during the previous year (141 minutes).

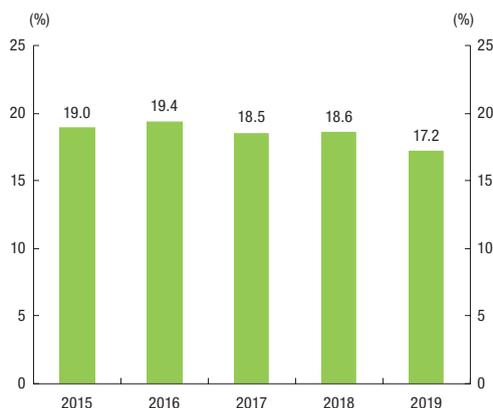
## Extension of BOK-Wire+ Operating Hours



Source: Bank of Korea

The retail payment systems operated by the Korea Financial Telecommunications & Clearings Institute (KFTC) also functioned smoothly. The net debit cap utilization rate of net settlement participants exceeded the cautionary level (70%) 83 times, a decrease from a year earlier (87 times). The average maximum net debit cap utilization rate stood at 17.2%, also recording a decrease from the previous year (18.6%). The share of payment-versus-payment (PvP) transactions in total foreign exchange transactions rose to 76.4%, from 71.3% a year earlier.

**Average Maximum Net Debit Cap Utilization Rate<sup>1)</sup>**



Note: 1) The average of the daily maximum net debit cap utilization rates of all participants.

Source: Bank of Korea

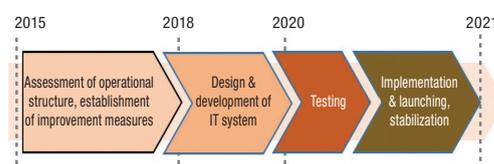
The securities settlement systems managed by the KRX and the KSD also operated smoothly. All transactions in the exchange-traded government bond market were settled by the deadline. In the Inter-institutional OTC Repo Settlement System, the share of free-of-payment (FoP) transactions, carrying a comparatively higher settlement risk due to the time lag between the delivery of securities and payment, fell to 5.7%, from the prior year's 6.7%.

**[Future Policy Directions]**

**⑥ For greater safety and efficiency of payment and settlement systems, the BOK will continuously expand infrastructures and improve the regulatory and institutional framework.**

The BOK will ensure that its next-generation BOK-Wire+ project will come to completion on time, for a planned deployment in the second half of 2020. The system will undergo an internal test during 2020, followed by a full-scale test with participants. Related regulations will also be appropriately amended to reflect new processes and procedures introduced by the next-generation system. Moreover, as part of an effort to facilitate the linkages between domestic and overseas settlement infrastructures, the BOK will actively work on the introduction of ISO 20022, the international electronic messaging standard, after collecting input from participants and once the global review of the project is completed.

**Timeline for the Establishment of the Next-Generation BOK-Wire+**



Source: Bank of Korea

To strengthen the management of credit risk arising from deferred net settlements, the BOK will progressively raise the collateral-to-net debit cap ratio for guaranteeing net settlements in successive steps, as planned. This will be coupled with a careful examination of available options for practically reducing the burden that the new collateral requirement for guaranteeing

net settlements may place on financial institutions. In tandem, the BOK will also continue its research into real-time gross settlement-based retail payment systems operated by central banks in the U.S. and other major countries to determine whether introducing such a system in Korea would be necessary or useful, analyzing their advantages and disadvantages.

The payment and settlement environment is continuously evolving, with payment services increasingly provided, in recent years, by fintech companies and other non-financial institutions. To ensure the safety of payment and settlement systems, all the while supporting innovation in this field, the BOK plans to review current rules for participation and explore improvement strategies.

**7 The BOK will strengthen its payment and settlement system oversight framework by increasing cyber-risk response capabilities and establishing guidelines for the assessment of payment and settlement infrastructures.**

The BOK will enhance its cyber risk response capabilities by stepping up oversight of operational risk in terms of IT, using its payment and settlement data warehouse, and through active cooperation with the BIS Cyber Resilience Coordination Centre (CRCC) and other domestic and international organizations.

Moreover, the BOK will establish assessment guidelines that have been adapted for the domestic payment and settlement environment, all the while closely reflecting the 「PFMI」, 「Resilience of Central Counterparties: Further Guidance on the PFMI」 and 「Recovery of Financial Market Infrastructures」. The new guidelines are

expected to increase transparency, effectiveness and the international conformity of assessment activities, and alleviate the work burden on assessed institutions, all resulting from the implementation of the recommendations for improvement issued by the BOK.

A plan is also in the works to update the oversight framework and revise payment and settlement statistics to reflect the recent increase in the participation of non-financial institutions in the payment service market. Improving the oversight framework is of particular importance for open settlement systems, like the open banking system, in which a substantial level of disparity exists between participating institutions in terms of risk management capabilities. Meanwhile, in light of the increasingly widespread use of various non-traditional electronic payment instruments, going forward payment instrument-related statistics will be further subdivided to include categories such as funding type and access channel.

**8 The BOK will strengthen its effort to promote innovation and advances in payment and settlement systems with financial inclusion initiatives such as protecting the consumer's right to choose between payment instruments.**

The BOK will proactively respond to rapidly-evolving developments surrounding the issue of CBDC through its newly-formed CBDC research units. A planned approach will be adopted for each phase of policy response development, from identification and formulation of policy tasks, through to legal, regulatory and technical research. A system will also be put into place to facilitate cooperation between CBDC units and other sections of the BOK with related

duties such as monetary policy, financial stability, international finance and currency issuance. In addition, the BOK will closely monitor the status of CBDC issues by the central banks of other major countries, and whether or not the Libra or other stablecoins are commercially launched, all while at the same time actively participating in related discussions across the international community, such as at the BIS.

The BOK will continue its research into DLT to determine whether the new technology can be applied to payment and settlement infrastructures. A mock test, currently underway, in which DLT is integrated into the settlement process for DvP transactions, is expected to come to a conclusion during 2020, yielding practical implications for its actual implementation.

These various initiatives to bring innovation to payment and settlement systems will be accompanied by efforts to protect the consumer's right to choose between payment instruments. In response to the recent decrease in the use of cash and to the reduction in the number of ATMs, ATM-related statistics will be further re-organized, and new measures to improve the public's access to cash will be developed and implemented through discussion with interested organizations. Meanwhile, to prevent innovation in payments and settlements from leaving behind those segments of the population that rely mainly on cash as a means of payment, the BOK plans to reinforce education about new emerging payment instruments.

Furthermore, the Committee on Financial Informatization Promotion (CFIP) is preparing a plan to support the broader use of bank account-based mobile debit payment services. By closely working together with participating

institutions, the CFIP will introduce near field communication (NFC) and other contactless payment instruments and expand the network of participating merchants. For the greater convenience of users, additional measures, such as depositing the changes into a bank account and raising the upper limit of deposits, are also planned.

**9 The BOK will proactively respond to the assessment of implementation for international standards, participate in payment and settlement-related international discussions and strengthen cooperation with countries across the region.**

The BOK will closely cooperate with relevant organizations to prepare for the forthcoming examination of implementation for payment and settlement-related international standards by the CPMI and the International Organization of Securities Commissions (IOSCO), scheduled to be conducted on 28 member countries. As part of this preparation, the BOK will review related domestic laws and regulations to determine whether the PFMI are appropriately reflected in them, and will participate in legal and regulatory amendment projects to introduce any needed changes.

The BOK intends to have a strong presence in the international debate concerning payment and settlement issues through active involvement in the activities of the BIS CPMI, and it will make use of the information obtained in the process in its own policymaking and in assisting with the oversight of payment and settlement systems, and while undertaking relevant research. Moreover, the BOK will ensure that Korea, as the chair country of the EMEAP Working Group on Payments and Market Infrastructures,

plays an expanding regional role in the field of payments and settlements. The BOK plans to lead discussions about key issues of interest for member countries, such as the cross-border linkage of payment and settlement infrastructures, CBDC, and increasing the efficiency of cross-border retail payment, all while at the same time laying the groundwork for regional policy cooperation.