

ISSN 1975-7042

Financial Stability Report

2021. 12



BANK OF KOREA

Bank of Korea Mid- and Long-term Strategic Plan (BOK 2030)

- **Vision** **Bank of Korea**
 : **Taking the lead in stabilizing and developing the national economy**

- **Strategic** **Agility** Pursue Innovation in a Flexible and Swift Manner
Directions **Collaboration** Bolster Synergy Through Collaboration
 Expertise Reinforce Policy and Research Capability

BANK OF KOREA

Financial Stability Report

2021. 12

This Financial Stability Report is published in accordance with the provisions of Article 96 of the Bank of Korea Act, and upon the resolution of the Monetary Policy Board.

December 2021



Lee, Juyeol

Governor

Bank of Korea

Chairman Lee, Juyeol
Member Lim, Jiwon
Member Cho, Yoon-Je
Member Suh, Young Kyung
Member Joo, Sangyong
Member Lee, Seungheon
Member Park, Ki Young

Financial stability refers to a condition in which the financial system works smoothly with all of its key components satisfactorily performing their roles: financial institutions carrying out their financial intermediary functions, market participants maintaining a high level of confidence in their financial market, and the financial infrastructure being well developed.

Financial stability is regarded as one of the policy goals that must be achieved, together with price stability and economic growth, for the realization of sustainable economic development. Policy authorities around the world thus devote great efforts to achieving financial stability.

As part of its conduct of macroprudential policies, the Bank of Korea has been publishing the Financial Stability Report on a biannual basis since 2003, analyzing and assessing the potential risks inherent in the Korean financial system and suggesting related policy challenges.

Notably, under the revised Bank of Korea Act of 2011 (Article 96), the Bank of Korea is obliged to draw up a Financial Stability Report and submit and report it to the Korean National Assembly at least two times each year.

The Bank of Korea is devoting its best efforts to qualitative improvement of the Financial Stability Report. This report takes the potential risks to financial stability highlighted until November 2021 as the objects of its analysis.

It is hoped that this Financial Stability Report will help financial market participants, regulators and policymakers to recognize the risk factors inherent in the financial system at an early stage, and deal with them appropriately.

Contents

[Executive Summary]	1
------------------------------	----------

[Financial Stability Situation by Sector]	17
--	-----------

I. Credit Markets	19
1. Credit Leverage	19
2. Household Credit	22
3. Corporate Credit	33

II. Asset Markets	52
1. Bond Markets	52
2. Stock Markets	56
3. Real Estate Markets	59

III. Financial Institutions	71
1. Banks	71
2. Non-Bank Financial Institutions	77
3. Interconnectedness	88

IV. Capital Flows	92
--------------------------	-----------

Contents

[Resilience of Financial System]	97
<hr/>	
I. Financial Institutions	99
1. Banks	99
2. Non-Bank Financial Institutions	110
<hr/>	
II. External Payment Capacity	119
<hr/>	
III. Financial Market Infrastructures	123
<hr/>	
[Overall Assessment]	133
<hr/>	
[Analysis of Financial Stability Issues]	139
<hr/>	
I. Assessment of Recent Domestic and External Financial Imbalances and Implications	141
<hr/>	
II. Financial and Economic Impacts of Household Debt in Korea	152
<hr/>	
III. Impacts of the Normalization of Monetary Policy in Major Countries on Foreign Portfolio Investment in the Domestic Securities Markets	161
<hr/>	
IV. Recent Trends in Interconnectedness in the Financial Sector and Risk Assessment	173

List of Boxes

[Financial Stability Situation by Sector]

Box 1. Status of Household Loan Delinquency Rate and Potential Risk	26
Box 2. Assessment of Recent Default Risk of the Corporate Sector and its Implications	38
Box 3. Potential Risks and Implications of Debt among the Self-Employed Business Owners	46
Box 4. Background and Implications of Recent Expansion of Housing Finance	65
Box 5. Corporate Loans Extended by NBFIs and the Background of their Continued growth	81

[Resilience of Financial System]

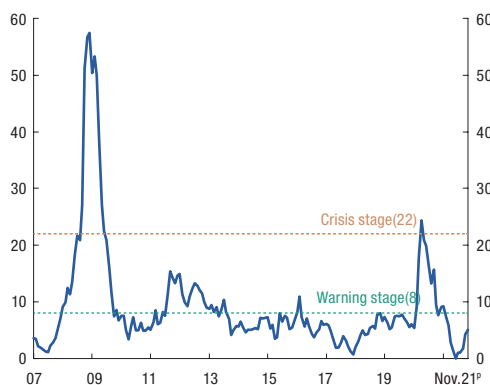
Box 6. Impact of Fintech and Big Tech on Banks	104
Box 7. Impact of Inflationary Pressure on the Financial System and its Implications	112
Box 8. Assessment of Large and Small and Medium Enterprises' Accessibility to Green Finance and its Implications	127

Executive Summary

Overview

Korea's financial system has generally been stable since the first half of this year, supported by economic recovery and a sound external position despite increased volatility in the financial market due to inflationary pressure at home and abroad. The Financial Stability Index (FSI), which shows overall financial system conditions, has remained below the warning stage threshold (8) since falling to its lowest level (0) in June this year.

Financial Stability Index (FSI)¹⁾²⁾



Notes: 1) A composite index (0-100) calculated by standardizing 20 monthly real and financial sector indicators related to financial stability. The warning and crisis stage thresholds are set at 8 and 22 respectively, using the "noise-to-signal" ratio method.

2) Preliminary figures for October and November 2021.

Source: Bank of Korea.

However, the potential vulnerability within the financial system from a medium- to long-term perspective is high due to the continued increase in household debt and the high rise in housing prices. The Financial Vulnerability Index (FVI) fell slightly in the second half of this year but remains higher than in previous years.

Financial Vulnerability Index (FVI)¹⁾²⁾



Notes: 1) A composite index (0-100) calculated by standardizing 39 indicators concerning three criteria for assessment (asset prices, credit accumulation and financial system resilience).

2) Preliminary figures for Q3 2021.

Source: Bank of Korea.

In the credit market, private credit increased significantly as both households and firms expanded their borrowing. Household income and corporate financial conditions are improving, but there is a possibility that the credit risk of vulnerable borrowers such as self-employed business owners could increase depending on the pattern of economic recovery in the future.

In asset markets, volatility in the bond and stock markets expanded due to inflationary pressure at home and abroad and normalization of monetary policies in major countries, while the high upward trend in housing prices continued along with the increase in private credit. The rise in housing sales prices has slowed slightly since September this year, but concerns over a mismatch between housing supply and demand, abundant market liquidity, and economic agents' risk-taking and search-for-yield are potential vulnerabilities.

With regard to financial institutions, asset soundness and profitability continued to improve on

the back of economic recovery, extended financial support measures, and increased lending amid sustained growth in assets. However, bad debts have increased in the food & accommodation industry due to the re-proliferation of COVID-19. The risk of rising delinquency rates may increase due to stricter loan regulations, normalization of financial support and easing measures, and rising lending rates.

The financial system's resilience, i.e. its capacity to withstand domestic and external shocks, has remained favorable, with the capital ratios of both banks and non-bank financial institutions significantly exceeding regulatory standards. In addition, Korea's external payment capacity remained stable, as official foreign exchange reserves recorded a historical high. While overall resilience is expected to remain favorable in the future, the resilience of some financial institutions may weaken depending on changes in financial and foreign exchange market conditions, and in the credit risks of borrowers.

Recently, as financial imbalances in the Korean economy are large and inflationary pressures at home and abroad are increasing, there are concerns about the negative impact on domestic financial stability from the normalization of monetary policy in major countries. Accordingly, this report examines in depth the main risks in terms of the financial stability facing the Korean economy through 「Analysis of Financial Stability Issues」 and 「Boxes」.

First of all, despite the surge in household borrowing, household debt does not appear to have reached the level of limiting household consumption, although continued accumulation of household debt could lead to further expanded volatility in the financial and real economy

and decreased stability of the financial system. In addition, even if monetary policy normalization in major countries proceeds, foreign securities funds are unlikely to flow out of the country on a large scale considering Korea's economic fundamentals. However, vigilance is needed with respect to the risk of faster-than-expected monetary policy normalization by central banks in major countries, leading to increased volatility in the international financial market. In addition, if the real economy recovers sluggishly due to Chinese economic risks amid rising global inflationary pressure at home and abroad, risks such as a decline in the resilience of financial institutions and rises in delinquency and default on loans to self-employed business owners could increase. Therefore, special monitoring and responses in this regard will be needed.

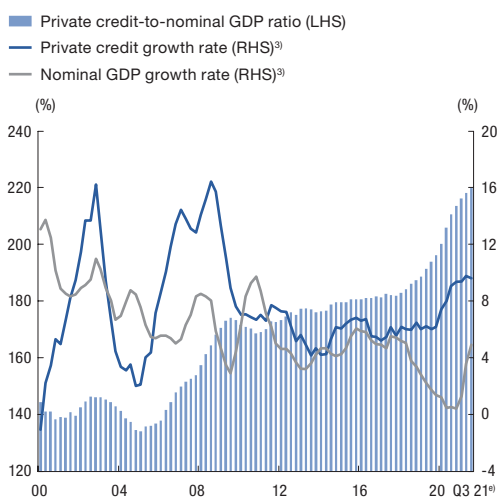
Accordingly, the policy authorities and the financial sector must continue their efforts to respond with policies to curb private debt growth while alleviating economic agents' risk-taking and search-for-yield in the future. However, as credit risks in vulnerable sectors may increase due to the normalization of financial easing measures, efforts to strengthen risk management for these borrowers are also needed. In addition, financial institutions should improve their external payment capabilities and asset soundness to be prepared against external risks and the possibility of expanding credit risks for vulnerable borrowers, while strengthening preemptive capital accumulation efforts.

Financial Stability Situation by Sector

I. Credit Markets

① The private credit-to-nominal GDP ratio, an indicator of the level of private sector leverage, stood at 219.9% (estimated) at the end of the third quarter of 2021, showing a sharp rise of 9.4%p from the same period of last year. This was attributable to the faster increase in private credit, largely because of an increase in household loans, to corporates' increased demand for funds due to the resurgence of the pandemic, and to the government's financial support and easing measures, despite expanded growth in nominal GDP.

Private credit¹⁾-to-nominal GDP²⁾ ratio



Notes: 1) Estimated figures for Q3 2021.

2) Sum of nominal GDPs in quarter concerned and immediately preceding three quarters.

3) Year-on-year basis.

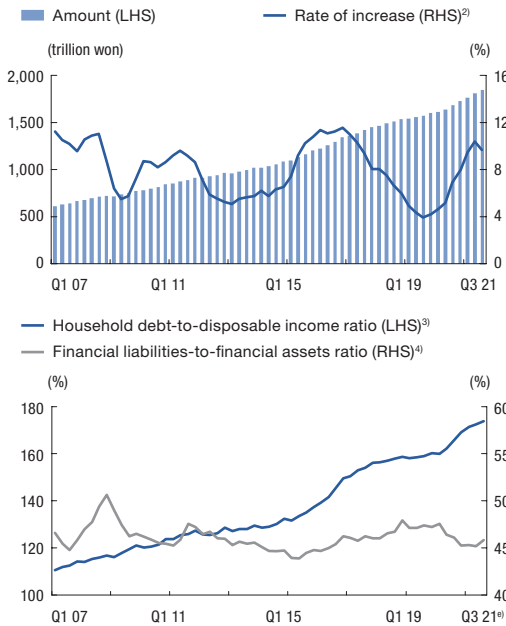
Source: Bank of Korea.

② Household debt (household credit statistics basis) increased by 9.7% year on year to record 1,844.9 trillion won at the end of the third quarter of 2021, showing a continued high rate of growth.

The household debt-to-disposable income ratio stood at 174.1% (estimated) at the end of the third quarter of 2021, a rise of 8.1%p from the same period of last year (166.0%), indicating an increase in the debt servicing burden for households. The financial liabilities-to-financial assets ratio (flow of funds statistics basis), however, dropped by 0.3%p to 45.8% (estimated) at the end of the third quarter of 2021 from a year earlier (46.1%), due to an increase in financial assets, influenced by the rise in stock prices.

Although the delinquency rate of household loans remains low, backed by rapid growth in lending, the rate of heavily indebted households and vulnerable households in particular may increase in the process of normalization of financial easing policy going forward.

Household credit¹⁾



Notes: 1) Household credit statistics basis.

2) Year-on-year basis.

3) Disposable income for Q3 2021 is estimated using the average of the household disposable income-to-gross national income ratios for the immediately preceding three years.

4) Based on flow of funds statistics; estimated figure for Q3 2021.

Source: Bank of Korea.

③ Corporate credit has maintained high growth due to an increase in corporate demand for funds stemming from the resurgence of the COVID-19 pandemic and the expansion of investment related to facilities and real estate, as well as sustained financial support and easing measures, while issuance of corporate bonds and CP also has increased due to demand for issuance in advance in expectation of a rise in interest rates. Corporate loans maintained strong growth to increase by 12.4% to 1,497.8 trillion won at the end of the third quarter of 2021 from the same period last year. By company size, the growth rate of loans to large enterprises decreased year on year, while that of loans to small and medium-sized enterprises (SMEs) showed

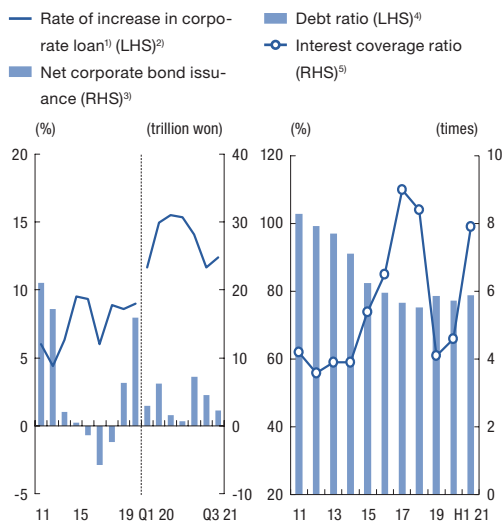
strong growth driven by the extension of support for SMEs hit by COVID-19, and increased demand for funds to be used for facilities.

Corporate financial soundness has improved, backed by recovery in the real economy. The overall corporate debt ratio (debt / equity) in the first half of 2021 rose slightly to 78.9% from 77.2% at end-2020. However, the share of companies with a debt ratio exceeding 200% decreased (15.3% at end-2020 12.3% at end-June 2021). The interest coverage ratio (operating income / total interest expenses) increased substantially to 7.9 from 4.6 in 2020.

In the future, the overall financial soundness of the corporate sector is expected to continue to improve, along with the economic recovery. However, attention should be given to the possibility of the risk of default by vulnerable companies, due mainly to the uneven recovery between company sizes and industries.

Corporate credit

Corporate financial soundness



Notes: 1) Based on deposit-taking banks and non-bank financial institutions (mutual credit cooperatives, mutual savings banks, insurance companies and credit-specialized financial companies); corporate loans by NBFIs for certain periods or sectors include loans to financial and insurance businesses, due to the limited availability of data.

2) Year-on-year basis.

3) Quarterly basis (since 2020).

4) Debt / Equity; end-period basis.

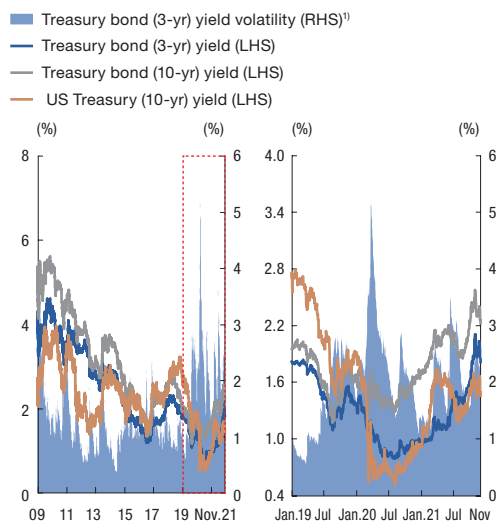
5) Operating income / Total interest expenses.

Sources: Bank of Korea, Korea Securities Depository, KIS-Value, Financial institutions' business reports.

II. Asset Markets

1) Treasury bond yields rose significantly, affected by changes in expectations about monetary policies at home and abroad, and by foreign investors' net sales of Korean Treasury Bond futures.

Korean and US Treasury bond yields

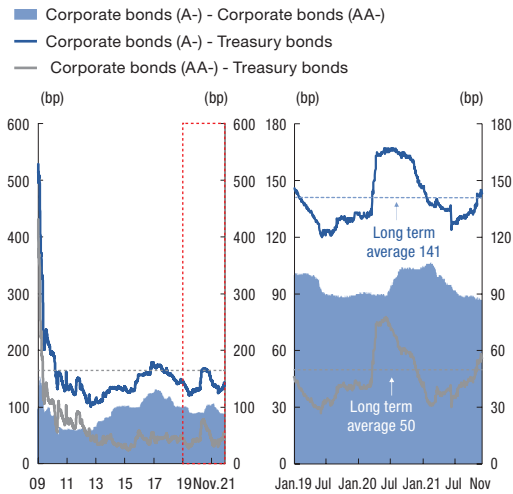


Note: 1) Daily volatility calculated using exponential weighted moving average (EWMA) method.

Sources: Korea Financial Investment Association, Bloomberg.

Corporate bond credit spreads remained stable but have widened slightly since mid-September due to the heightened volatility of Treasury bond yields.

Corporate bond credit spreads,¹⁾²⁾ and spread across credit ratings



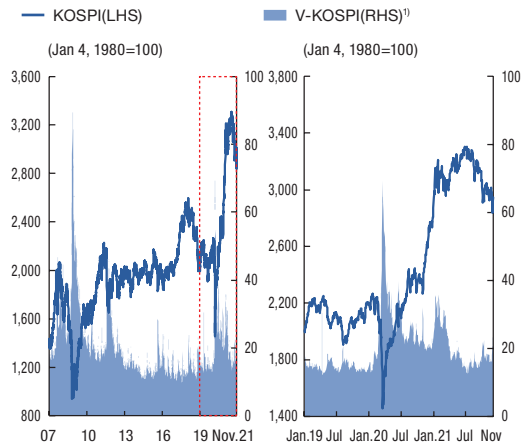
Notes: 1) 3-yr maturity basis.

2) The long-term average is for the period between January 2010 and November 2021.

Source: Korea Financial Investment Association.

② Stock prices reached a record high in early July (3,305 on July 6) but then fell considerably, affected by foreign investors' large-scale net sales in mid-August stemming from concerns about a slowdown in the semiconductor industry. Stock prices bounced back in early September, driven by improvements in corporate performances, but then fell back again, caused by global supply disruptions and changes in expectations related to monetary policy normalization in major countries. Stock prices declined at a faster pace in late November due to concerns about a new COVID-19 variant, but then rebounded afterwards, caused by the recognition that stock prices had fallen excessively. The stock price volatility index (V-KOSPI) temporarily rose and fell at around early October, influenced by external factors, but then rose again in late November due to concerns about the spread of the virus variant.

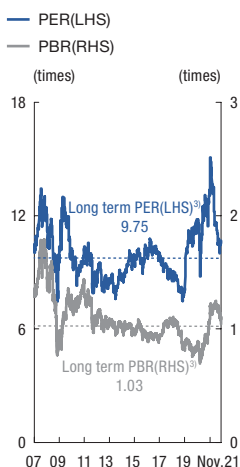
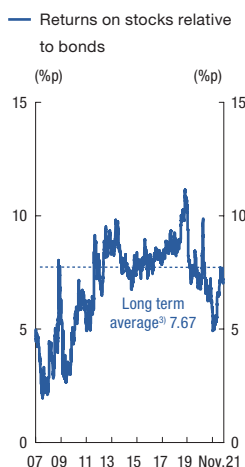
Stock price and stock price volatility indices



Note: 1) Volatility index calculated based on prices for options on the KOSPI200 index.

Source: KOSCOM.

The overvaluation of the stock market was mitigated following declines in stock prices, but stock prices still remain high compared to past years. The price-earnings ratio (PER), showing the level of a firm's stock price relative to its profit, stood at 10.67 as of end-November, running slightly above its long-term average (9.75 since 2010). Meanwhile, the equity risk premium (a lower equity risk premium is associated with greater risk-taking behavior by investors) stood at 7.17%p, remaining below its long-term average (7.67%p since 2010).

PER¹⁾ and PBR²⁾Stock risk premium⁴⁾

Notes: 1) MSCI basis (12-month forward PER)

2) KOSPI basis.

3) Long-term average for in the January 2010-November 2021 period.

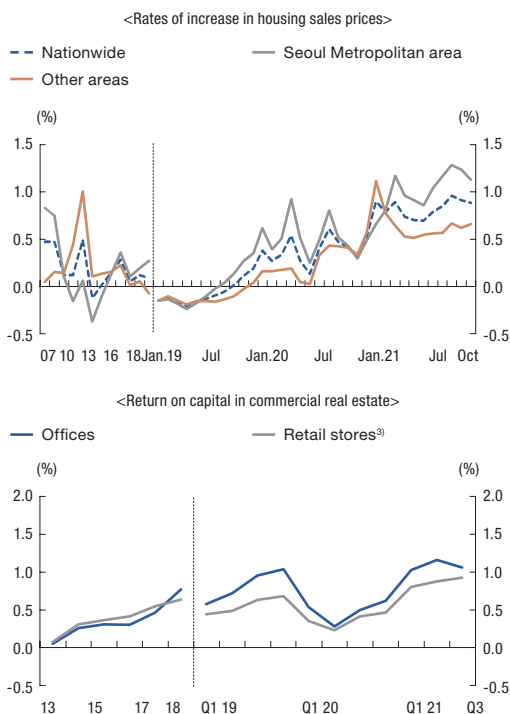
4) Earnings-price ratio (the inverse of 12-month-forward PER based on the MSCI)- Treasury bond yield (10-yr).

Sources: Bloomberg, Refinitiv.

③ Housing sales prices sustained their steep uptrend, despite a reduction in sales transactions, affected by continued expectation for price hikes. Leasehold deposit (jeonse) and monthly rental prices continued to rise, while the volume of transactions increased mainly on monthly rentals.

In the commercial real estate market, rental prices further weakened affected by stricter social distancing measures. However, due to sustained investment demand, return on capital remained high and transaction volume continued to rise.

Exposure to real estate financing continued to expand as the market remained favorable. Nevertheless, the need for preemptive risk management is growing over the possibility that related loans will become insolvent due to rising loan interest rates and the possibility of a real estate market adjustment in the future.

Rates of increase¹⁾ in housing sales prices and return on capital²⁾ in commercial real estate

Notes: 1) For 2018 and earlier, annual average of monthly growth; for 2019 onward, month-on-month increase.

2) Quarter-on-quarter rate of increase in asset value reflecting changes in land and building prices. For 2018 and earlier, annual average.

3) Medium- and large-sized property basis.

Source: Korea Real Estate Board.

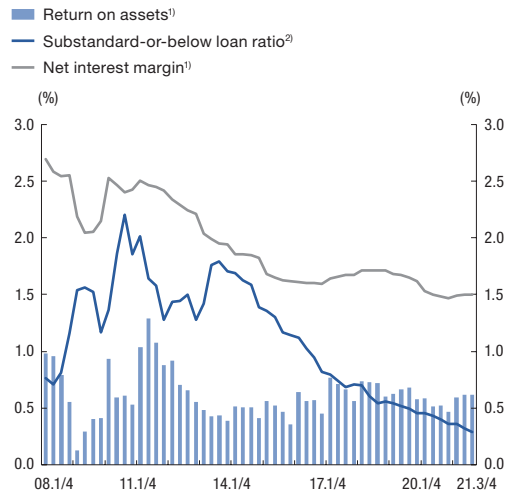
III. Financial Institutions

1 The financial soundness of commercial banks remained generally solid, in terms of both their profitability and asset soundness.

Commercial banks' total assets grew by 11.0% from a year earlier to 2,088 trillion won at the end of the third quarter of 2021, showing the largest increase since the first quarter of 2009 (+14.8%). Their asset soundness continued to improve with the substandard-or-below loan ratio falling to 0.29%, thanks to economic recovery and the government's financial support and easing measures. Their profitability also improved owing to a growth in interest income. Their return on assets (ROA) stood at 0.62% (annualized) in the third quarter of 2021, up 0.10%p from the same period of last year (0.52%).

However, given that distressed debt appears to be growing in certain self-employed businesses affected by the resurgence of COVID-19, such as those in the food & accommodation industry, banks should continue to closely monitor the quality of loans, particularly those extended to vulnerable sectors.

Commercial bank asset soundness and profitability



Notes: 1) Accumulated quarterly incomes annualized.

2) End-period basis.

Sources: Commercial banks' business reports.

2 The financial soundness of NBFIs remained favorable. Their asset soundness and profitability improved from a year earlier in all NBFi sectors.

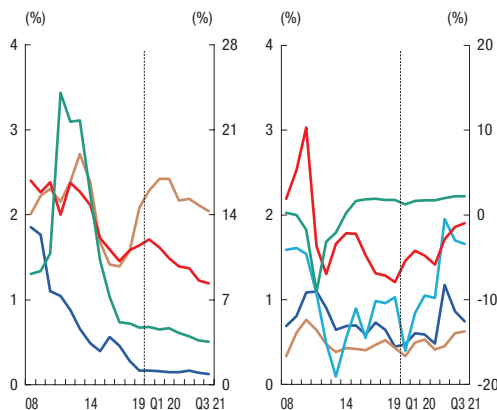
NBFIs' assets recorded 3,311 trillion won at the end of the third quarter of 2021, up by 7.9% year on year. Mutual savings banks showed particularly rapid growth at 32.1% compared to a year earlier. Asset quality strengthened, with delinquency rates and substandard-or-below loan rates falling in most NBFi sectors, particularly in mutual savings banks and credit-specialized financial companies.

Profitability improved significantly, led by mutual savings banks and credit-specialized financial companies. The drivers of this improvement were increased interest income following an expansion in unsecured household loans for mutual savings banks, and substantial growth in fee and interest income for credit-specialized

financial companies.

NBFI standard-or-below loan ratios¹⁾²⁾

— Insurance cos. (LHS) — Mutual credit cooperatives (LHS)
— Credit-specialized cos. (LHS) — Securities cos. (LHS)
— Mutual savings banks (RHS)



Notes: 1) End-period basis, excluding securities cos.

2) For 2019 and earlier, annual basis; for 2020 onward, quarterly basis.

3) Accumulated quarterly income annualized.

Sources: Financial institutions' business reports.

③ The growth in financial institutions' interconnectedness through their funding and operations has slightly slowed, as their fund operations through the household and corporate sectors expanded. Mutual transactions among financial institutions amounted to 3,090 trillion won at the end of the second quarter of 2021, rising only by 6.5% from the same period of last year (10.4% at Q2-end 2020). Mutual transactions accounted for 32.7% of the total assets of the overall financial sector, down by 0.5%p from the same period of last year.

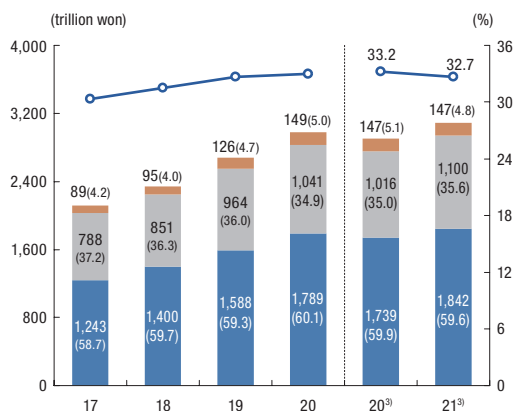
Looking at mutual transactions across financial sectors, those between banks and NBFIs and those among NBFIs rose by 8.4% and 5.9% respectively, while those among banks declined by 0.2%. As a result, the proportions of mutual transactions within the banking sector of total

mutual transactions went up by 0.6%p to 35.6% at the end of the second quarter of 2021.

Analysis of the default contagion and concentration risks based on the structure of mutual transactions across financial sectors shows that both remained at similar levels to those of last year.

Mutual transactions among financial institutions and across sectors¹⁾²⁾

■ Within banking sector (LHS)
■ Between banks and NBFIs (LHS)
■ Among NBFIs (LHS)
○ Proportions in total assets (RHS)



Notes: 1) Mutual transaction amounts are on an end-period basis (flow of funds statistics).

2) Figures within parentheses are the proportion of the total amount of mutual transactions.

3) Based on end-Q2 of each year.

Source: Bank of Korea.

IV. Capital Flows

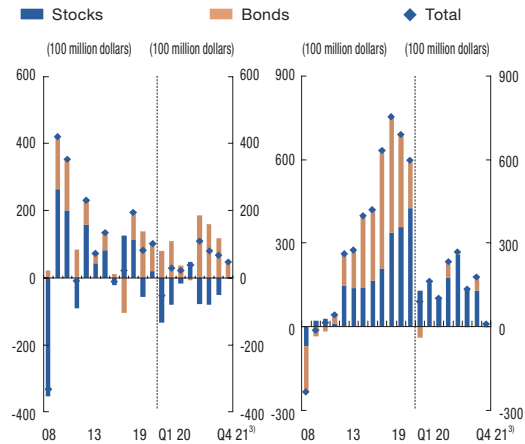
From January to November 2021, foreigners' domestic stock investment recorded a net outflow while foreigners' domestic bond investment registered a net inflow. Foreigners' funds for stock investment showed a net outflow due to concerns over the slowing increase in corporate profits in major industries. However, foreigners' funds for bond investment continued to show net inflows, driven by public funds, thanks to Korea's favorable external soundness and relatively high domestic interest rate levels.

Going forward, the volatility of foreigners' domestic portfolio investment is expected to expand, affected by the pace of monetary policy normalization in major economies, and the pace of economic recoveries at home and abroad. Net inflows of bond investment are projected to continue for some time, considering the level of domestic interest rates.

Between January and October 2021, residents' overseas portfolio investment increased greatly year on year from 39.4 billion dollars to 58.9 billion dollars, as investment in overseas stocks rose substantially.

Changes¹⁾ in foreigners' domestic portfolio investment

Changes²⁾ in residents' overseas portfolio investment



Notes: 1) A "+" means net inflow, and a "-" net outflow.

2) A "+" means net investment, and a "-" net withdrawal.

3) Changes in foreigners' domestic portfolio investment are based on October-November; changes in residents overseas portfolio are based on October.

Source: Bank of Korea.

Resilience of Financial System

I. Financial Institutions

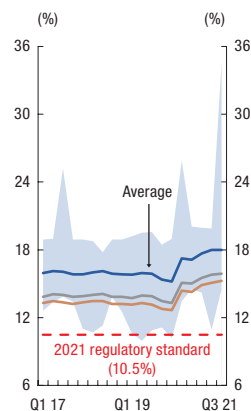
1 Commercial banks' resilience remained generally solid, with their capital adequacy ratio rising and liquidity ratios exceeding the regulatory standards.

Commercial banks' total capital ratio and Common Equity Tier 1 Capital ratio under Basel III, indicative of their loss absorption capacities, amounted to 17.98% and 15.26% at the end of the third quarter of this year, up by 0.83%p and 0.98%p respectively compared to the end of last year. Commercial banks' liquidity coverage ratio (LCR), measuring the ability to respond to sudden net outflows of funds, declined slightly by 1.2%p from the end of last year to reach 93.9% at the end of October 2021. The decrease was attributable to a rise in net cash outflows affected by an increase in standby money held by corporations.

Financial institutions need to take preemptive actions to enhance their loss absorption capacities, as there is a possibility of relevant risks increasing with the termination of government's financial support and easing measures and rising market interest rates.

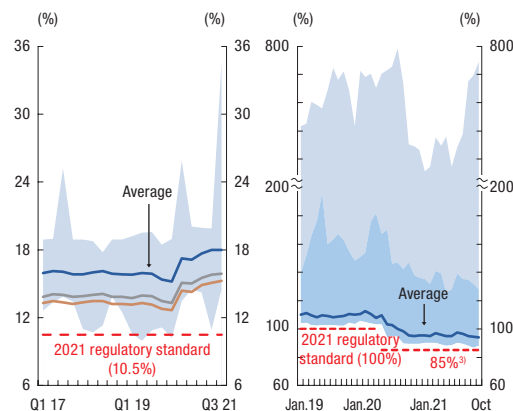
Commercial bank total capital ratios¹⁾

— Total Capital ratio
— Tier 1 Capital ratio
— Common Equity Tier 1 Capital ratio



Commercial bank liquidity coverage ratios (LCRs)¹⁾²⁾

— Commercial banks' liquidity coverage ratio (LCR)



Notes: 1) The shaded area indicates the distribution of individual banks, and the deep shaded area indicates distribution with Internet-only banks excluded.

2) High-quality liquid assets / Total net cash outflows over next 30 calendar days.

3) 85% for a limited period from April 2020 to March 2022.

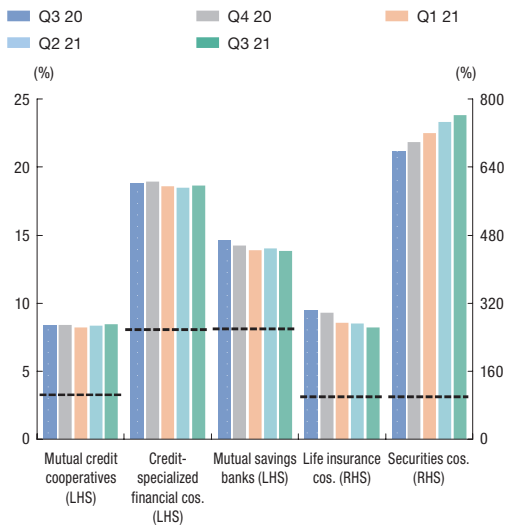
Sources: Commercial banks' business reports.

2 The resilience of NBFIs remained favorable as well, with their capital adequacy ratio exceeding the regulatory standards in all sectors.

The net capital ratio of securities companies moved up by 64.1%p from the end of last year to reach 762.7% at the end of the third quarter of 2021. The risk-based capital ratio (RBC ratio) of life insurance companies declined by 35.1%p compared to the end of last year to stand at 262.2%. Mutual savings banks' BIS capital ratio and credit-specialized financial companies' adjusted capital ratio dropped by 0.4%p and 0.3%p from the end of last year to come to 13.8% and 18.6% respectively due to rises in lending. The net capital ratio of mutual credit cooperatives rose by slightly from the end of last year to reach 8.5%.

Although the resilience of NBFIs is currently at a favorable level, some financial institutions with insufficient loss absorption capacities should make preemptive recapitalization efforts in preparation against changes in conditions at home and abroad.

NBFI capital adequacy ratios¹⁾²⁾



Notes: 1) Mutual credit cooperatives' net capital ratio (supervisory standard 2%; 4% for MG community credit cooperatives and 5% for NongHyup), credit-specialized financial companies' adjusted capital ratio (7%; 8% for credit card companies), mutual savings banks' BIS capital ratio (7%; 8% for banks with total assets of 1 trillion won or more), insurance companies' risk-based capital ratio (100%), securities companies' net capital ratio (100%).
2) The dotted lines show the supervisory standards.

Sources: Financial institutions' business reports.

II. External Payment Capacity

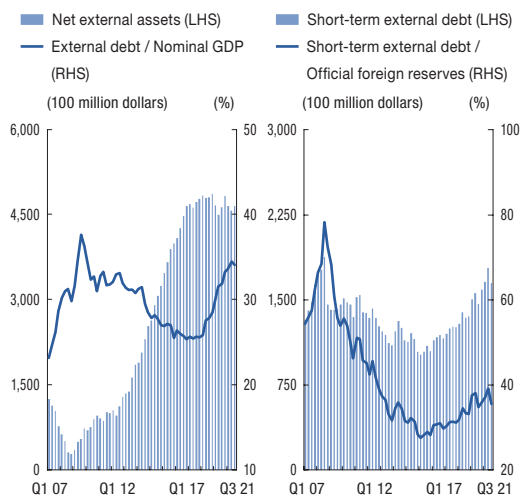
Korea's external payment capacity remained generally satisfactory.

Net external assets increased by 1.8 billion dollars year on year. Official foreign reserves showed volatility in the first half of this year due to changes in the exchange rate, but showed an overall upward trend in the second half to stand at 463.91 billion dollars at the end of November 2021.

The ratio of external debt relative to nominal GDP rose year on year, which is attributable to the increase in foreigners' domestic bond investment, and the soundness of external debt is regarded as generally favorable. The ratio of short-term external debt relative to official foreign reserves increased slightly year on year from 34.7% to 35.5% in the third quarter of 2021.

External debt-to-nominal GDP ratio¹⁾

Short-term external debt-to-official foreign reserves ratio¹⁾



Note: 1) End-quarter basis.

Source: Bank of Korea.

III. Financial Market Infrastructures

The payment and settlement systems have been operated smoothly, with settlement risks managed stably amid an increase in the amount of settlement, driven mainly by securities settlements by financial institutions and electronic funds transfers by general customers and companies.

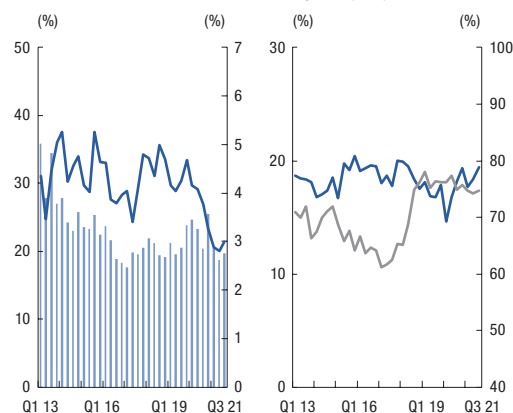
The rate of maximum intraday overdraft cap utilization and the proportion of payment orders in queue for settlement, both of which are monitored as indicators of the settlement liquidity of BOK-Wire+ participants in the nation's large-value settlement system, remained generally stable to stand at 19.8% and 3.0%, respectively, during the third quarter of 2021. The net debit cap utilization rate, showing settlement risks related to the retail payment systems operated by Korea Financial Telecommunications & Clearing Institute, was also favorable at 19.4%. Meanwhile, the share of settlements handled by the CLS payment-versus-payment system, which reduces settlement risk effectively through the settlement of foreign exchange transactions without any time lag, maintained a high level of 74.8% in the third quarter of 2021.

Large-value payment system

- Rate of maximum intraday overdraft cap utilization (LHS)¹⁾
- Proportion of payment orders in queue for settlement (RHS)²⁾

Retail payment and foreign exchange settlement systems

- Average maximum net debit cap utilization rate (LHS)³⁾
- Proportion of foreign exchange settlements made using CLS system (RHS)⁴⁾



- Notes: 1) Average of daily maximum intraday overdraft cap utilization rates of participants.
 2) Average ratio of the amount of payment orders in queue for settlement / Total settlement amount of participants (excluding payment orders in queue for liquidity savings).
 3) Simple average of daily maximum net debit cap utilization rates (unsettled net debits / net debit caps) of participants during the quarter.
 4) Proportions in total CLS eligible FX transactions of those settled through the CLS system, transactions made by domestic banks and foreign bank branches.

Source: Bank of Korea.

Financial Stability Situation by Sector

I. Credit Markets	19
II. Asset Markets	52
III. Financial Institutions	71
IV. Capital Flows	92

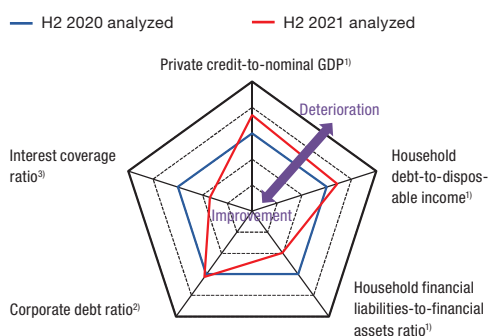
I. Credit Markets

The private credit-to-nominal GDP ratio,¹⁾ an indicator of the level of private sector leverage, rose despite the expansion of GDP growth as private credit growth accelerated.

As household credit continued its steep upward climb, exceeding income growth, the household debt service burden increased.

Corporate credit also continued its robust growth on the continued financial support amid the COVID-19 pandemic and net issuance of corporate bonds and commercial paper (CP) driven by preemptive issuance demand by companies in anticipation of interest rate hikes. In tandem with the economic recovery, the financial soundness of companies has improved.

Figure I-1. Map of changes in credit market conditions



Notes: 1) Extents of change as of end-Q3 2021 compared to end-Q3 2020 indexed.
2) Extents of change as of end-June 2021 compared to end-2020 indexed.
3) Extents of change as of H1 2021 compared to 2020 indexed.

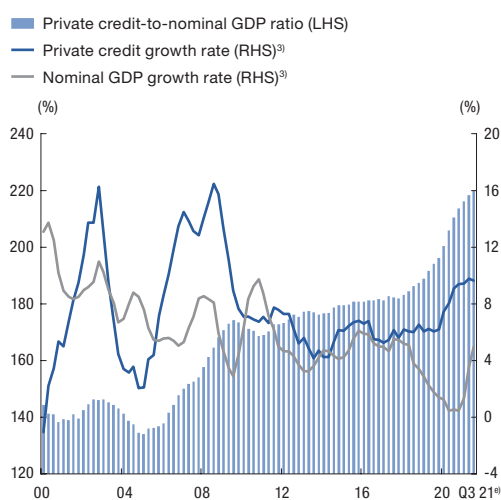
Source: Bank of Korea.

1. Credit Leverage

Continuous rise of private credit-to-nominal GDP ratio

At the end of the third quarter of 2021, the private credit²⁾-to-nominal GDP ratio recorded year-on-year growth of 9.4%p, rising to 219.9% (estimated).³⁾ This is attributed to private credit growing by 9.6%, which is higher than the nominal GDP⁴⁾ growth rate of 5.0% (Figure I-2).

Figure I-2. Private credit¹⁾-to-nominal GDP²⁾ ratio



Notes: 1) Estimated figures for Q3 2021.

2) Sum of nominal GDPs in quarter concerned and in immediately preceding three quarters.

3) Year-on-year basis.

Source: Bank of Korea.

Continuous uptick in both household and corporate leverage

Credit leverage continued on an upward path

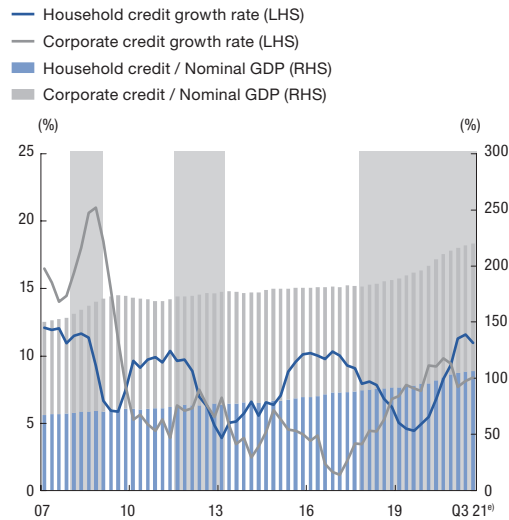
1) The level of private sector leverage can be assessed using a variety of financial and real economic indicators, such as the private credit growth rate by sector, debt repayment burdens of households and corporations, housing price levels, and bank leverage. In this report, the level of private sector leverage is discussed based primarily on the private credit-to-nominal GDP ratio, which is the global common reference guide recommended by the Basel Committee on Banking Supervision (hereafter "BCBS," 2010) under the Bank for International Settlements (BIS).

in both the household and corporate sectors. At the end of the third quarter of 2021, the household credit-to-nominal GDP ratio rose by 5.8%p year on year to 106.5%, and the corporate credit-to-nominal GDP ratio climbed by 3.6%p year on year to 113.4%.

The household credit growth rate continued rising at the end of the third quarter of 2021 to 11.0% year on year on the back of rising credit demand associated with housing transactions.

Corporate credit also showed robust year-on-year growth of 8.4%, fueled by the demand for liquidity amid the resurgence of the pandemic and extension of financial support measures and easing of COVID-19 prevention measures by the government (Figure I-3).

Figure I-3. Credit leverage and credit growth rates,¹⁾²⁾³⁾ by sector



Notes: 1) Estimated figures for Q3 2021.

2) Year-on-year basis.

3) Shaded area indicates contraction period of Composite Economic Indexes Indicators.

Source: Bank of Korea.

Widening household and corporate credit-to-nominal GDP gap

In both the household and corporate sectors, the gap⁵⁾ between credit leverage and its long-term trend has continued to widen significant-

2) The BCBS (2010) broadly defines private credit as “all types of debt funds provided to households and non-financial corporations.” In accordance with this definition, we used the sum of household debt (borrowing from financial institutions and government) and corporate debt (borrowing from financial institutions and government and issuance of securities other than shares) private and government loans and securities other than shares) as reported in the flow of funds statistics.

3) Household and corporate credit based on the flow of funds statistics for the third quarter of 2021 were estimated through a linear regression model using the rate of household credit growth (based on household credit statistics) and the rate of corporate credit growth of deposit-taking institutions, respectively, as the explanatory variables.

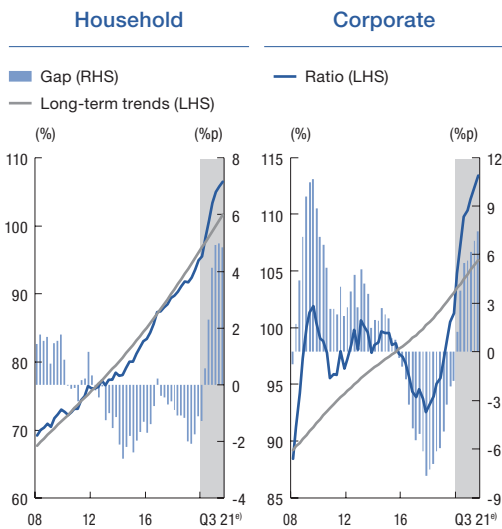
4) Calculated as the sum of the nominal GDP of the current quarter and that of the three preceding quarters, this amount is not the same as the quarterly nominal GDP reported in the national income statistics.

5) As the household or corporate credit-to-nominal GDP ratio tends to rise over the long run as a result of financial deepening, the gap between this ratio and its long-term trends, i.e. its deviation from long-term trends, is used as a common indicator to measure systemic risk in time series. Although the BCBS (2010) recommends a smoothing parameter of 400,000 when calculating long-term trend values using an HP filter (one-sided), in this report, we opted for a significantly smaller smoothing parameter (25,000), given that the financial cycle in Korea is much shorter than in other OECD economies.

ly since the first half of 2020, when it turned positive. The household credit-to-nominal GDP gap recorded +4.9%p during the third quarter of 2021 (+2.3%p, in the third quarter of 2020)

The corporate credit-to-nominal GDP gap widened to +7.5%p during the third quarter of 2021, since entering positive territory in the first quarter of 2020 (Figure I-4).

Figure I-4. Private credit-to-nominal GDP ratios and gaps,¹⁾²⁾ by sector



Notes: 1) Differences between credit-to-nominal GDP ratio and long-term trend value based on HP filter, by sector.

2) Shaded area indicates the period during which the gap was positive.

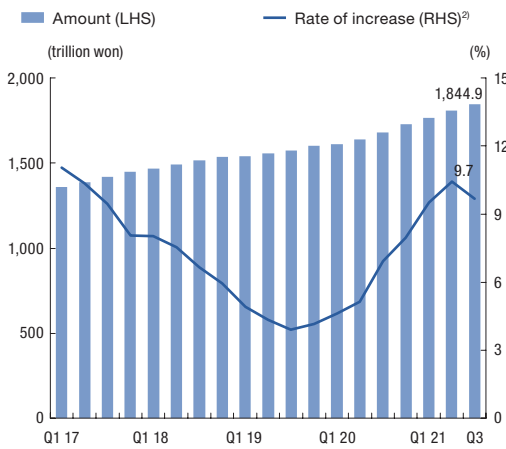
Source: Bank of Korea.

2. Household Credit

Continued steep upward trend

Household debt (based on household credit statistics) continued on a steep upward curve, reaching KRW 1,844.9 trillion at the end of the third quarter of 2021, up 9.7% from the same period a year earlier (Figure I-5). Of this amount, KRW 1,744.7 trillion was accounted for by household loans (94.6% of total household debt) and KRW 100.2 trillion (5.4%) by merchandise financing.

Figure I-5. Household credit¹⁾

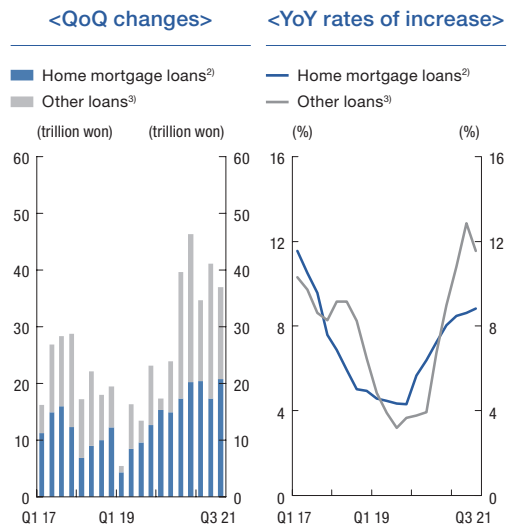


Notes: 1) Household credit statistics basis.
2) Year-on-year basis.

Source: Bank of Korea.

By loan type, home mortgage loans climbed by 8.8% year on year to reach KRW 969.0 trillion at the end of the third quarter of 2021. This increase was due to the increased loan demand associated with housing sales and leasehold deposits amid rising prices. Unsecured and other loans amounted to KRW 775.7 trillion, representing an 11.6% year-on-year increase (Figure I-6).

Figure I-6. Household loans,¹⁾ by loan type



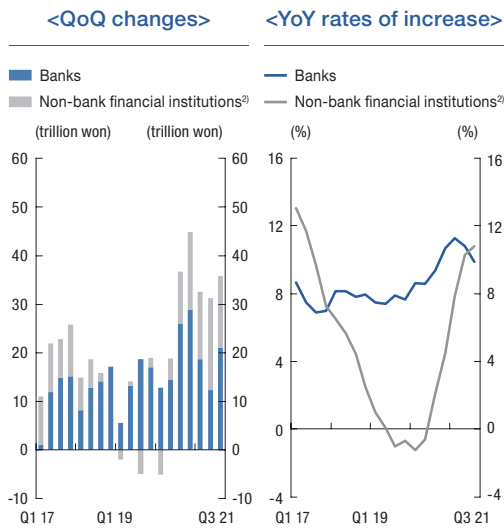
Notes: 1) Household credit statistics basis.

2) Home mortgage loans, leasehold deposit fund loans, etc.

3) Secured loans not collateralized by housing, unsecured loans, guaranteed loans, etc.

Source: Bank of Korea.

By type of financial institution, banks' household loan balance soared by 9.9% year on year to KRW 902.0 trillion at the end of the third quarter of 2021. Household loans by non-bank financial institutions (NBFIs) rose by 10.8% to KRW 651.5 trillion, growing at a rate faster than that of loans by banks due to differences in regulations between types of financial institutions (Figure I-7).

Figure I -7. Household loans,¹⁾ by financial sector

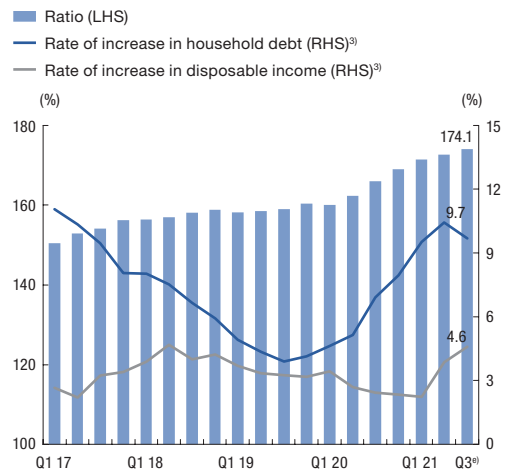
Notes: 1) Household credit statistics basis.

2) Non-bank deposit-taking institutions and others (excluding Korea Housing Finance Corporation, etc.).

Source: Bank of Korea.

Increased debt service burden for households

At the end of the third quarter of 2021, the household debt-to-disposable income ratio (based on household credit statistics) increased 8.1%p year on year to 174.1% (estimated). Although households' disposable income showed signs of improvement, households' debt service burden expanded significantly as household debt continued to soar at a higher rate (Figure I-8).

Figure I -8. Household debt¹⁾-to-disposable income²⁾ ratio

Notes: 1) Disposable incomes for Q3 2021 are estimated using the average of the household disposable income-to-gross national income ratios for the immediately preceding three years.

2) Household credit statistics basis.

3) Year-on-year basis.

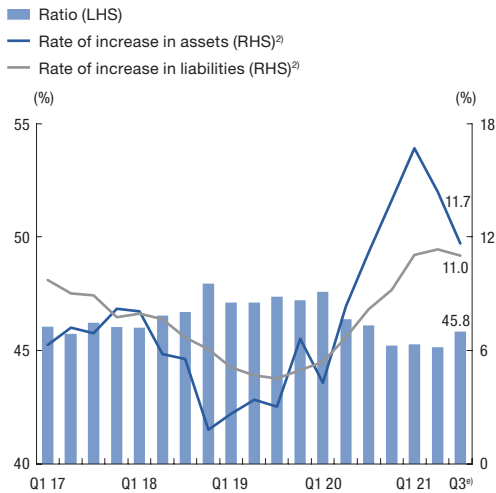
Source: Bank of Korea.

Meanwhile, the financial liabilities-to-financial assets ratio (based on flow of funds statistics) stood at 45.8%⁶⁾ (estimated) at the end of the third quarter of 2021, representing a year-on-year slip of 0.3%p. The higher rate of growth of financial assets (11.7% year on year), caused mainly by elevated⁷⁾ equity valuations, outpaced the rate of growth of financial liabilities (11.0%) during the same period (Figure I-9).

6) At the end of 2020, Korea's financial assets-to-financial liabilities ratio stood at 45.2%, above the OECD average (31.2%, which is arithmetic average of 33 countries for which data is available).

7) Owing to the impact of the rise in stock prices (KOSPI, 31.8% year on year), equity securities and investment funds accounted for 61.1% of the increase in total financial assets.

Figure I -9. Financial liabilities-to-financial assets ratio¹⁾



Notes: 1) Flow of funds statistics basis.

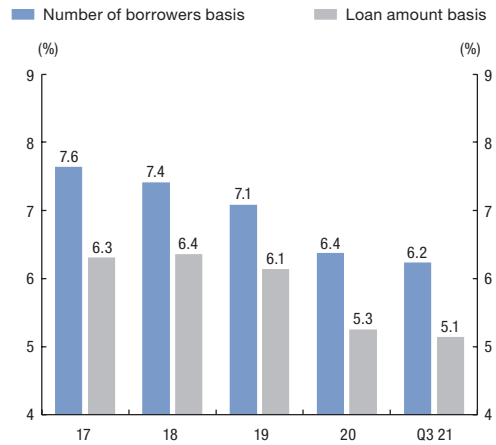
2) Year-on-year basis.

Source: Bank of Korea.

Declining share of vulnerable borrowers

The share of borrowers with comparatively low debt repayment capacities among total household borrowers declined slightly. At the end of the third quarter of 2021, borrowers with low income (bottom 30%) or low credit ratings (credit score of 664 or below),⁸⁾ who also hold multiple household loans, accounted for 6.2% of all borrowers, dropping slightly from the end of the previous year. In terms of loan value, the share of vulnerable borrowers of total household loans was 5.1%, edging down from the share recorded at the end of 2020 (Figure I-10).

Figure I -10. Proportions of vulnerable borrowers



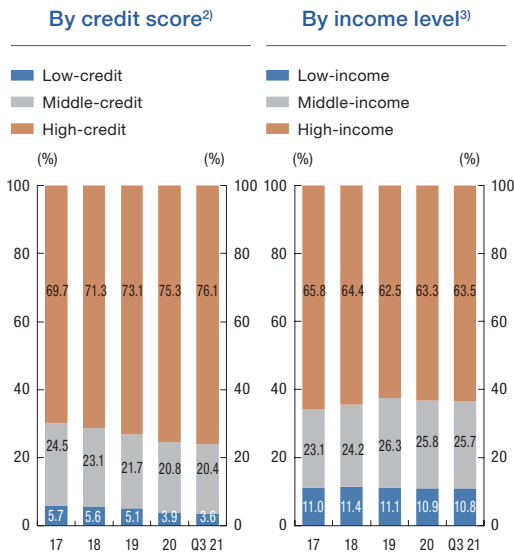
Source: Bank of Korea (Consumer Credit Panel).

By borrower profile, while the share of borrowers with high credit ratings continued edging higher,⁹⁾ the share of high-income borrowers remained mostly unchanged from the end of 2020. At the end of the third quarter of 2021, the share of borrowers with high credit ratings stood at 76.1%, up 0.8%p from the end of the previous year, and the share of high-income borrowers was 63.5%, up 0.2%p from the end of the previous year (Figure I-11).

8) In 2021, the rating system for consumer creditworthiness was changed from a grade-based system to a score-based one. In this report, scores of 840 and above (based on credit scores by NICE Credit Information Service) were considered high; scores between 665 and 839, average; and scores below 664, low.

9) This came as financial institutions focused on increasing loans to borrowers with high credit ratings for the sake of risk management and as the credit ratings of borrowers overall were adjusted upwards as the delinquency rate declined amid low-interest rates.

Figure I -11. Shares¹⁾ in household loans, by borrower credit score and income level

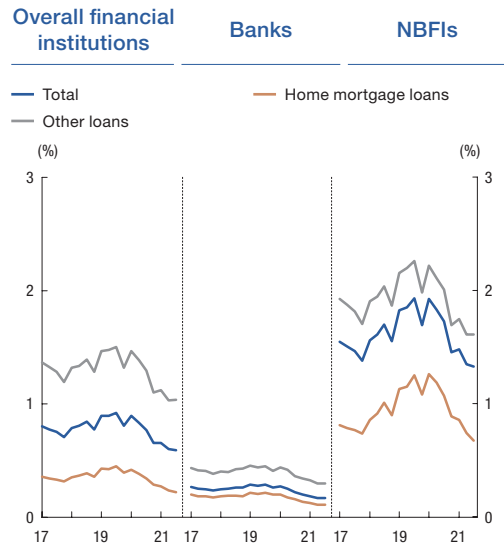


Notes: 1) Loan amount basis.
 2) High-credit (scores greater than or equal to 840), middle-credit (scores 665-839), low-credit (scores less than or equal to 664).
 3) High-income (top 30%), middle-income (30-70%), low-income (bottom 30%).

Source: Bank of Korea (Consumer Credit Panel).

Household loan delinquency rates of both banks and non-bank financial institutions continued falling. At the end of the third quarter of 2021, the household loan delinquency rate dropped 0.09%p year on year to 0.17% for bank loans and fell 0.45%p to 1.33% for non-bank loans, setting a record low (Figure I-12).

Figure I -12. Delinquency rates¹⁾ of household loans extended by banks and NBFIs²⁾³⁾



Notes: 1) Based on delinquencies of one month and longer (for mutual credit cooperatives and mutual savings banks, principal delinquencies of one day and longer or interest delinquencies of one month and longer).
 2) Mutual savings banks, mutual credit cooperatives, insurance companies, credit-specialized financial companies, etc.
 3) Excluding insurance contract loans for insurance companies, and including card (excluding merchandise credit), installment and lease assets for credit-specialized financial companies.

Sources: Financial institutions' business reports.

Box 1.

Status of Household Loan Delinquency Rate and Potential Risks

The delinquency rate of household loans of financial institutions¹⁾ has declined since the fourth quarter of 2019. The rapid growth of loans to borrowers with high credit ratings that occurred after the outbreak of COVID-19 is likely to have led to this decline in the delinquency rate. However there is a possibility that the credit risk²⁾ of borrowers may increase due to rising loan interest rates and phasing out of financial support measures.

This section examines the trends and recent status of the delinquency rate of household loans and the factors behind the decline in the delinquency rate, and checkreviews the potential risks.

Trends and recent status of delinquency rate

Since the global financial crisis, the delinquency rate of household loans has fallen to its lowest level, standing at 0.60% at the end of June 2021, after going through³⁾ two ups and downs.

1) Based on delinquency of one month or and longer (same hereinafter).

2) The household loan credit risk index of domestic banks (lending behavior survey resultsthe results of the Loan Officer Survey on Financial Institution Lending) is projected to rise from 6six in the third quarter of 2021 to 18 in the fourth quarter of 2021. The credit risk index (projection) of non-bank financial institutions in the fourth quarter rose in all sectors (mutual savings banks: 13 → 22, credit card companies: 14 → 36, mutual credit cooperatives: 24 → 33, life insurance companies: 6 → 9).

3) Around 2012, the delinquency rate rose as domestic economy recovery was delayed amid the global financial crisis and European sovereign debt crisis, and the fall inof housing prices persisted largely in the Seoul metropolitan area. Around 2018, the delinquency rate climbed mainly in home mortgage loans by non-bank financial institutions as the domestic economy was in a downturn due to external factors such as the US-China trade dispute, financial instability in emerging countries, and sluggish housing market sluggishness in regional areas of Korea.

Changes in the share of delinquency amounts of household loans by sector and loan type

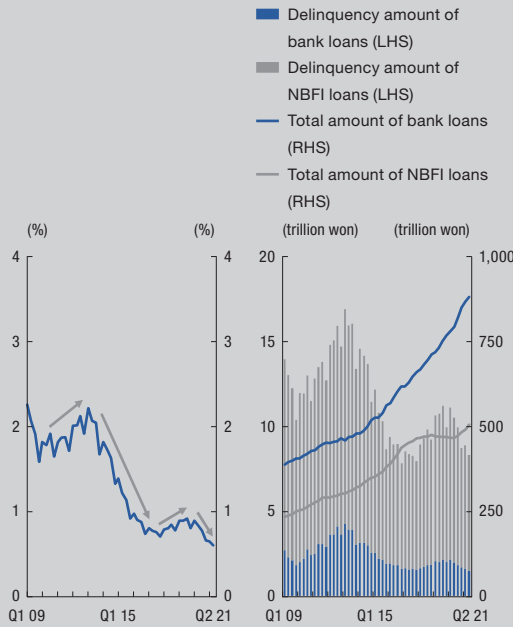
Category	Period	Home mortgage loans by banks	Home mortgage loans by non-bank financial institutions	Other loans by banks	Other loans by non-bank financial institutions
Rise in delinquency rate	4Q 2011 to 1Q 2013	+2.1(14.2 → 16.3)	+2.0(17.6 → 19.6)	+0.1(8.7 → 8.8)	-4.2(59.5 → 55.3)
	1Q 2018 to 3Q 2019	+0.5(9.5 → 10.0)	+2.1(14.9 → 17.0)	+0.2(9.0 → 9.2)	-2.8(66.6 → 63.8)
Fall in delinquency rate	2Q 2013 to 4Q 2017	-5.9(15.8 → 9.9)	-5.5(20.0 → 14.5)	+0.7(8.7 → 9.4)	+10.7(55.5 → 66.2)
	4Q 2019 to 2Q 2021	-2.7(10.6 → 7.9)	-2.8(16.3 → 13.5)	+0.4(9.5 → 9.9)	+5.1(63.6 → 68.7)

Note: 1) () refers to the share of the delinquent amount of the respective loans in total delinquent amount.

Sources: Financial institutions' business reports

Trends of household loan delinquency rate¹⁾

Trends in the volume of total and delinquent household loans

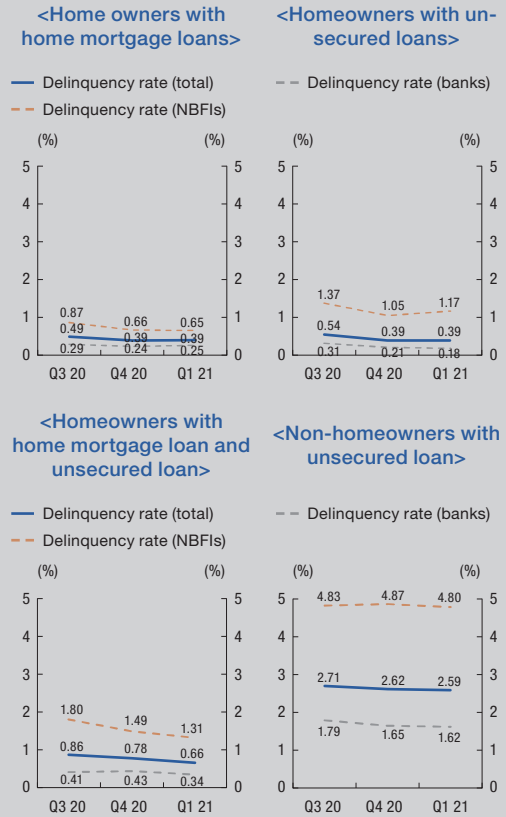


Notes: 1) Sum of banks and NBFIs including mutual savings banks, mutual credit cooperatives, credit-specialized companies, and insurance companies. Data available after 2009 due to limited statistics.

Source: Financial institutions' business reports.

Looking at the breakdown of the delinquency rate of household loans after COVID-19 by borrowers' home ownership and loan type, the delinquency rate of non-homeowner borrowers with unsecured loans from non-bank financial institutions without owing a homestead at 4.80% at the end of March 2021, a record high. Among homeowners, the delinquency rate of borrowers who had both home mortgage loans and unsecured loans was higher than that of other borrowers. In particular, as a significant portion of these borrowers may have relied heavily on external borrowings to purchase housing heavily relying on, their delinquency rate could rise sharply with a change in economic conditions.

Household delinquency rate¹⁾ by borrowers' ownership of housing, by sector and loan type



Note: 1) Data available after Q3 2020 due to limited statistics.
Source: Bank of Korea (Consumer Credit Panel database).

The causes of recent decline in delinquency rate

As a result of decomposing the contribution of the decline (-0.21%p) inof the household delinquency rate from the fourth quarter of 2019 to the second quarter of 2021, both the decrease in delinquent loans⁴⁾ (numerator: -0.12%p) and the increase in the loan balance (denominator: -0.09%p) were all found to have had an impact on the decline in the delinquency rate.

4) Last year, the size of the sale and write-off of non-performing household loans at domestic banks reached only KRW 0.3 to 0.5 trillion and shrunk significantly this year. Hence, the impact of the sale and write-off of non-performing loans on the reduction of the delinquent amount is assessed as not significant.

Contribution analysis¹⁾ of the decline in the delinquency rate after COVID-19

	Delinquency rate	Delinquent loans (numerator)	Total loans (denominator)
Change (%)	0.81 → 0.60	-16.7	+12.1
Contribution (%p)	-0.21	-0.12	-0.09

Note: 1) End-Q2 2021 compared to end-Q4 2019 basis.
Source: Financial institutions' business reports.

The background behinds the decline in the delinquency rate despite the ongoing COVID-19 crisis is analyzed by examining individual factors below.

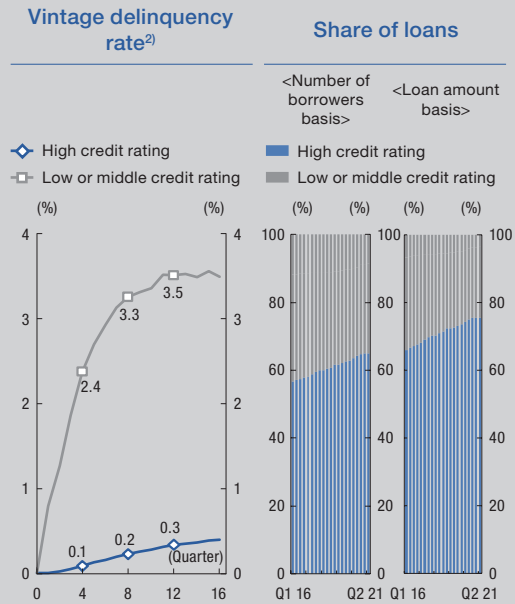
(Strengthening credit risk management and expanding loans to borrowers with high credit ratings)

The household loan delinquency rate has fallen as financial institutions⁵⁾ have expanded their share of loans to borrowers with high credit ratings and sufficient debt repayment capacity while strengthening their risk management of household loan borrowers.

A review of the vintage delinquency rate⁶⁾ according to the credit ratings of borrowers (2013-2021) shows that the delinquency level for loans with high credit is significantly lower than for loans with low or middle credit, and the increase

in the delinquency rate over time is also small.⁷⁾ Loans from high-credit borrowers increased⁸⁾ by over 10% this year, with their share of total loans inching higher by 2.4%p after the COVID-19 pandemic (73.1% at the end of 2019 to 75.5% at the end of June 2021).

Status of delinquency and loan amount by credit rating¹⁾ of borrowers



Notes: 1) High credit rating means scores greater than or equal to 840.
2) Average of delinquency rates by year from Q1 2013 to Q2 2021.
Source: Bank of Korea staff calculation.

In particular, the increase in unsecured loans to borrowers with high credit ratings and easier

5) Banks have steadily launched a wide range of unsecured loan products for office workers with high job security such as professionals, government employees, and employees of large corporations, boosting access to loans for borrowers with high credit ratings. Furthermore, financial institutions allocated credit mostly to borrowers with high credit ratings who have sufficient debt repayment capacity for the sake of risk management amid the government's regulation on household loans.

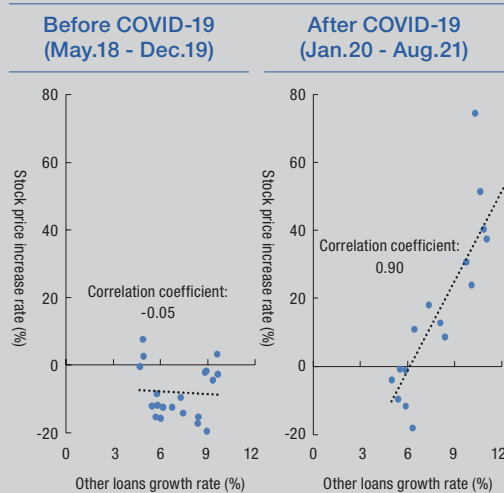
6) For details, refer to Box 1 "Household Loan Delinquency Rate by Vintage," Financial Stability Report, June 2021 (p.26).

7) The vintage delinquency rate of household loans to borrowers with low and middle credit ratings rose steeply to 2.4% in one year after the loans were made, 3.3% in two years, and 3.5% in three years. On the other hand, the vintage delinquency rate of loans issued to borrowers with high credit ratings gradually rose by the range of 0.1% to 0.3% the three years after the loans were made.

8) The growth rate of loans to borrowers with high credit ratings (year on year, loan amount basis) climbed by 4.3%p from 6.6% in the fourth quarter of 2019 to 10.9% in the second quarter of 2021.

access to loans is related to the trend of asset investment in high-risk, high-yield assets such as stocks such as according to the trend of pursuing and, and such risk has not yet materialized under the impact of the cumulative rise in asset prices.⁹⁾ In fact, the relationship between the growth rate of other loans (including unsecured loans) and the growth rate of stock prices before and after the COVID-19 pandemic showed that the correlation coefficient (0.90) between the two variables after the pandemic increased sharply from its pre-pandemic level (-0.05).

Relationship between growth¹⁾ rate of loans²⁾ and increase rate¹⁾ of stock prices



Notes: 1) Year-on-year basis.

2) Based on other loans including unsecured loans by deposit-taking institutions.

Sources: Bank of Korea, KB Kookmin Bank.

(Increase in housing-related loans)

The recent decrease in the delinquency rate of household loans is also in large measure due to the sharp increase in housing-related loans. As the delinquency rate is calculated by dividing the delinquent loan amount (numerator) by the loan

balance (denominator) at a specific point of time, the delinquency rate immediately declines as much as the loan increases to the same extent as the increase in loans. After COVID-19, with the significant growth of home mortgage loans (up 6.6% from the fourth quarter of 2019 to the second quarter of 2021, based on the Consumer Credit Panel database) and a sharp increase in Jjeonse loans (up 48.3%), the sum of home mortgage loans and jJeonse loans accounted for 53.6% of total household loans at the end of June 2021. Moreover, if unsecured loans held by borrowers of housing-related loans are included, the proportion rises by 0.9%p, increasing from 61.2% at the end of 2019 to 62.1% at the end of June 2021.

Growth rate¹⁾ and share²⁾ of housing-related loans

	Growth rate	Share (%)	
		Q4 2019	Q2 2021
Housing-related loans (A)	12.6	53.5	53.6
(Home mortgage loans)	6.6	45.8	43.5
(Jeonse loans)	48.3	7.7	10.1
Unsecured loans by borrowers of housing-related loans (B)	24.3	7.7	8.5
Total (A+B)	14.0	61.2	62.1

Notes: 1) End-Q2 2021 compared to end-Q4 2019 basis.

2) End-quarter basis; loan balance to total household loans.

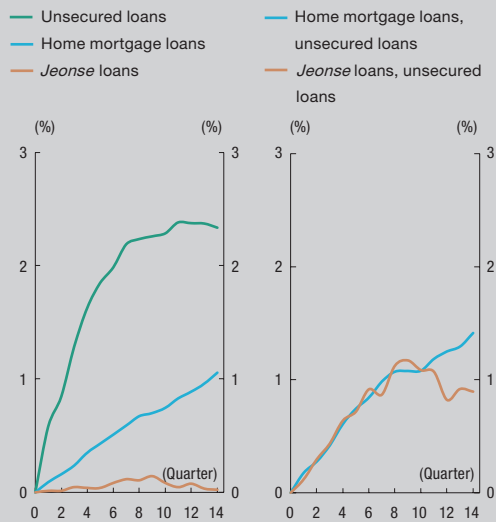
Source: Bank of Korea(Consumer Credit Panel database).

On the other hand, the delinquent amount (numerator) tends to rise gradually with time, rather than immediately in proportion to the increase in loan balance. A review of the vintage delinquency rate of loans (2013-2021) that can track the change in delinquency over time showed that the rate peaked after a certain period of time. Accordingly, in the early phase of the loans,

9) From January 2020 to August 2021, stock prices (KOSPI) and housing prices (based on data of Kookmin Bank) rose by 51.0% and 19.1%, respectively.

the increase in the loan balance is less likely to lift the delinquency rate of total household loans. In particular, the vintage delinquency rate of *Jjeonse* loans remained at a very low level, while that of home mortgage loans¹⁰⁾ crept up gradually for a long period. If unsecured loans¹¹⁾ held by borrowers of housing-related loans are included, the vintage delinquency rate rises slightly higher than that only for housing-related loans, although the pace of increase tends to be gradual.

Vintage delinquency rate¹⁾ by household loan type



Note: 1) Average of delinquency rates by year from Q1 2013 to Q2 2021; *jeonse* loans are from Q3 2017.

Source: Bank of Korea staff calculation.

(Continuation of COVID-19-related financial support measures)

Meanwhile, the various financial support and relief measures and Base Rate reduction implemented after COVID-19 are assessed as having made a significant contribution to lessening the burden of debt repayment for household loan borrowers and mitigating the risk of delinquency. Notably, the measures to defer the repayment of principal and interest for vulnerable borrowers who suffered serious damages and faced difficulties in securing funds amid the pandemic helped lower the delinquency rate of household loans considerably.

Examination of potential risks

As examined above, the delinquency rate of household loans has fallen in tandem with the rapid increase in loans to borrowers with high credit ratings and the implementation of financial support measures after the pandemic. Meanwhile, the delinquency rate is likely to surge given the tendency of delinquency rates to rise after a certain period of time from loan extension, concern over heightened volatility in the asset market along with the recent rise in the loan interest rate, and the upcoming termination of financial support and relief measures in early 2022.

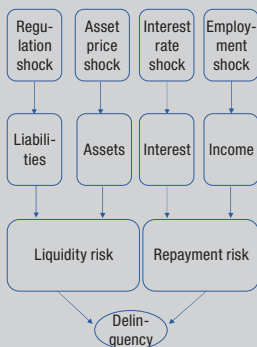
The empirical analysis in consideration of the transmission channel affecting the delinquency rate shows that the decline in housing prices

10) As of the end of June 2021, the average LTVs of banks (41.3%) and mutual credit cooperatives (60.9%) dropped by 8.9%p and 1.1%p, respectively, from the end of 2019, showing that collateral capacity has improved.

11) Because loan balance decreases due to principal redemption and the delinquent amount increases with time, the vintage delinquency rate tends to go up with time. By loan type, home mortgage loans have a longer maturity (15.7 years on average) and higher share of loans with amortization, showing an even distribution of delinquencies and gradual rise in the vintage delinquency rate. On the other hand, as unsecured loans have a shorter maturity (1.4 years on average) and the portion of loans with bullet repayment is over 90% of the total, the vintage delinquency rate tends to soar rapidly in a short period of time (one to two years) and later rise at a much slower pace.

and rise in the loan interest rate are critical factors affecting the earlier phase of delinquency. Given these, it should be noted that a steep rise in the loan interest rate as a result of the soaring inflationary pressure as well as the more stringent regulation on household loans could escalate the pressure for an asset price adjustment or a decrease in income, leading to higher delinquency rates among borrowers with excessive debts or vulnerable borrowers who face difficulty securing liquidity and repaying principal and interest.

Pathway of shock on household loan delinquency rate



Impulse-response function¹⁾ of household loan delinquency rate



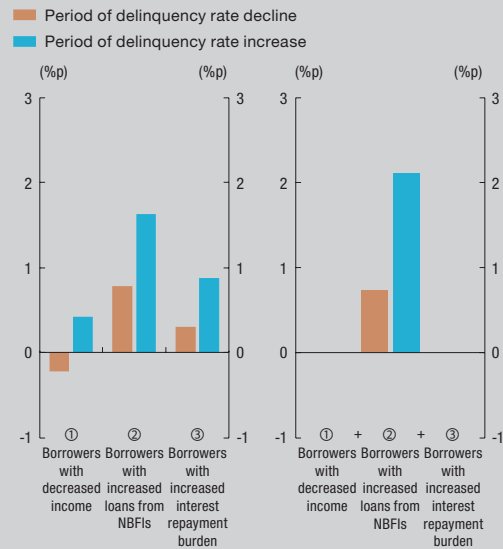
Notes: 1) Using a vector autoregression model and applying the differentiated variables in the order of housing prices, employment rate, CD interest rate, household loans, and delinquency rate according to the result of the Granger causality test, Analysis period is from Q1 2009 to Q2 2021.

Source: Bank of Korea staff calculation.

These characteristics were observed on two occasions in the past where the delinquency rate increased due to the deterioration of domestic and global conditions. During these adverse times, spurred by the sluggish housing market, the delinquency rate of home mortgage loans rose appreciably, driven up by some borrowers with excessive debts. In particular, for borrowers who experienced a combination of a drop

in income, an increase in loans from non-bank financial institutions, and an increase in interest burden simultaneously, the delinquency rate rose at a rate three times faster than it did when conditions were favorable (+0.7%p when the delinquency rate was falling and +2.1%p when it was rising).

Increase in delinquency rate of borrowers with decreased income, increased loans by NBFIs and increased interest repayment burden¹⁾



Notes: 1) Borrowers receiving three shocks such as a decrease in income, increase in loan by NBFIs, and increase in interest repayment burden individually or simultaneously over the past two periods of delinquency rate incline or decline.

Source: Bank of Korea (Consumer Credit Panel database).

The decline in the delinquency rate of household loans observed after COVID-19 seems to be related, to a large extent, to the spike in demand for loans to purchase assets such as stocks and housing amid the upward spiral of asset prices as well as the effects of various policies. It should be noted that, as observed in the past, a sharp increase in asset purchases using loans could increase the risk of a downward adjustment in asset prices and further amplify the risk of a rising delinquency rate in the future. Hence,

prudential preparation is necessary to cope with a surge in delinquency risk among vulnerable households, driven by the accelerated rise in the loan interest rate amid the domestic and global economic recovery, inflationary pressure, and regulation on household loans.

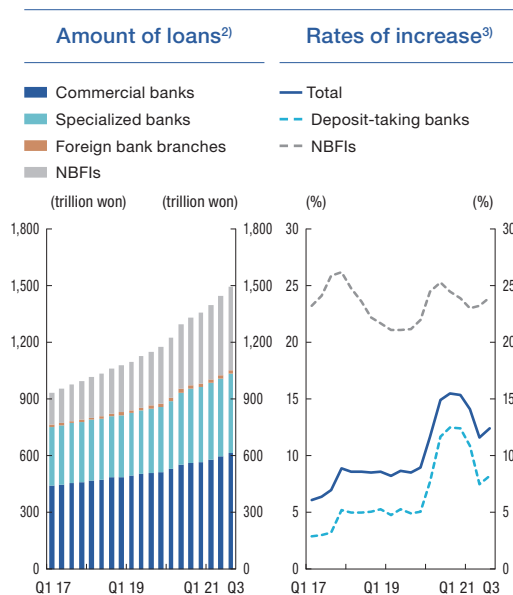
3. Corporate Credit

Continued growth of corporate credit

Corporate loans by financial institutions continued on a steep upward trend, jumping by 12.4% year on year to KRW 1,497.8 trillion at the end of the third quarter of 2021. The pace of growth of corporate loans remained faster than the pre-pandemic level, due to the resurgence of COVID-19, rise of raw material prices, expanded investment in facilities and real estate, and the government's extension¹⁰⁾ of pandemic lending programs.

By type of financial institution, corporate loans from both deposit-taking banks and NBFIs grew at a higher rate. At the end of the third quarter of 2021, corporate loans by deposit-taking banks reached KRW 1,055.2 trillion (KRW 615.1 trillion in commercial bank loans and KRW 423.1 trillion in loans by specialized banks), representing a year-on-year increase of 8.2% (9.3% for commercial banks and 7.3% for specialized banks). Corporate loans by NBFIs¹¹⁾ recorded sharp year-on-year growth of 24.0%, reaching KRW 442.6 trillion,¹²⁾ mainly driven by a sharp rise in loans by mutual credit cooperatives (28.7%) (Figure I-13).

Figure I -13. Corporate loans of financial institutions¹⁾



Notes: 1) Deposit-taking banks include commercial banks, specialized banks and foreign bank branches; NBFIs include mutual savings banks, mutual credit cooperatives, insurance companies, and credit-specialized financial companies.
 2) End-period basis; excluding financial and insurance companies.
 3) Year-on-year basis.

Sources: Financial institutions' business reports.

By company size,¹³⁾ loans to large enterprises continued decreasing over two consecutive quarters on a year-on-year basis, while loans to SMEs maintained a strong upward momentum. While loans to large enterprises (KRW 208.4 trillion, year-on-year growth of -1.4%) decreased, largely driven by a decrease in

10) In September 2021, the government again extended its loan forbearance programs (maturity extensions, deferred interest repayment measures) for SMEs and small businesses for six more months, until March 2022. The BOK also extended its temporary relief program for COVID-19-impacted businesses by six months, also until March 2022, and increased the limit of loans for small business owners by KRW 3 trillion.

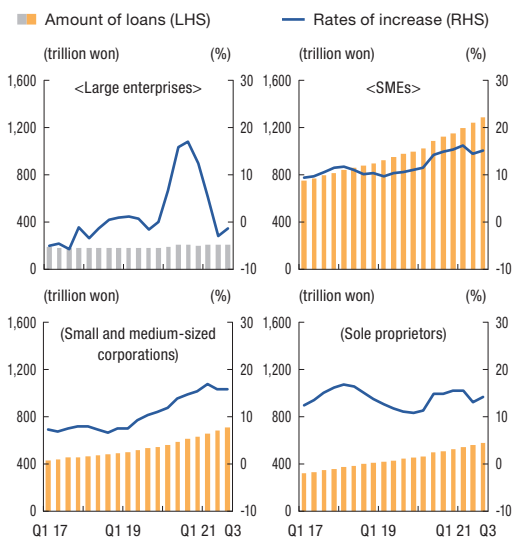
11) Corporate loans by NBFIs include loans extended by mutual savings banks, mutual credit cooperatives (Nonghyup, Suhyp, Forestry Cooperatives, Shinhyp, and MG Community Credit Cooperatives), insurance companies (life insurance and liability insurance companies), and credit-specialized financial companies. However, due to the limited availability of data, the data of some sectors include loans to financial and insurance companies.

12) By type of financial institution, this amount breaks down to KRW 246.5 trillion for mutual credit cooperatives (55.7% of total corporate loans by NBFIs), KRW 95.0 trillion for insurance companies (21.5%), KRW 57.3 trillion for credit-specialized financial companies (12.9%), and KRW 43.8 trillion for mutual savings banks (9.9%).

13) Due to the limited availability of data, some NBFIs loans that could not be classified by company size were excluded from this analysis.

bank loans, loans to SMEs (KRW 1,287.2 trillion, year-on-year growth of 15.1%) showed an upward trend, owing to the continuation of financial support amid COVID-19 and expansion of demand for facilities loans (small- and medium-sized enterprises: KRW 707.9 trillion, 15.8%; sole proprietors: KRW 579.3 trillion, 14.1%) (Figure I-14).

Figure I -14. Corporate loans,¹⁾²⁾³⁾ by company size

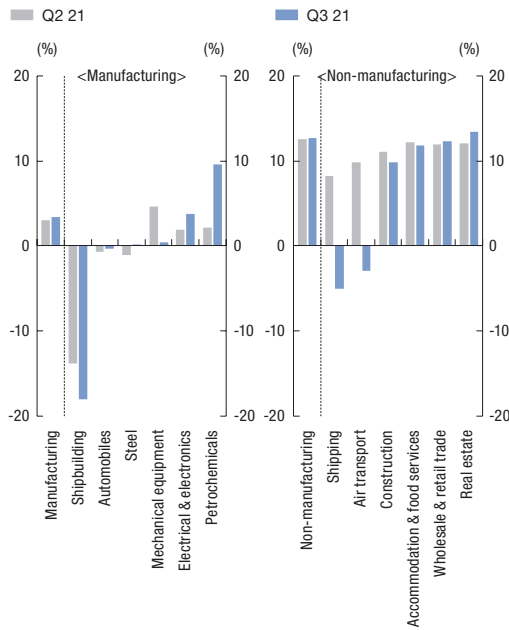


Notes: 1) Based on sum of banks and NBFIs.
 2) End-period basis (excluding financial and insurance companies); rates of increase are year-on-year basis.
 3) "Small and medium-sized corporations" refers to SMEs other than sole proprietors.
 Sources: Financial institutions' business reports.

By industry,¹⁴⁾ loan growth accelerated¹⁵⁾ for petrochemicals and electrical & electronics in the manufacturing sector, while the same was

true for real estate, wholesale & retail trade and accommodation & food services in the non-manufacturing sector (Figure I-15).

Figure I -15. Growth rates¹⁾ of financial institutions' corporate loans,²⁾ by industry

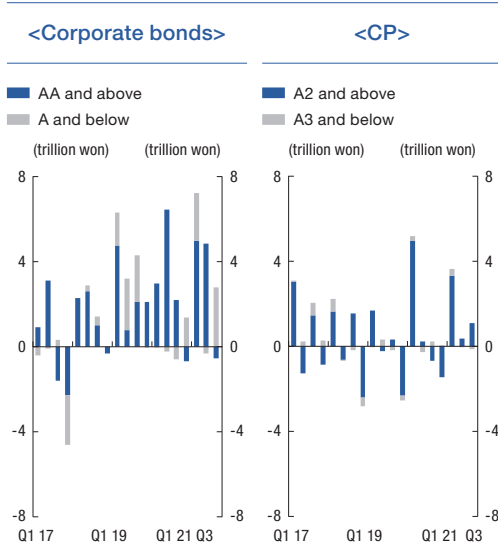


Notes: 1) Year-on-year basis.
 2) Based on sum of banks and some non-bank financial institutions that can be classified by industry.
 Sources: Financial institutions' business reports.

In the direct finance market, there was a net issuance of corporate bonds and commercial papers as companies moved to preemptively issue debt instruments in anticipation of upward pressure on interest rates (Figure I-16).

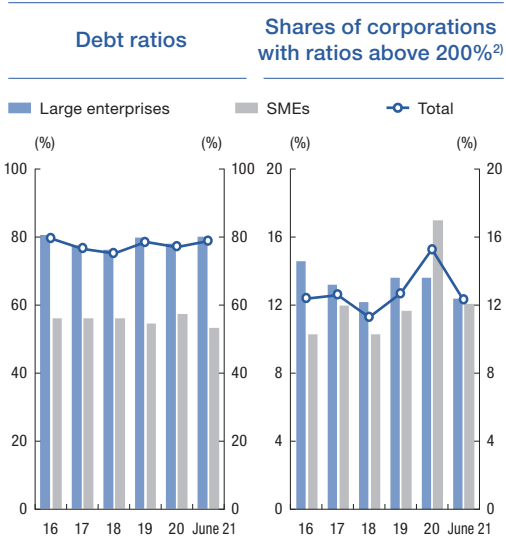
14) The analysis excluded corporate loans by some types of institutions (mutual savings banks, credit-specialized financial companies, and community credit cooperatives) due to the data not being classified by industry.
 15) Loans to the petrochemicals sector increased sharply due to the increase in raw material prices, while loans to the wholesale & retail trade and accommodation & food services sectors also rose significantly owing to increasing demand for working capital amid the resurgence of COVID-19. Meanwhile, loans to the electric & electronics sector climbed at a faster pace owing to an increase in facilities investment, and loans to the real estate sector soared by a larger margin due to growing demand for facilities loans to fund investment in commercial property.

Figure I -16. Corporate bond and commercial paper (CP) issuance¹⁾



Note: 1) Excluding issuance by financial holding companies and special purpose companies (SPCs); net-issuance basis.
Sources: Bank of Korea, Korea Securities Depository, Korea Credit Information Services.

Figure I -17. Corporate debt ratios,¹⁾ by company size



Notes: 1) Debt / Equity; end-period basis.
2) Including corporations with capital erosion.
Source: KIS-Value.

Fall in the share of excessively indebted firms

The overall corporate¹⁶⁾ debt ratio (debt / equity), stood at 78.9%, up slightly¹⁷⁾ from the end of 2020 (77.2%). However, the share (12.3%) of firms with a debt ratio above 200% (excessively indebted firms) showed a decline from the end of 2020 (15.3%)¹⁸⁾ (Figure I-17).

Significant improvement of growth and profitability

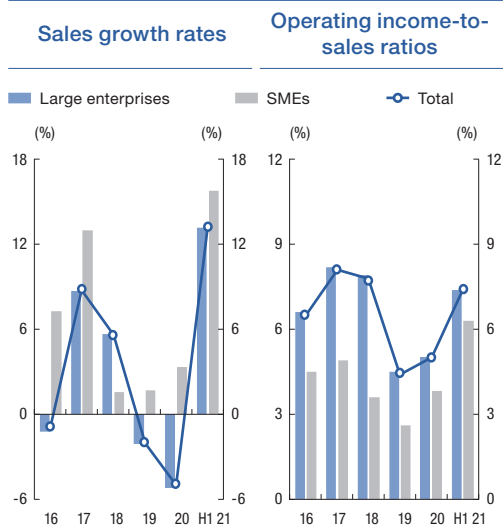
In the first half of 2021, the sales growth rate of firms was 13.2% on a year-on-year basis, showing a sharp turnaround from the decline in 2020 (-5.0%). By industry, the steel, automobiles, and petrochemical sectors, which were sluggish in 2020, saw their sales recover significantly, while sales of the shipbuilding and airline businesses remained on a downward path on a year-on-year basis. By company size, the rate of sales growth turned positive

16) Hereafter, based on 2,265 firms (1,171 large enterprises and 1,094 SMEs), including listed companies and some unlisted companies required to file a business report pursuant to the Financial Investment Services and Capital Markets Act (excluding the financial and insurance industries). Note that the analytical sample firms used in this analysis are not the same as the sample used in the Financial Statement Analysis and that the debt ratios and other financial soundness indicators reported here are also different as a result.
17) As for the average debt ratio by firm size, the ratio of large enterprises rose (78.2% → 80.3%), while that of SMEs fell (57.4% → 53.3%).
18) As for the share of excessively indebted firms by firm size, both large enterprises and SMEs saw their ratios fall (13.6% → 12.4% and 17.0% → 12.1%, respectively).

among large enterprises (-5.2% in 2020 → 13.2% in the first half of 2021) compared to the previous year, and the positive momentum among SMEs accelerated (3.3% → 15.8%).

The operating income-to-sales ratio (operating income / sales), a measure of corporate profitability, improved significantly (5.0% in 2020 → 7.4% in the first half of 2021) as operating income rose on the back of the recovery of sales in the first half of 2021. By company size, the operating income-to-sales ratio surged for both large enterprises (5.0% → 7.4%) and SMEs (3.8% → 6.3%), compared to the previous year (Figure I-18).

Figure I-18. Sales growth rates¹⁾ and operating income-to-sales ratios,²⁾ by company size



Notes: 1) Year-on-year basis.

2) Operating income / Sales.

Source: KIS-Value.

Marked increase in the interest coverage ratio

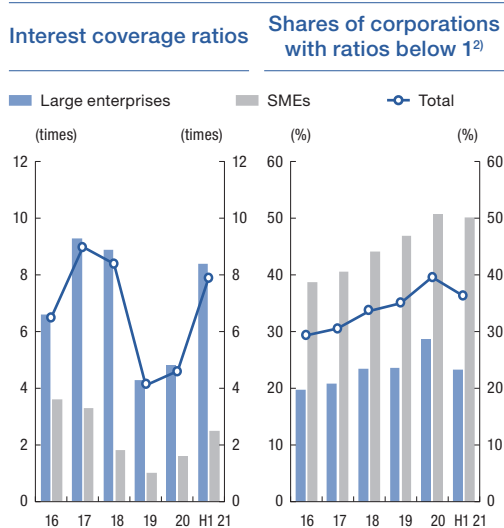
In the first half of 2021, the interest coverage ratio¹⁹⁾ (operating income / total interest expense), which measures a company's ability to pay the interest on its outstanding debt, jumped²⁰⁾ from 4.6 in 2020 to 7.9. By company size, the interest coverage ratio soared both among large enterprises (4.8 → 8.4) and SMEs (1.6 → 2.5) compared to a year earlier.

The proportion of firms with an interest coverage ratio less than one decreased from 39.7% in 2020 to 36.4% in the first half of 2021. While the share of vulnerable firms with a low interest payment capacity declined from a year earlier among large enterprises (28.8% at the end of 2020 → 23.4% in the first half of 2021), over half of all SMEs (50.9% → 50.3%) appear to be unable to pay their interest expenses from operating income (Figure I-19).

19) For the calculation of the interest coverage ratio, operating income was divided by total interest expenses, including interest expenses on corporate bonds.

20) The interest coverage ratio rose significantly, driven by business sectors with favorable performance including electrical and electronics (29.4), petrochemicals (14.7), and steel (13.4).

Figure I -19. Corporate interest coverage ratios,¹⁾ by company size



Notes: 1) Operating income / Interest expenses.

2) Including corporations recording operating losses.

Source: KIS-Value.

In the first half of 2021, the financial soundness of the overall corporate sector rapidly improved owing to the increase in sales associated with the economic recovery, but some business sectors remained sluggish. With the differing levels of recovery by company size and business sector due to the continued spread of COVID-19, attentions should be paid to the possibility of growing default risks among vulnerable firms.²¹⁾

21) For details, refer to Box 2. "Assessment and implications of recent default risks in the corporate sector" (p.38).

Box 2.

Assessment of Recent Default Risk of the Corporate Sector and its Implications

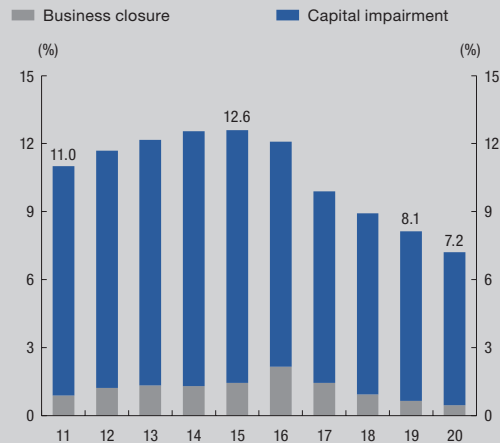
Sales and financial conditions in the corporate sector, which were greatly weakened by the impact of COVID-19 last year, are rapidly improving overall thanks to the recent economic recovery. However, there is concern over the increasing risk of default of vulnerable companies due to the uneven recovery across company sizes and industries. Hereunder, the default risk of the corporate sector is estimated using a corporate default prediction model, and changes in corporate default risks during the COVID-19 pandemic were compared with those observed during past crises to identify the characteristics and backgrounds of such changes in default risk.

Corporate default prediction model

To estimate a corporate default prediction model, the characteristics of insolvent firms that experienced business closure or capital impairment among firms subject to external audit requirements (hereinafter “external audit firms”)¹⁾ were examined. The proportion of insolvent firms among external audit firms rose from 11.0% in 2011 to 12.6% in 2015 due to difficulties in the shipbuilding and shipping industries and then declined gradually, falling to 7.2% in 2020 despite the impact of COVID-19. When the financial conditions of these insolvent firms in the year immediately preceding their default are

compared with those of firms that avoided business closure or capital impairment (hereinafter “continuing firms”), it can be seen that the median values of insolvent firms’ profitability (return on total assets, ROA), stability (return on equity, ROE), liquidity (current ratio), and debt servicing ability (interest coverage ratio) were significantly lower.

Proportion¹⁾ of insolvent firms²⁾



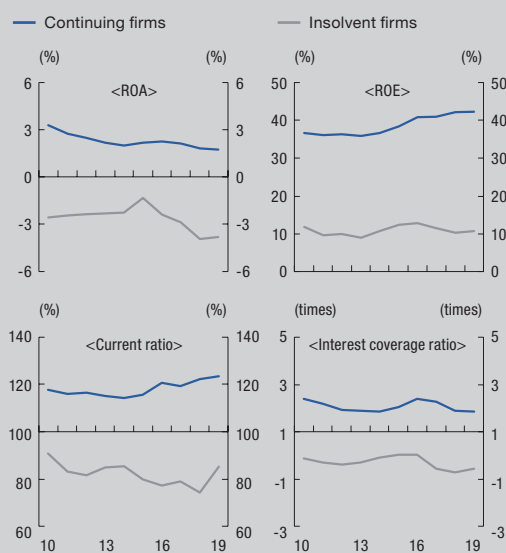
Notes: 1) Among external audit firms by year.

2) Firms that experienced business closure or capital impairment.

Source: KIS-Value.

1) Companies that undergo an audit performed by an external auditor and publicly disclose annual business reports in accordance with the Act on External Audit of Stock Companies (excluding inapplicable business sectors such as finance and insurance). A total of 22,688 external audit firms (4,400 large enterprises, 18,288 small and medium enterprises) as of the end of 2020 were analyzed.

Major financial conditions¹⁾²⁾ of insolvent firms and continuing firms



Notes: 1) Median of financial conditions for insolvent firms and continuing firms each year.

2) Return on total assets (ROA) = Net income / Total assets (%).

ROE = Equity capital / Total assets (%)

Current ratio = Current asset / Current liabilities (%)

Interest coverage ratio = Operating income / Total interest expenses (times)

Sources: Bank of Korea staff calculation, KIS-Value.

By using major financial indicators that exhibit clear differences between insolvent firms and continuing firms as explanatory variables, a logit model that predicts corporate defaults after one year was estimated as follows. The estimation results showed that the coefficients of all explanatory variables were statistically significant and in line with the expected sign.

$$P(Y_{i,t} | X_{i,t-1}) = \frac{\exp(X_{i,t-1}\beta)}{1 + \exp(X_{i,t-1}\beta)}$$

$Y_{i,t}$: Whether firm i is an insolvent company in year t (insolvent 1, continuing 0)

$X_{i,t-1}$: Vector of explanatory variables related to the financial condition of firm i in year $t-1$

Result¹⁾ of estimating²⁾ the corporate default prediction model

Explanatory variable	Expected sign	Coefficient	Note
Return on total assets	(-)	-0.023243***	Net income / Total assets
Equity ratio	(-)	-0.047292***	Equity capital / Total assets
Current ratio	(-)	-0.000551**	Current asset / Current liabilities
Interest coverage ratio	(-)	-0.005688***	Operating income / Total interest expenses
Sales growth rate	(-)	-0.003918***	Year-on-year basis.
Debt reliance	(+)	0.002364**	Total debt / Total assets
Average borrowing cost	(+)	0.021111***	Total interest expenses / Total debt
Firm size	(-)	-0.082270***	Log of total assets
Constant		-1.671396***	

Notes: 1) ***, **, * mean significance levels of 1%, 5% and 10% respectively.

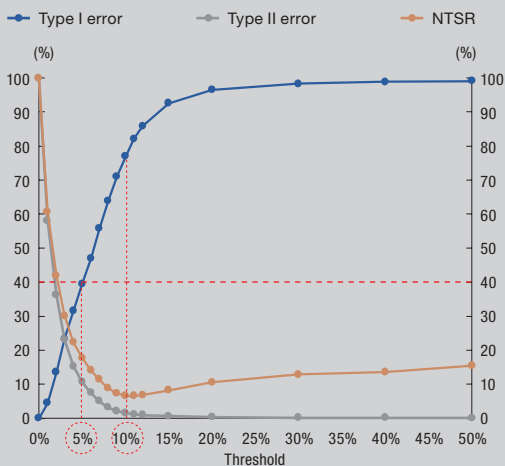
2) For 135,492 external audit firms, excluding outliers, from 2010 to 2019.

A firm was assessed as a “default risk firm” if its default probability estimated by this model exceeded a critical threshold estimated using the noise-to-signal ratio (NTSR) approach²⁾ (Borio & Drehmann, 2009). According to the results of the calculation of the NTSR by threshold for external audit firms from 2010 to 2019, a default probability of 5% was the optimum threshold.³⁾

2) The NTSR approach minimizes the ratio of noise power at which continuing firms are assessed as insolvent firms (Type II error) over the signal power at which insolvent firms are assessed as insolvent firms (1 - (Type I error: error of judging insolvent firms as continuing firms)). The NTSR was also used to calculate the threshold of FSI (financial stability index).

3) The NTSR reaches its lowest when the threshold is set at the default probability of 10 to 11%, but as Borio & Drehmann suggested, among thresholds with a default prediction power of over 60% (Type I error below 40%), the NTSR was the lowest at a default probability of 5%.

Estimating¹⁾ the threshold of corporate default prediction model



Note: 1) Dotted line is the maximum acceptable limit (40%) for type I error.

Source: Bank of Korea staff calculation.

Development and characteristics of corporate default risk

Hereunder, the trends of corporate⁴⁾ default risk since 1996 are analyzed, and their characteristics are identified. At the end of the second quarter of 2021, the average corporate default risk stood at 1.89%, well below the 3.19% recorded at the end of 2020, falling to the lowest level since 1996.⁵⁾ The weighted average default risks based on the size of firms' assets and liabilities were 0.64% and 1.03%, respectively, down from the end of 2020 (0.77% and 1.40%, respectively). Notably, the default risk of firms

with relatively large assets and liabilities was found to be lower, showing that the weighted average default risk of firms is less than their arithmetic average default risk.

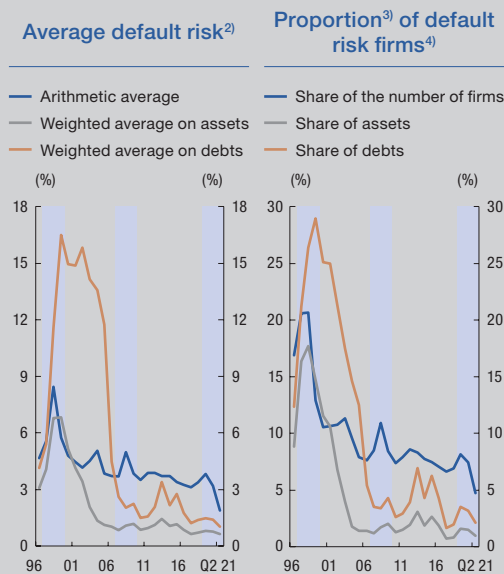
Meanwhile, at the end of the second quarter of 2021, 107 firms, or 4.7% of all firms analyzed, had a default probability of over 5%, well below the number recorded at the end of 2020 (187 firms, 7.4%). In addition, the assets and liabilities of these default risk firms accounted for 1.0% and 2.1% of those of all firms, respectively, slipping from the figures seen at the end of last year (1.5% and 3.2%, respectively).

If the recent changes in corporate default risk are compared with those that occurred in past crises, it is notable that the average default risks and share of default risk firms recorded in the early stage of the COVID-19 pandemic rose moderately and then fell rapidly to levels more favorable than before the pandemic. Meanwhile, the weighted average default risk of firms, which far exceeded the arithmetic average default risk during the Asian financial crisis and fell significantly around the time of the global financial crisis, remained nearly unchanged at a relatively low level during the COVID-19 pandemic. Hence, the defaults that occurred in the corporate sector at the end of the second quarter of 2021 are not likely to spread across the entire financial system.⁶⁾

4) Hereunder, for the sake of promptness in assessing the latest default risk of the corporate sector, this section analyzed 2,265 listed and non-listed companies (1,171 large enterprises and 1,094 small and medium enterprises) that disclosed business reports as of the end of the second quarter of 2021, according to the Financial Investment Services and Capital Markets Act, instead of analyzing external audit firms.

5) Given the moderate rise in the interest rate for corporate loans after the hike of the Base Rate by the Bank of Korea in the second half of 2021, it was presumed that, with the higher total interest expenses of corporate borrowers, the reasons for the slight increase in the average default risk were the decline of the interest coverage ratio (operating income / total interest expenses) and rise in average borrowing costs (total interest expenses / total borrowing). If other factors, such as corporate sales, profitability, and total borrowing, are assumed to remain unchanged, reflecting the rise in total interest expenses associated with the 50bp rise in the interest rate, the average corporate default risk was estimated to be 2.48%, which is slightly higher than the level of risk expected without such an interest rate hike (1.89%) but still much lower than the pre-pandemic level (3.80% at end-2019).

Development of corporation default risk¹⁾



- Notes: 1) Shaded areas indicate the foreign exchange crisis, global financial crisis and COVID-19 pandemic periods.
 2) Based on arithmetic and weighted average (by assets and liabilities) of firms' default probability.
 3) Compared to the total number, assets and debts of analyzed firms.
 4) Firms with default probability of over 5%.

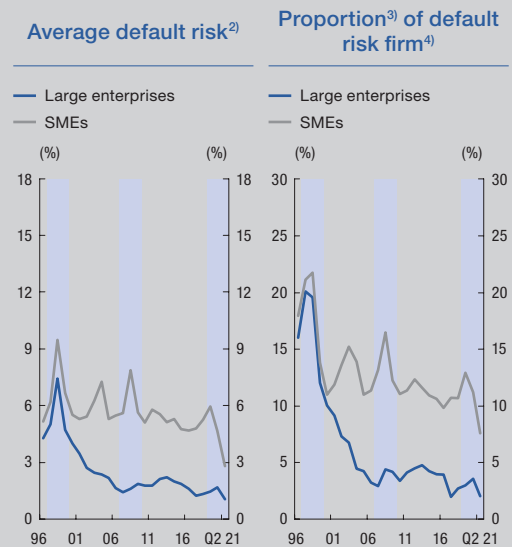
Source: Bank of Korea staff calculation.

Examining the trend of corporate default risk by firm size, at the end of the second quarter of 2021, the average default risk of small and medium-sized enterprises (SMEs) (2.80%) was higher than that of large enterprises (1.04%), representing a slight slip from the levels seen at the end of 2020 for both large enterprises and SMEs (1.66% and 4.67% respectively). Furthermore, the share of default risk firms dropped dramatically for both large enterprises (3.6% at the end of 2020 → 2.0% at the end of the second quarter of 2021) and SMEs (11.2% → 7.6%).

The recent trends of corporate default risk by firm size were compared with those observed during past economic crises. During the cur-

rency crisis, the default risks of large enterprises and SMEs were not much different; since 2000, however, as the average default risk of large enterprises fell drastically, the gap between it and that of SMEs widened significantly. Meanwhile, while the default risk of large enterprises during the period from the global financial crisis until the recent COVID-19 pandemic remained almost unchanged, SMEs saw their average default risk and share of default risk firms escalate dramatically, exhibiting their relatively vulnerable status. Still, during the COVID-19 crisis, the default risk of SMEs rose by a smaller margin than during past crises and dropped swiftly, reaching a level lower than that before the pandemic at the end of the second quarter of 2021.

Development of corporation default risk,¹⁾ by firm size



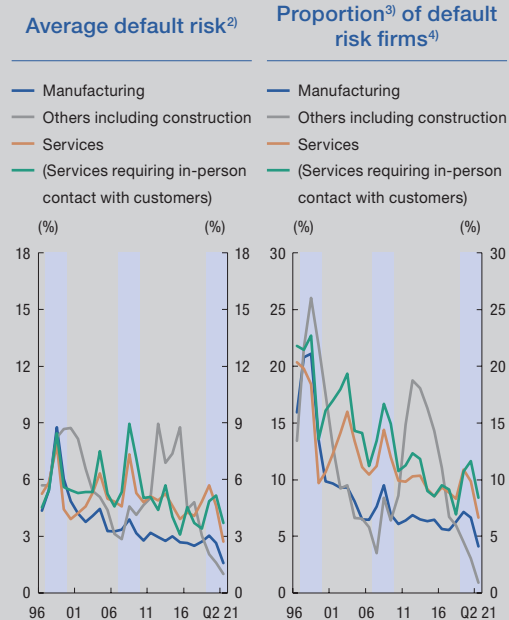
- Notes: 1) Shaded areas indicate the foreign exchange crisis, global financial crisis and COVID-19 pandemic periods.
 2) Based on arithmetic and weighted average (by assets and liabilities) of firms' default probability.
 3) Compared to the total number, assets and debts of analyzed firms.
 4) Firms with default probability of over 5%.

Source: Bank of Korea staff calculation.

6) The higher liability-weighted average default risk of firms and higher share of liabilities of default risk firms mean that it is more likely that corporate defaults will be translated into credit risk for financial institutions due to defaults of corporate loans, thus affecting the entire financial system.

Looking at the trends of corporate default risk by industry, at the end of the second quarter of 2021, the average default risk of the services sector (2.71%) was found to be moderately higher than those of the manufacturing sector (1.58%) and other sectors (including construction)⁷⁾ (1.01%), but relative to the end of 2020 (services: 4.61%, manufacturing: 2.65%, other sectors (including construction): 1.62%), the average default risk of most sectors dropped significantly. As a result, the share of default risk firms fell significantly in the services sector (end of 2020: 9.9% → end of Q2 2021: 6.7%), manufacturing (6.7% → 4.1%), and other sectors (including construction) (3.1% → 0.9%). Still, parts of the services sector that require in-person contact with customers,⁸⁾ which experienced sharp decreases in sales amid COVID-19, are recovering slowly due to the social distancing measures implemented to slow the spread of infection, with their average default risk (end of 2020: 5.16% → end of Q2 2021: 3.70%) and share of default risk firms (11.6% → 8.4%) nonetheless remaining higher than those of other industries.

Development of corporation default risk,¹⁾ by sector



Notes: 1) Shaded areas indicate the foreign exchange crisis, global financial crisis and COVID-19 pandemic periods.

2) Based on arithmetic and weighted average (by assets and liabilities) of firms' default probability.

3) Compared to the total number, assets and debts of analyzed firms.

4) Firms with default probability of over 5%.

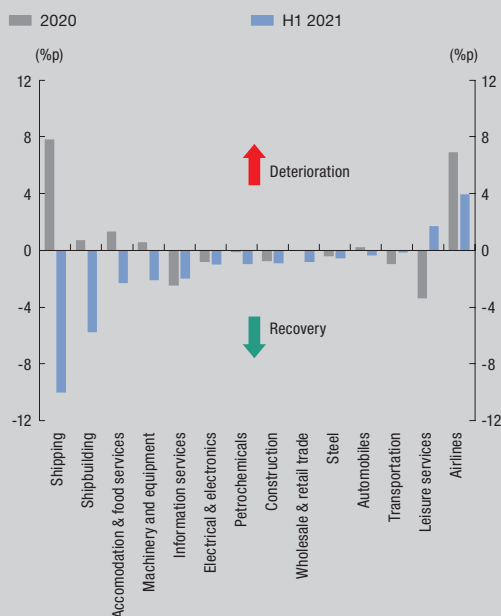
Source: Bank of Korea staff calculation.

A review of changes in average default risk by industry before and after the COVID-19 shock found that, in 2020, default risk soared sharply in the shipping, air transport, accommodation & food services, and shipbuilding sectors, but in 2021, there an uneven recovery among business sectors hit by the pandemic. In the shipping and shipbuilding sectors, the average default risk recovered to a level lower than that before the pandemic thanks to brisk exports, while air transport and leisure services remained sluggish with their average default risks edging up this year.

7) The construction industry, which occupies the largest share of other sectors that do not include manufacturing and services, was affected more by the real estate market than by COVID-19 and recently saw its average default risk and share of default risk firms fall steadily.

8) In this report, wholesale & retail trade, accommodation & food services, air transport, shipping, leisure services, films, and travel services were classified as "services requiring in-person contact with customers."

Changes¹⁾ in the insolvency risk of major sectors during COVID-19



Note: 1) Compared to the previous year's average default risk by sector.

Source: Bank of Korea staff calculation.

Background of changes in corporate default risk during COVID-19

The COVID-19 pandemic negatively affected private consumption and exports in the early, leading to a significant contraction of services and manufacturing production in the first half of 2020. Since the second quarter of 2020, however, the negative impact has subsided, with major financial indicators of businesses recovering

gradually.

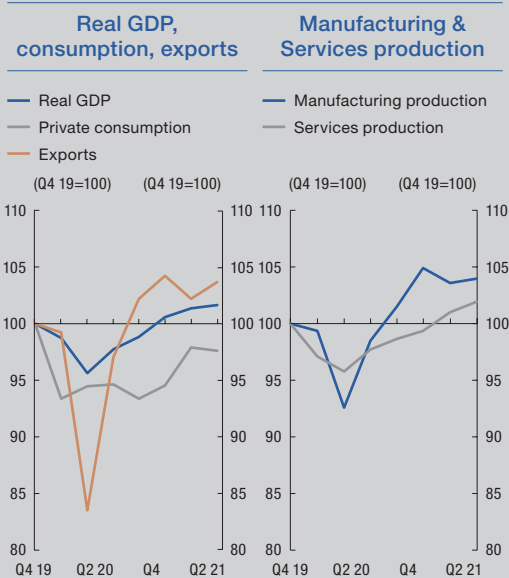
The average sales of companies fell precipitously in 2020, but bounced back in the first half of 2021, with profitability surpassing the level seen before the pandemic. As businesses responded to the pandemic-driven liquidity shortage through borrowing, average debt reliance increased slightly with only a limited¹⁰⁾ decline in the current ratio. Moreover, the average borrowing costs during the same period declined thanks to the Base Rate cut by the Bank of Korea and the government's financial support measures, and the decline continued¹¹⁾ in the first half of 2021. At the end of 2020, the interest coverage ratio, an indicator of companies' capacity to pay interest, rose above the level seen in 2019 and improved by a larger margin in the first half of 2021.

9) In 2020, average corporate borrowing increased by a remarkable 8.7% year on year, but total assets increased by 6.6%, allowing debt reliance (total borrowing / total assets) to rise slightly from 19.7% at the end of 2019 to 20.1% at the end of 2020.

10) The average current ratio (current assets / current liability) fell by 9.2%p during the global financial crisis (end of 2007: 121.0% → end of 2008: 111.8%), but during the COVID-19 pandemic, it dropped by 2.1%p, a much smaller decline (end of 2019: 133.9% → end of 2020: 131.8%).

11) Despite the sharp increase in total borrowing in 2020 (8.7%), average total interest expenses (including interest on corporate bonds) decreased from last year (-5.0%), resulting in a significant reduction of average borrowing costs (total interest expenses / total borrowing) (2019: 4.0% → 2020: 3.5%). In the first half of 2021, total borrowing continued to grow at a rapid pace (9.9%), but total interest expenses increased only slightly (1.3%), leading to a further decline in average borrowing costs (3.2%).

Real GDP and industrial production during COVID-19¹⁾



Note: 1) Each sector's value at Q4 2019 is normalized to 100.

Sources: Bank of Korea, Statistics Korea.

Major financial indicators²⁾ of firms¹⁾ during COVID-19

Financial indicator	2018	2019	2020	Q2 2021
Return on total assets (%)	3.8	1.8	1.9	5.0
Equity ratio (%)	57.7	56.6	56.5	55.9
Current ratio (%)	135.0	133.9	131.8	131.8
Interest coverage ratio (times)	8.1	4.0	4.6	7.9
Sales growth rate (%)	5.5	-1.9	-4.9	13.4
Debt reliance (%)	19.4	19.7	20.1	20.1
Average borrowing cost (%)	3.7	4.0	3.5	3.2

Notes: 1) Based on listed and non-listed companies at each period.

2) Average for each period of financial indicators used as explanatory variables for the corporate default prediction model.

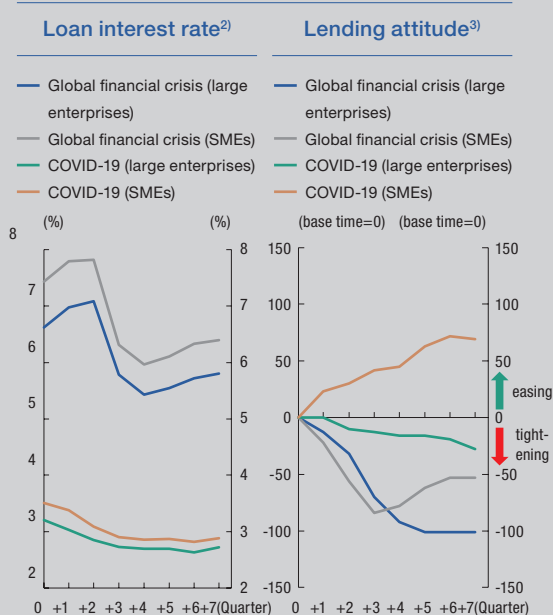
Sources: Bank of Korea staff calculation, KIS-Value.

The rapid decline in corporate default risk, particularly among small and medium enterprises, during COVID-19 appears to be due in large measure to changes in the corporate borrow-

ing conditions after the outbreak as well as the early recovery of the real economy in Korea. A comparison of companies' loan interest rates between the global financial crisis and the COVID-19 shock shows that the loan interest rate was already lower at the time of the coronavirus outbreak than it was in the past, and fell rapidly immediately after. A comparison of changes in banks' lending attitude in terms of corporate loans based on the Loan Officer Survey on Financial Institution Lending¹²⁾ conducted by the Bank of Korea indicates that while banks drastically tightened their guidelines for issuing loans to both large enterprises and SMEs during the global financial crisis, they continuously relaxed their lending attitude toward SMEs during the coronavirus pandemic. Various financial support measures such as deferment of principal and interest payment to support pandemic-affected SMEs, which were taken promptly upon the onset of COVID-19, seem to have improved the borrowing conditions for such enterprises, mitigating the negative impact of the pandemic.

12) By accumulating lending attitude indices in the survey during relevant periods, trends of changes in banks' lending attitude at various points of time relative to the pre-pandemic level were analyzed.

Changes in firms' lending conditions during¹⁾ the global financial crisis and COVID-19



Notes: 1) Base times are Q2 2008 and Q4 2019, which are the times immediately before the outbreak of the global financial crisis and COVID-19, respectively.

2) Based on weighted average interest rate on corporate loans by banks.

3) Cumulative lending attitude index after outbreak of crisis.

Source: Bank of Korea.

Implications

Immediately after the outbreak of COVID-19, corporate default risk was slightly elevated, largely among SMEs and in the services sector, but the financial relief support measures promptly implemented by policy authorities upon the outbreak helped relieve businesses' temporary shortage of liquidity, thus mitigating the negative impact of the pandemic. Furthermore, the recent improvement in sales and profitability amid the economic recovery has significantly lowered the default risk of the corporate sector overall and reduced the number of default risk firms, improving the performance of businesses

to a level higher than before the outbreak.

Despite the overall improvement in performance across the corporate sector, however, the recovery of some services segments that require in-person contact with customers is relatively slow. Considering the high proportion of self-employed business owners in those vulnerable services sectors, the recovery may have been even more uneven than expected.¹³⁾ In addition, it is necessary to continue monitoring potential risks that could heighten increase the default risk of the corporate sector overall, such as an increase in raw material a rise in global commodity prices, sustained global supply chain disruption, and resurgence of the coronavirus due to the emergence of new variants.

13) This section analyzed relatively large companies to reflect recent business conditions and assess corporate default risk. Regarding small businesses such as self-employed business owners, refer to "Box 3. Potential risks and implications of debt among the self-employed (p.46)."

Box 3.

Potential Risks and Implications of Debt among the Self-Employed Business Owners

As the improvement in the income of self-employed business owners (hereinafter “SEBOs”) in the accommodation and food services sectors has been sluggish recently, while their debt¹⁾ has been rising dramatically, concern over debt insolvency is growing. Hereunder, the potential risks of loans issued to SEBOs are reviewed, and implications are derived.

Sales of SEBOs and loan trends

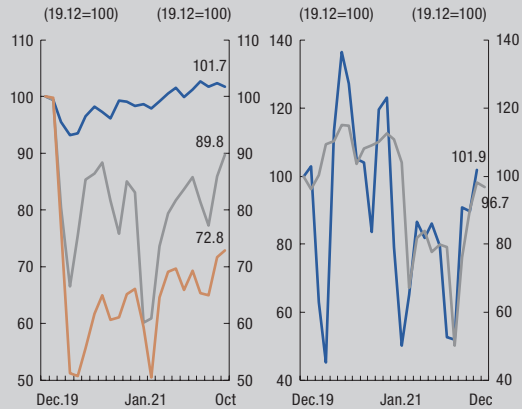
The sluggishness of SEBOs’ sales depends on the strength of epidemic prevention measures. Sales in some sectors, such as accommodations and food services, remain below the pre-pandemic level.²⁾ In October 2021, production in accommodation & food services remained at 89.8% of the level recorded as of December 2019 (seasonally adjusted), and production in leisure services stood at 72.8%.

Services production index¹⁾

— Wholesale & retail trade
— Accommodation & food services
— Leisure services

Small merchants business survey index

— Sales sentiment
— Sales projection



Note: 1) Seasonally adjusted index basis.

Sources: Ministry of SMEs and Startups, Statistics Korea.

On the other hand, after the COVID-19 outbreak, loans issued to SEBOs continued growing by a large margin.³⁾ At the end of the third quarter of 2021, loans to SEBOs amounted to KRW 887.5 trillion,⁴⁾ up 14.2% year on year. By type of business, the wholesale & retail trade and leisure services sectors grew by 12.7% and 20.1%, respectively, and by income quintile, low- and middle-income self-employed borrowers (first, second, and third quintiles) showed significant growth.

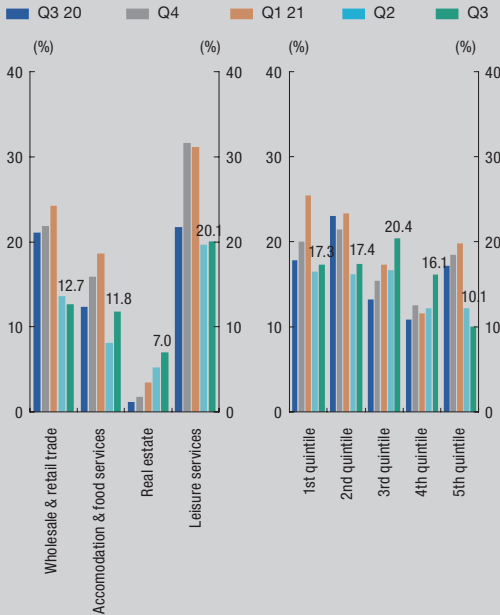
1) The Bank of Korea Consumer Credit Panel is panel data of about one million borrowers. Hereunder, borrowers of sole proprietor loans listed in the Consumer Credit Panel data were identified as SEBOs, and the sum of household loans and sole proprietor loans held by them was recognized as loans issued to SEBOs.

2) In November 2021, the sales sentiment index and sales projection index of small merchants stood at 101.9% and 96.7% of the levels recorded at the end of 2019, respectively. By business sector, the business sentiment index of the retail business was 82.6% of the level at the end of 2019, followed by leisure services at 92.6% and personal services at 98.3% (Business Survey on Small Merchants, November 2021).

3) Loans to SEBOs have increased dramatically from the second quarter of 2020, after the COVID-19 outbreak (Q1 2020: 10.0% → Q2: 15.4% → Q3: 15.9% → Q4: 17.3% → Q1 2021: 18.8% → Q2: 13.7% → Q3: 14.2%), outpacing the growth of household loans (Q1 2021: 9.5% → Q2: 10.5% → Q3: 10.0%).

4) At the end of September 2021, loans to SEBOs (KRW 887.5 trillion and 2.572 million borrowers) consisted of sole proprietor loans (KRW 583.5 trillion) and household loans (KRW 304.0 trillion). This represents 59.3% of corporate loans, 50.9% of household loans, and 27.4% of the sum of corporate loans and household loans (KRW 3,240.4 trillion) issued in the entire financial sector.

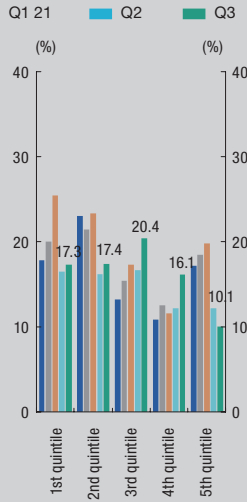
Growth rate¹⁾ of loans to SEBOs by business sector



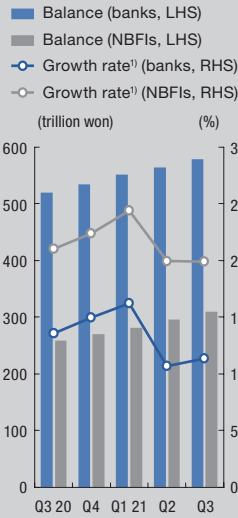
Note: 1) Year-on-year basis.
Source: Bank of Korea (Consumer Credit Panel).

By type of financial institution, loans issued to SEBOs by non-bank financial institutions, which carry higher interest rates, grew at a faster pace than those issued by banks, increasing the debt burden of SEBOs. The number of new borrowers among SEBOs rose sharply in the second quarter of 2020, immediately after the onset of COVID-19, and started to moderate in the third quarter. The delinquency rate of loans to SEBOs (0.19%, based on sole proprietor loans issued by domestic banks) remained low thanks to the government's financial support measures, staying at a level similar to that of household loans (0.17%).

Growth rate¹⁾ of loans to SEBOs by income quintile

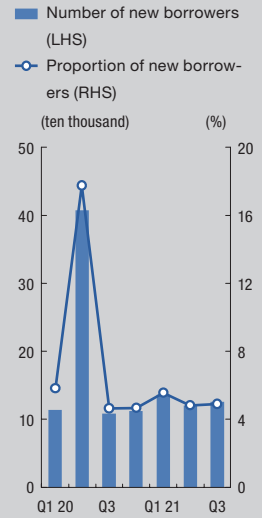


Loans to SEBOs by financial institution sector



Notes: 1) Year-on-year basis.
2) Borrowers with no balance of sole proprietor loans.
Source: Bank of Korea (Consumer Credit Panel).

Number of new borrowers among SEBOs



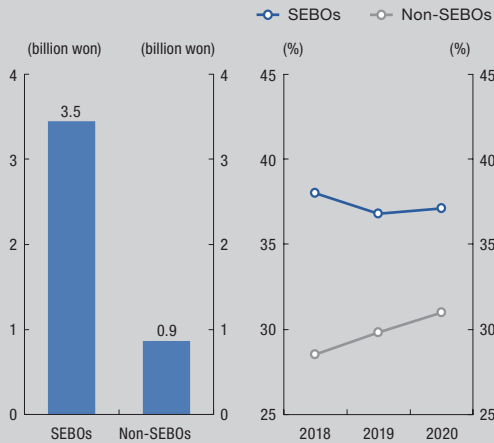
Potential risks of loans to SEBOs

(Heavy burden of principal and interest repayment)

The value of loans issued to SEBOs is much larger than that of loans issued to non-SEBOs such as salaried workers since such borrowers need to raise funds for their businesses. At the end of September 2021, the per-capita balance of loans issued to SEBOs was KRW 350 million, four times more than that of loans to non-SEBOs (KRW 90 million). The DSR of SEBO households (based on 2020 Survey of Household Finances and Living Conditions) stood at 37.1%, much higher than that of households of non-SEBOs (31.0%).

Per-capita balance¹⁾ of loans to SEBOs

DSR²⁾ of SEBO

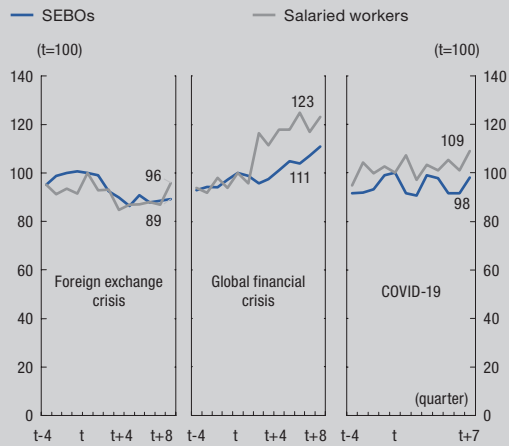


Notes: 1) Consumer Credit Panel (end-Sep. 2021) basis.
 2) 2020 Survey of Household Finance and Living Conditions basis.
 Sources: Bank of Korea (Consumer Credit Panel), Statistics Korea.

(Sluggish income growth)

The income flow of SEBOs showed more vulnerability to external shocks than that of salaried workers. During Asian financial crisis and global financial crisis, the income of SEBOs recovered at a slower pace than that of salaried workers. With the onset of the COVID-19 pandemic, the income of SEBOs fell drastically, unlike that of salaried workers, and as of the end of September 2021, it had not yet recovered to the pre-pandemic level.⁵⁾

Income¹⁾ trends²⁾ of SEBOs and salaried workers



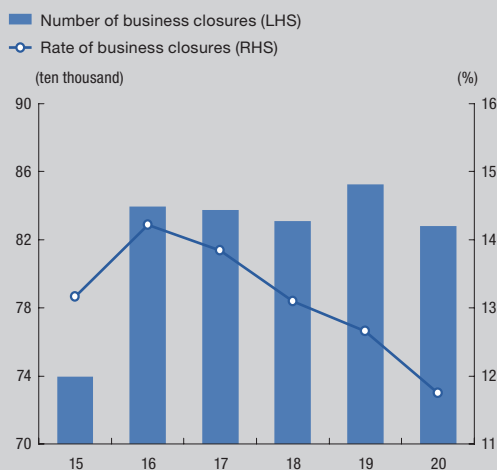
Notes: 1) Business income and salaries basis.
 2) t refers to Q3 1997 for asian financial crisis, Q3 2008 for the global financial crisis, and Q4 2019 for COVID-19.
 Source: Statistics Korea.

(Accumulated debt associated with delay in business closures)

In 2020, the business closure rate of SEBOs was 11.8%, which is lower than the 12.7% recorded in 2019. This appears to be attributable to the government's active provision of financial support, SEBOs' fear of losing their eligibility for emergency funding if their business is closed, possibility of loss of business premium, and difficulties in shifting to other business sectors despite the sales slump amid COVID-19. It is to be noted that business closures are being delayed while the debt of SEBOs are accumulating.

5) SEBOs with hired employees fell from 1.538 million in 2019 to 1.372 million in 2020, recording the lowest level since the 2000s (based on annual average) and demonstrating a continued business slump, and declined further to 1.313 million at the end of October 2021.

The number and rate¹⁾ of SEBOs business closures



Note: 1) The number of business closing sole proprietors / Previous year's total number of sole proprietors.

Source: National Tax Service.

(Vulnerable debt repayment capacity in the event of a decline in real estate prices)

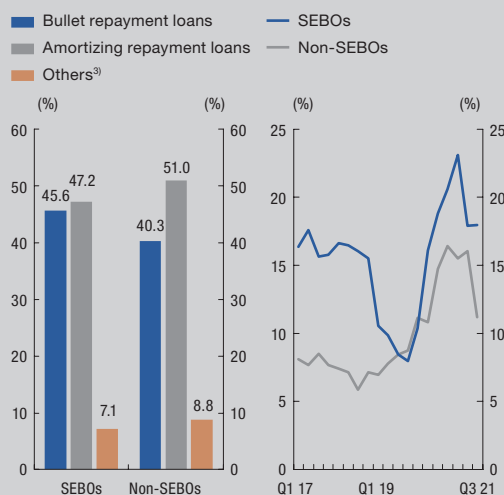
The debt repayment capacity of SEBOs is vulnerable to declines in real estate prices. The share of real estate-collateralized loans in household loans of self-employed borrowers is 69.3%, higher than that of non-SEBOs such as salaried workers (55.7%), and the portion of non-residential real estate loans (29.0%) in real estate loans is 2.5 times more than that of non-SEBOs (11.7%). Non-residential real estate collateral, such as stores, is less liquid than housing, and the auction rate⁶⁾ is low.

(Vulnerable debt structure)

The debt structure of SEBOs is characterized by a higher proportion of loans with bullet repayment and higher refinancing risk due to shorter maturity. At the end of September 2021, the share of loans issued to SEBOs with bullet repayment (based on household loans) stood at 45.6%, higher than that of non-SEBOs (40.3%), with 69.8% of sole proprietor loans being due in one year.⁷⁾ In addition, the rapid growth of unsecured loans issued to SEBOs after the COVID-19 outbreak warrants attention. Unsecured loans have a higher delinquency rate⁸⁾ than home mortgage loans and higher proportion of loans with a variable interest rate,⁹⁾ amplifying the burden of borrowers in the event of an increase in the interest rate.

Share¹⁾ of amortizing and bullet repayment loans

Growth rate²⁾ of unsecured loans



Notes: 1) Business income and salaries basis.

2) Year-on-year basis.

3) Lines of credit, revolving loans, etc.

Source: Bank of Korea (Consumer Credit Panel).

6) From January through November 2021, the auction rate (contract price / appraised value) of stores was 70.2%, well below that of apartments (101.0%).

7) At the end of September 2021, the remaining maturities of sole proprietor loans were as follows: up to six months (30.4%), over six months to one year (39.4%), over one to two years (12.5%), and over two years (17.4%).

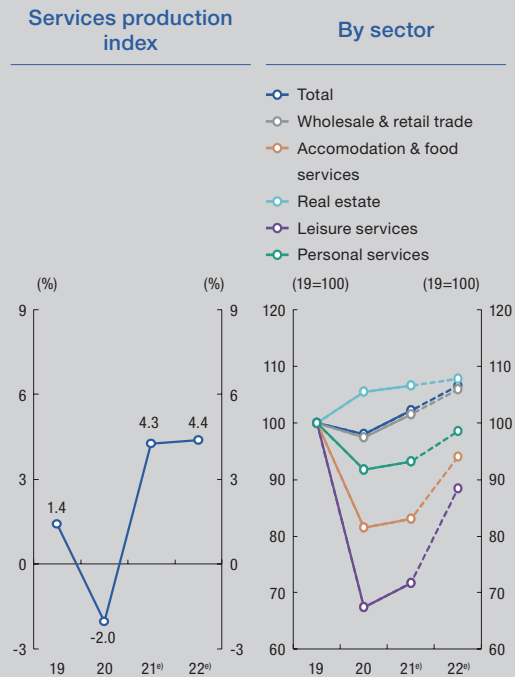
8) At the end of September 2021, the delinquency rates of home mortgage loans and unsecured loans among total household loans (domestic banks) were 0.11% and 0.29%, respectively.

9) At the end of September 2021, the shares of home mortgage loans and unsecured loans with variable interest rates (domestic banks) were 66.1% and 78.5%, respectively.

Prospects for the financial soundness of SEBOs

Although it seems unlikely that the COVID-19 pandemic situation will improve in a short time, the sales of SEBOs¹¹⁾ are expected to recover gradually thanks to the high vaccination rate.¹⁰⁾ However, while the debt of SEBOs has surged since the outbreak, the loan maturity extension and payment deferment measures¹²⁾ are scheduled to expire in March 2022. The impact¹³⁾ of the phasing out of these measures needs to be assessed based on the DSR prospects of SEBOs.

Recovery path of SEBO sales



Sources: Bank of Korea staff calculation, Statistics Korea.

If the financial forbearance and deferment measures are terminated in March 2022 as scheduled, the DSR of SEBOs is likely to rise by 2.2%p (41.3%) in comparison to the scenario in which the support measures are extended (39.1%), as they would bear the additional burden of repaying deferred principal and interest. The DSR is expected to rise in most sectors, and by a relatively higher margin in the leisure and personal services sectors.

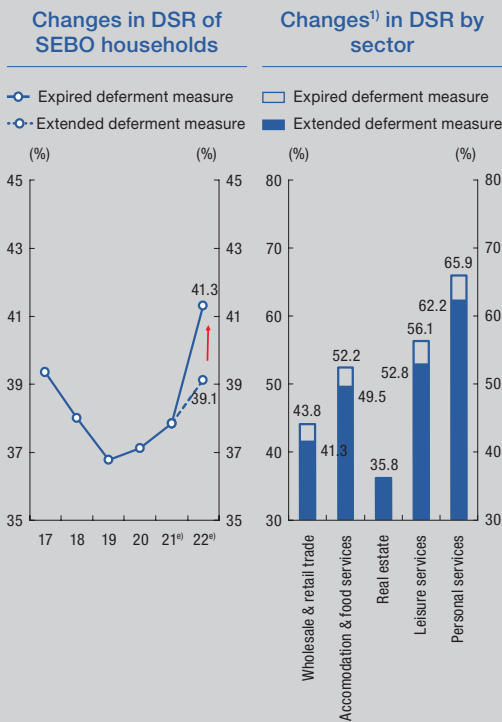
10) As of December 8, 2021, Korea's vaccination rates were 83.3% (at least one dose) and 80.7% (fully vaccinated).

11) The sales of SEBOs by business type were assumed to have recovered to a level in line with the prospects for GDP and path of private consumption improvement. In addition, data of Statistics Korea, such as the Consumer Credit Panel database, Survey of Household Finances and Living Conditions, and Household Income and Expenditure Survey, were used to estimate the debt and income of SEBOs in 2021 and 2022.

12) Measures for the deferment of principal and interest payment for small merchants have been in place since April 2020. The measures have been extended three times due to the ongoing COVID-19 pandemic (September 2020, March 2021, and September 2021) and are scheduled to end in March 2022.

13) Considering the applications for loan maturity extension and deferment of principal and interest repayment, it was assumed that 13% of sole proprietor loans were subject to deferment of principal and interest repayment for SEBOs. Moreover, it was also assumed that upon the termination of the measure, loans with extended maturity or deferred principal and interest repayment would be repaid in amortization over five years.

Changes in DSR of SEBOs



Note: 1) Projected figures for 2022.

Sources: Bank of Korea (Consumer Credit Panel), Bank of Korea staff calculation, Statistics Korea.

Implications

Since the outbreak of COVID-19, loans issued to SEBOs have grown much faster than household loans. SEBOs have exhibited a higher burden of principal and interest repayment, slower pace of improvement in income flows, and more vulnerable debt structure than non-SEBOs such as salaried workers.

The delinquency rate of loans issued to SEBOs

remained low due to the government's implementation of financial support measures, and business closures of SEBOs declined compared to the pre-COVID-19 period. Although the government's financial relief measures alleviated the sharp increase in the default risk of SEBOs hit by the pandemic, the possibility that the measures may have resulted in the accumulation of debt needs to be noted.

Meanwhile, loan maturity extension and payment deferment are phased out in 2022, the DSR of SEBOs is projected to rise moderately. Accordingly, if COVID-19 resurges with the emergence of new variants and strict social distancing rules are re-implemented, the slump in the sales of SEBOs will likely persist, deteriorating their debt repayment ability. Hence, related authorities and financial institutions need to be fully prepared to mitigate risks and develop measures tailored to vulnerable SEBOs with high risk.¹⁴⁾

In the long term, as the pattern of private consumption is expected to change due to the increase in contactless digital service transactions amid the pandemic, the government needs to provide more systematic support to SEBOs from a more structural perspective by revamping the system¹⁵⁾ for storing and providing detailed information regarding self-employed businesses.

14) New SEBOs raise business funds from the savings of themselves and their families (68.0%), funds secured from friends, relatives, or partners (6.8%), and borrowings from others (excluding friends, relatives, and partners) (5.2%), in addition to loans from financial institutions (26.0%) (August 2021, Statistics Korea). Hence, the defaults of SEBOs could trigger defaults of household debt of related persons as well as defaults of borrowers of sole proprietor loans and relevant financial institutions.

15) In addition to providing education and consulting on non-contact transactions for SEBOs, big data-based commercial area information systems need to be established to ensure that startups of SEBOs are not disproportionately concentrated in a specific sector.

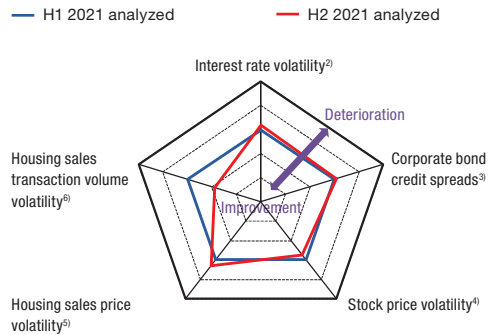
II. Asset Markets

Treasury bond yields rose significantly on a change in expectation regarding domestic and foreign monetary policies and net selling of Treasury bond futures by foreign investors. Credit spreads on corporate bonds, which had remained stable, widened somewhat following a spike in the volatility of Treasury bond yields after October.

Stock prices rallied to a record high in early July, and have since retreated by a large due to supply chain disruptions, and concerns over debt defaults by Chinese property companies and the spread of COVID-19 variants.

The growth rate of housing purchase prices slowed moderately after September on the back of rising loan interest rates and the government's stricter restrictions on loans, but remained on an upward trend.

Figure II -1. Map of changes in asset market conditions¹⁾



- Notes: 1) Extents of change in December 2020-May June to November 2021 (June-October 2021 period for housing sales price and housing sales volume) compared to December 2020-May 2021 period indexed.
- 2) Daily volatility of Treasury bond yield (3-yr) calculated using exponential weighted moving average (EWMA) method.
- 3) Corporate bond yield (A-) - Treasury bond yield (3-yr), with its extent of change as of end-November 2021 compared to end-May 2021 indexed.
- 4) V-KOSPI basis.
- 5) Indexed monthly volatility of housing sales price index.
- 6) Indexed monthly volatility of housing sales transaction volume.

Source: Bank of Korea.

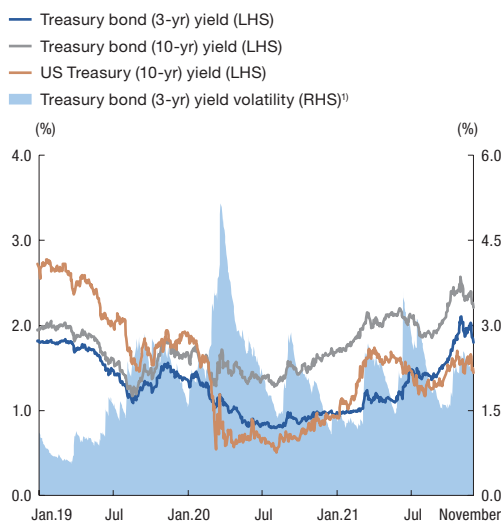
1. Bond Markets

Significant rise in long-term market interest rates

Treasury bond yields climbed dramatically due to changes in monetary policy at home and abroad. In the second half of 2021, yields of bonds with longer-term maturities (10-year) temporarily dropped in tandem with the movement of US Treasury bonds. After September, however, with advanced economies moving to pull back from their accommodative monetary policies due to the deepening concern over global inflation and massive net selling of domestic Treasury bond futures by foreign investors, 3-year and 10-year bonds jumped to as high as 2.11% (November 1) and

2.58% (October 29), respectively. In November, despite their watchfulness over the monetary policies of advanced economies, policy authorities' market stabilization measures¹⁾ reigned in this increase (Figure II-2). Meanwhile, the gap between the 3-year Treasury bonds and the Base Rate widened as Treasury bond yields climbed by a larger margin despite the Base Rate hike in August (Figure II-3).

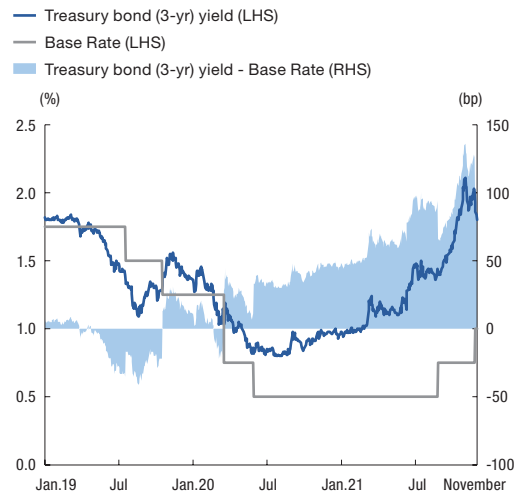
Figure II-2. Korean and US Treasury bond yields



Note: 1) Daily volatility calculated using exponential weighted moving average (EWMA) method.

Sources: Korea Financial Investment Association, Bloomberg.

Figure II-3. Base Rate and Treasury bond yield



Sources: Bank of Korea, Korea Financial Investment Association.

Moderate widening of credit spreads on corporate bonds

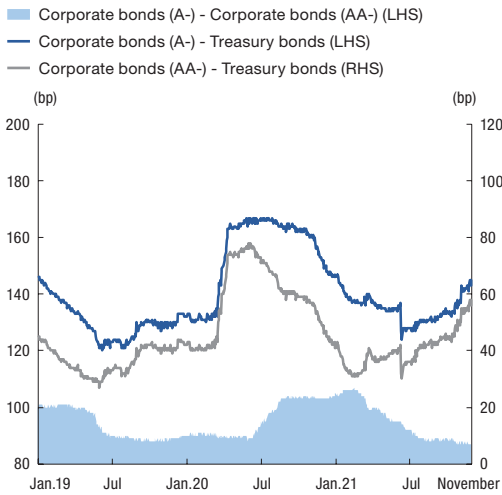
The credit spreads on corporate bonds were stable overall in the second half of 2021 and widened somewhat after October as the volatility of Treasury bond yields increased. From July to September, the credit spreads on prime bonds (rated AA-) fell due to the replacement²⁾ of the benchmark Treasury bond in June and returned to the previous position, while the credit spreads on non-prime bonds (rated A-) remained low due to incentives for high yield. However, after October, with the growing volatility of Treasury bond yields, investor sentiment in corporate bonds subsided moderately, driving up the credit spreads on both prime

1) On October 28, the BOK unveiled a measure to scale back the issuance of Monetary Stabilization Bonds and expand bond redemption during November. Later, the government announced (November 2) and implemented (November 5) an emergency measure to repurchase Treasury bonds worth about KRW 2 trillion.

2) After the change of the benchmark Treasury bond (3-year) on June 10, which is the basis for calculating the credit spreads on corporate bonds, the credit spreads on both prime bonds and subprime bonds narrowed by 10bp. This is largely attributed to the abrupt, significant rise of Treasury bond (3-year) yields in anticipation of interest rate hikes, driven by lower demand for the new reference Treasury bond, whose remaining maturity is longer by six months (June 9: 1.14% → June 10: 1.28%).

bonds and subprime bonds by a small margin. Spreads between credit ratings (AA- and A-) narrowed until August, but showed no significant change after that as credit spreads moved overall in tandem (Figure II-4).

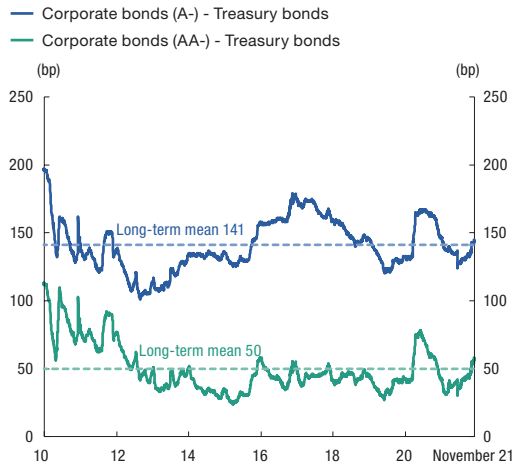
Figure II-4. Corporate bond credit spreads,¹⁾ and spread across credit ratings



Note: 1) 3-year maturity basis.
Source: Korea Financial Investment Association.

In terms of long-term time series, credit spreads on both prime and subprime bonds observed as of the end of November 2021 are currently above their respective long-term averages (January 2010 to November 2021) (Figure II-5).

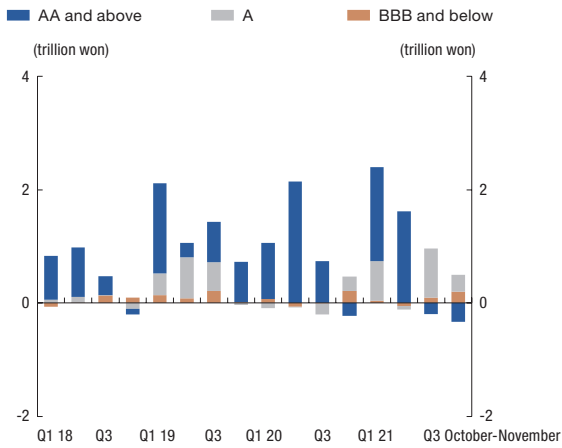
Figure II-5. Corporate bond credit spreads¹⁾²⁾



Notes: 1) 3-year maturity basis.
2) Long-term mean in January 2010-November 2021 period.
Source: Korea Financial Investment Association.

Meanwhile, in the second half of 2021, the net issuance of corporate bonds continued, driven mainly by subprime bonds. This seems to be attributable to preemptive demand for bond issuance in anticipation of further increase in the Base Rate (Figure II-6). However, the rate of participation in book-building for prime bonds (AA or higher) was favorable, at over 300%, but the rate for subprime bonds (A or lower) was moderately lower than that of average years due to unsold bonds (Figure II-7).

Figure II -6. Net corporate bond¹⁾ issuances²⁾

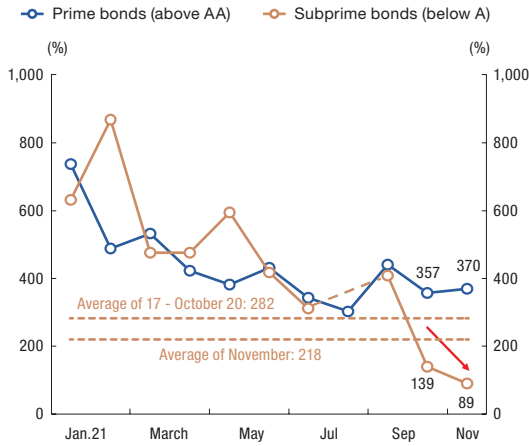


Notes: 1) Public offer basis; excluding issuance by financial companies.

2) Monthly average basis.

Sources: Bank of Korea, Korea Securities Depository.

Figure II -7. The rate of participation¹⁾ in book-building for prime bonds²⁾



Notes: 1) Participation in book-building for prime bonds amount/Expected issuance amount.

2) Public offer basis; excluding issuance by financial companies.

Sources: Bank of Korea, Korea Securities Depository.

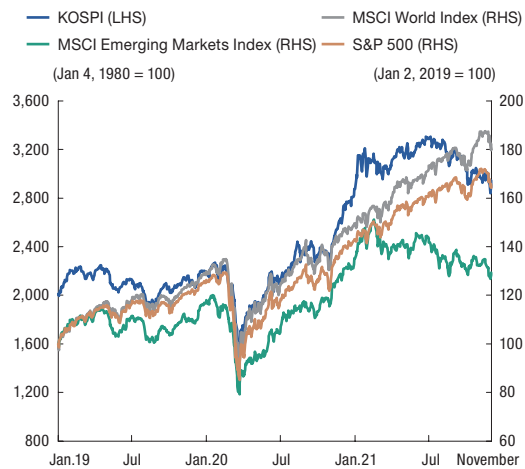
2. Stock Markets

Decline in stock prices

56

Stock prices reached a record high in early July (3,305 on July 6) owing to expectations for improved economic indicators at home and abroad, but fell sharply with a massive net selling of equities by foreign investors on concern over the slowdown of the semiconductor industry in mid-August. In early September, stock prices rebounded somewhat thanks to improved company earnings and favorable stock markets in advanced economies, but again declined, falling to around 3,000 after mid-September owing to global supply chain disruptions, the concern over debt defaults of Chinese real estate companies, and change in expectations regarding monetary policy normalization in advanced countries. In late November, as concern over the new COVID-19 variant heightened, stock prices dropped to the lowest level of the year (2,839 on November 30), but soon rebounded in response to the perception that the fall had been excessive (Figure II-8).

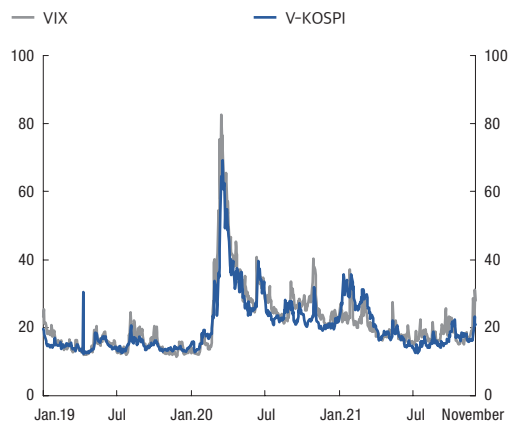
Figure II-8. KOSPI and global stock prices¹⁾



Note: 1) US stock prices based on S&P 500 index; developed and emerging market country stock prices based on MSCI.
Sources: KOSCOM, Bloomberg.

In early October, the KOSPI 200 volatility index (V-KOSPI) rose temporarily and then fell due to external factors and remained at a low level. Amid the concern over the spread of the new COVID-19 variant in late November, V-KOSPI bounced back as stock prices plunged (Figure II-9).

Figure II-9. Stock price volatility indices¹⁾

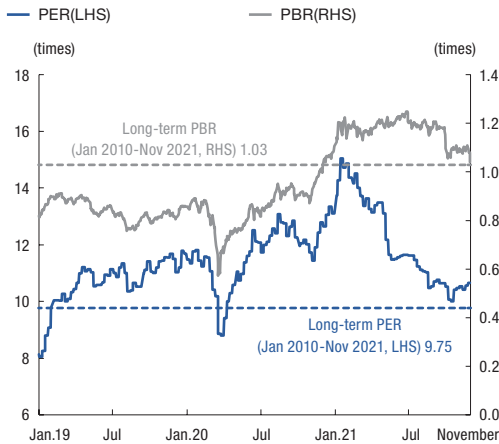


Note: 1) Volatility indices calculated using prices for options on KOSPI 200 and S&P 500 indices.
Sources: KOSCOM, Bloomberg.

Decline in PER and PBR

The price-to-earnings ratio³⁾ (PER) fell from 11.63 in early July to 10.67 in late November, along with the falling stock prices, despite the increase in expected corporate profits. The price-to-book ratio (PBR) also declined from 1.20 in early July to 1.04 in late November. Nonetheless, both the PER and PBR stayed slightly above their long-term averages (9.75 for PER and 1.03 for PBR, after 2010) (Figure II-10).

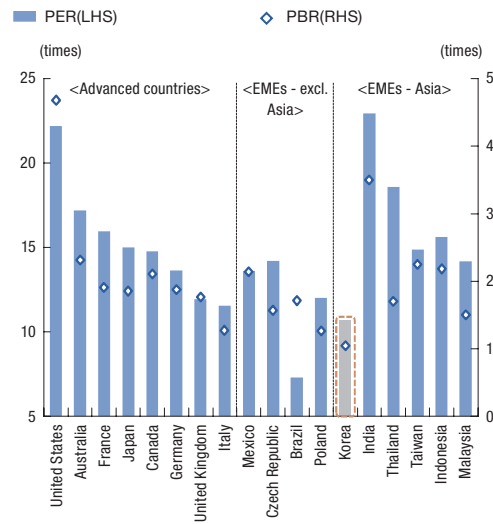
Figure II-10. PER¹⁾ and PBR²⁾



Notes: 1) MSCI basis (12-month forward).
2) KOSPI basis.
Sources: Bloomberg, Refinitiv.

The PER and PBR in Korea remained low compared to advanced countries and other emerging market countries (Figure II-11).

Figure II-11. PERs¹⁾²⁾ and PBRs¹⁾ of major countries



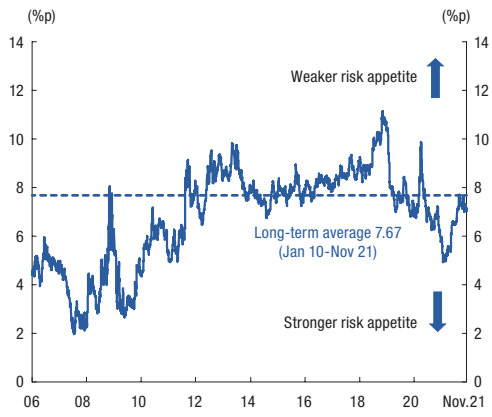
Notes: 1) End-Nov 2021 basis.
2) MSCI basis (12-month forward).
Sources: Bloomberg, Refinitiv.

The equity risk premium,⁴⁾ which had fallen sharply since the onset of the COVID-19 pandemic, stood at 7.17%p at the end of November, staying below its long-term average (7.67%p after 2010). This low risk premium indicates that the risk appetite of investors remained strong (Figure II-12).

3) Based on the 12-month forward MSCI PER, calculated by dividing the sum of the stock market capitalizations of companies tracked by the MSCI index by the sum of their expected net profits (values forecasted by Korean and foreign securities companies) during the next one-year period.

4) The equity risk premium (yield gap) is calculated by deducting the Treasury bond yields (risk-free rate of return) from the equity return (expected return). Based on the reasoning that investors with lower risk appetite demand higher return than risk-free assets as compensation, lower and higher risk premium translates to stronger and weaker risk appetite, respectively.

Figure II -12. Stock risk premium¹⁾



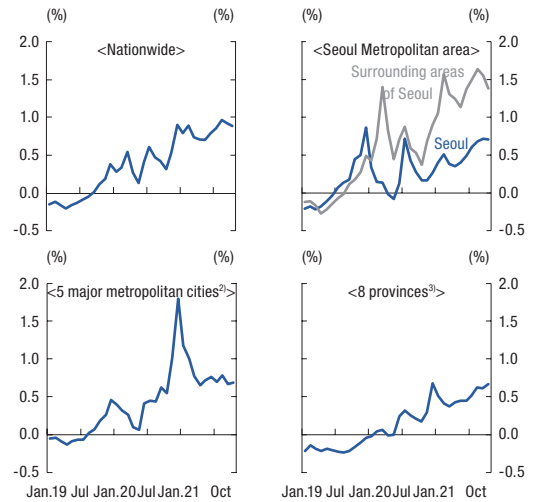
Note: 1) Treasury bond (10-year) yield subtracted from the earnings-to-price ratio (inverse of the 12-month forward MSCI PER).
Sources: Bloomberg, Refinitiv.

3. Real Estate Markets

Continuing steep ascent of housing purchase prices

Housing purchase prices continued their dramatic rise, buoyed by the persistent expectation of price appreciation on the back of reconstruction and re-development projects. However, higher loan interest rates⁵⁾ and stricter restrictions⁶⁾ imposed on household debt by the government slowed the rise of prices moderately after September. By region, housing purchase prices increased more in Gyeonggi and Incheon, due to upside factors such as metropolitan transportation networks and district development projects (Figure II -13).

Figure II -13. Rates of increase¹⁾ in housing sales prices



Notes: 1) Compared to previous months.

2) Busan, Daegu, Daejeon, Gwangju and Ulsan.

3) Gangwon, Chungbuk, Chungnam, Jeonbuk, Jeonnam, Gyeongbuk, Gyeongnam and Jeju.

Source: Korea Real Estate Board.

Meanwhile, as the growth of housing purchase prices outpaced the rise of annual household income and rent, the price-to-income ratio (PIR)⁷⁾ and price-to-rent ratio (PRR)⁸⁾ edged higher nationwide (Figure II -14).

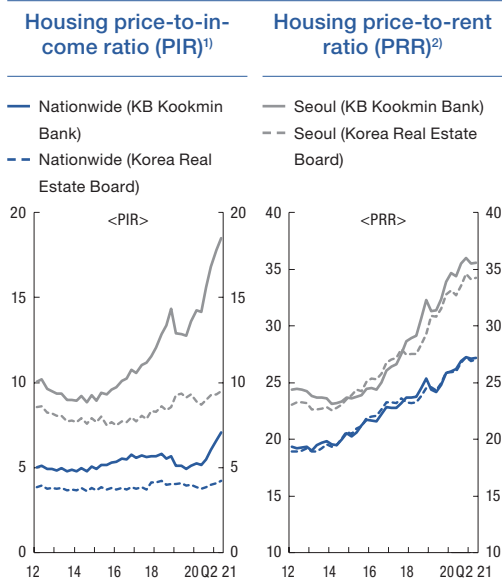
5) The weighted average interest rate of home mortgage loans by deposit-taking banks (based on new loans) rose from 2.88% in August to 3.01% in September and 3.26% in October.

6) As the growth rate of household loans after August for some financial institutions exceeded targets assigned by the financial authorities at the beginning of the year, controls on loan growth were strengthened. On October 26, the government unveiled a household debt management measure that included the earlier implementation of DSR by individual borrowers, strengthened DSR rules guidelines at NBFIs, and the application of average loan maturities when calculating DSR.

7) The PIR is the ratio of housing prices relative to the annual income of households.

8) The PRR is the ratio of housing prices relative to annual rents.

Figure II -14. Price-to-income ratio and price-to-rent ratio



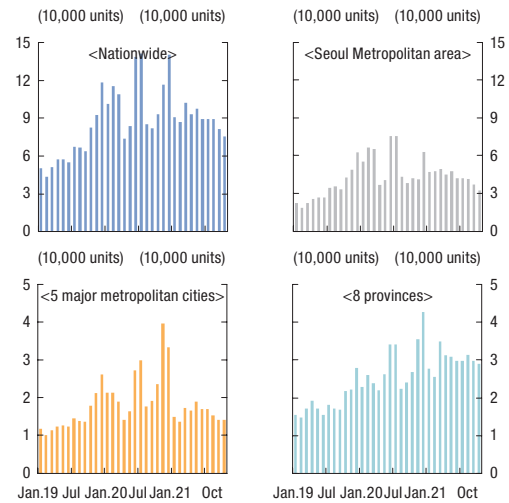
Notes: 1) Housing price / Annual household income.

2) Housing price / Annual rent.

Sources: Bank of Korea staff calculations, KB Kookmin Bank, Korea Real Estate Board.

From January to October of 2021, the volume of housing purchase transactions fell by 12.5% from the same period a year earlier (1,022,000), recording 894,000, as purchase sentiment⁹⁾ was dampened by higher loan interest rates and more stringent restrictions on loans (Figure II-15).

Figure II -15. Housing sales transaction volumes



Source: Ministry of Land, Infrastructure and Transport.

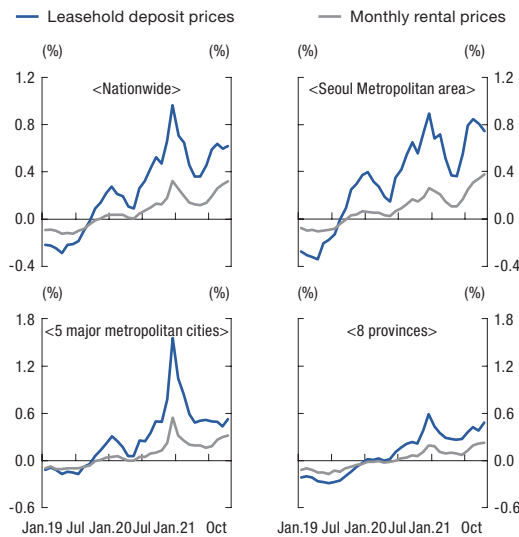
Continued rise of leasehold deposit and monthly rental prices

Leasehold deposit (jeonse) prices in housing rental markets maintained their recent upward trend. However, the increase in leasehold deposit prices in the Seoul metropolitan area slowed after September amid the stronger¹⁰⁾ restrictions imposed on household debt by the government. Monthly rental prices rose at a faster pace mainly in the Seoul metropolitan area (Figure II-16).

9) The buyer superiority index (KB Kookmin Bank) transitioned to a downward trend in late August and continued falling, dropping to below 100 in October (114.6 in third week of August → 109.2 in first week of September → 97.8 in second week of October → 67.8 in fourth week of November).

10) Some financial institutions restricted new household loans, including leasehold deposit loans. However, on October 26, the financial authorities excluded leasehold deposit loans from the total household debt management target for 2021.

Figure II -16. Rates of increase¹⁾ in leasehold deposit and monthly rental prices



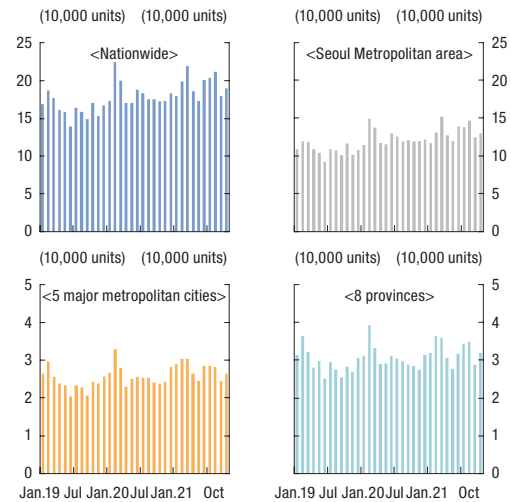
Note: 1) Compared to previous months.

Source: Korea Real Estate Board.

From January to October of 2021, the volume of leasehold deposit and monthly rental transactions increased¹¹⁾ by 6.0% from the same period of 2020 (1,833,000), rising to 1,943,000. By type of lease, while the volume of leasehold deposit transactions was 1,105,000, similar to the level recorded during the same period of 2020 (1,094,000), that of monthly rental transactions rose by 13.4% year on year, increasing from 739,000 to 838,000. By region area, the volume of leasehold deposit and monthly rental transactions in the Seoul metropolitan

area rose¹²⁾ by 6.3% year on year to 1,324,000, and those in the five metropolitan cities and eight provinces edged higher by 6.4% and 4.4%, respectively, recording 277,000 and 324,000 (Figure II-17).

Figure II -17. House leasehold deposit and monthly rental transaction volumes¹⁾



Note: 1) Since June 2021, the scope of calculation has been expanded from registered fixed date data to housing rental transaction report data.

Source: Ministry of Land, Infrastructure and Transport.

In 2021, the supply of new apartments is expected to decrease from last year's level (362,000 units) to 284,000 units, which is below the average of previous years (annual average of 310,000 from 2011 to 2020). The volume of new apartment sales¹³⁾ is projected

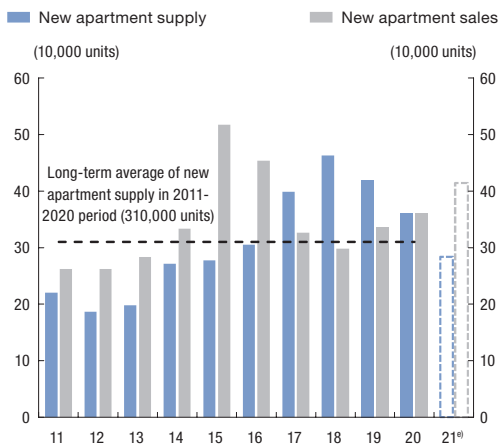
11) As the Housing Rental Transaction Reporting System was implemented in June 2021, the scope for calculating the volume of leasehold deposit and monthly rental transactions was broadened. The volume of leasehold deposit and monthly rental transactions would have increased by 2.6% if the scope of calculation had been limited to registered contracts with fixed dates under the previous system.

12) The share of monthly rental transactions in housing leasehold deposit and monthly rental transactions soared from 38.6% in July 2020, prior to the enforcement of the Housing Lease Protection Act, to 40.4% in August 2020 and 44.7% in October 2021.

13) In 2021, the volume of apartment sales is expected to rise above last year's level both in the Seoul metropolitan area (196,000 units → 198,000 units) and other parts of the country (164,000 units → 220,000 units). Meanwhile, the preliminary applications to purchase new apartment units in new cities such as the third New Town began in July 2021.

to surpass last year's level (360,000 units), reaching 418,000 units (Figure II-18). Meanwhile, the inventory of unsold housing stood at 14,000 units¹⁴⁾ (at the end of October 2021 (1,000 units in the Seoul metropolitan area and 13,000 units in other parts of the country)), down 25.9% from the end of 2020 (19,000 units).

Figure II-18. New apartment supply and new apartment sales¹⁾



Note: 1) December 2, 2021 basis; based on planned amount for December 2021.

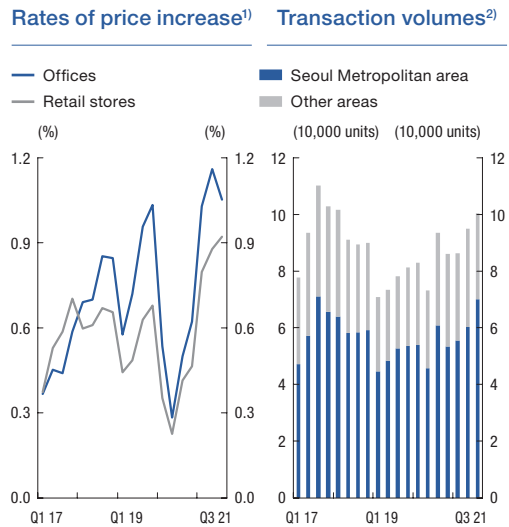
Source: Real Estate 114.

Continued growth in commercial real estate prices

In the third quarter of 2021, the rate of increase in retail store prices inched up by 0.05%p from the previous quarter to 0.92%. The rate of increase in office prices declined

by 0.11%p from the previous quarter to 1.05%, remaining above the growth rates recorded from 2017 to 2020. In the third quarter of 2021, the volume of commercial real estate transactions climbed by 7.5% to 100,000 from the same period a year earlier (93,000), driven by transactions in the Seoul metropolitan area (Figure II-19).

Figure II-19. Rates of increases in commercial real estate price and volume of commercial real estate transactions



Notes: 1) Quarter-on-quarter rate of increase in asset value reflecting changes in land and building prices. Retail stores are based on medium-sized to large retail stores.

2) Based on buildings for commercial use including officetels (dual-purpose buildings used for commercial and residential purposes). Including transactions other than sales, such as allotment of new apartments, gifts, and exchanges.

Sources: Korea Real Estate Board, Ministry of Land, Infrastructure and Transport.

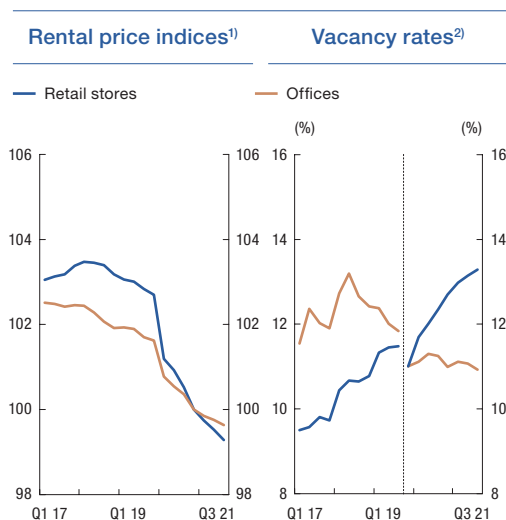
14) The inventory of unsold housing decreased steadily, hitting, in September 2021, the lowest level (14,000 units) since statistics were first recorded in 2001.

15) The level of social distancing had been gradually strengthened from Level IV in the Seoul metropolitan area and Levels I to III in other areas (July 12) to Level VI in the Seoul metropolitan area and Level III in other areas (July 27). On November 1, the social-distancing restrictions were lifted, and a reopening measure was implemented to ease the COVID-19 restrictions over three phases. However, on December 18, social-distancing rules were again imposed.

Decline of commercial real estate rental prices

Rental prices of commercial real estate declined steadily as demand was weakened by the introduction of stronger social-distancing rules.¹⁵⁾ Rental prices of retail stores and offices fell by 0.7% and 0.4%, respectively, from January to September of 2021. Meanwhile, the vacancy rate for retail stores remained on an upward trajectory (Figure II-20).

Figure II-20. Commercial real estate rental price indices and vacancy rates



Notes: 1) Q4 2020 = 100, Based on medium-sized to large retail stores.

2) Interrupted due to redesign of the samples of the commercial real estate market rent survey in Q1 2020.

Source: Korea Real Estate Board.

Increase in real estate finance exposures

At the end of September 2021, real estate finance exposure¹⁶⁾ stood at KRW 2,488.2 trillion, representing a year-on-year increase of 12.2%, due to the impact of the favorable real estate business.¹⁷⁾ By type, household credit rose 10.5% year-on-year to KRW 1,253.2 trillion (50.4% of total exposures), with much of this increase accounted for by personal credit guarantees associated with housing rentals. Real estate-related corporate loans jumped 14.3% year on year to KRW 936.6 trillion (37.6%), owing to the steady increase in loans and issuance of sales guarantees and leasehold deposit guarantees¹⁸⁾ by financial institutions. Meanwhile, financial investment products¹⁹⁾ increased by 12.7% year on year to KRW 298.3 trillion (12.0%), representing a year-on-year increase of 12.7%, driven by the expansion of real estate funds and REITs as well as continuous issuance of mortgage-backed securities (Figure II-21).

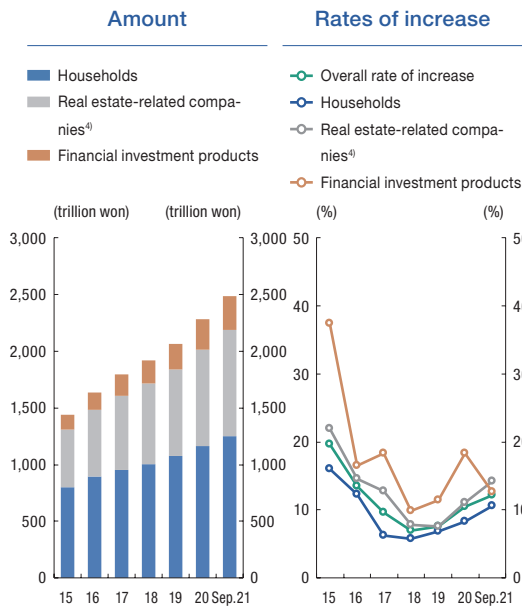
16) Real estate finance exposure is defined as the sum of real estate-related loans to households and corporation by financial institutions and credit guarantee institutions, and real estate-related financial investment products. For more information about real estate finance exposure, refer to the Financial Stability Report of June 2017, Box 3. "Current Status of Real Estate Exposure" (page. 44).

17) For details, refer to Box 4. "Background and Implications of Recent Expansion of housing Finance," (page. 54).

18) On August 18, the measure for the mandatory purchase of leasehold deposit guarantees by housing lease business operators took effect.

19) Starting in the fourth quarter of 2019, the volume of issuance of mortgage-backed securities expanded significantly, due in part to the securitization of fixed-rate re-finance loans for low-income borrowers by the Korea Housing Finance Corporation. However, the year-on-year rate of increase slowed from early 2021 as the base effect of the previous period wore off.

Figure II -21. Amount¹⁾ and rates of increase²⁾ of real estate finance exposures³⁾



Notes: 1) End-period basis.

2) Year-on-year basis.

3) The sum of real estate-related household loans, corporate loans issued by financial institutions and credit guarantee institutions, and real estate-related financial investment products.

4) Defined as companies directly related to real estate market conditions (such as real estate rental and supply businesses and related service businesses) and construction firms.

Source: Bank of Korea.

As discussed above, although the volume of housing purchase transactions is falling, housing purchase prices are still on the rise, and the prices of commercial real estate remain elevated. These upward trends of real estate market prices have steadily driven up real estate finance exposures. As the share of loans with variable interest rates²⁰⁾ has soared recently, any change in financial conditions, such as an interest rate hike, could lead to the adjustment of the real estate business and more defaults on related loans.

To summarize the above discussion on the conditions of asset markets, the prices of some assets, such as stocks and bonds, have shown signs of retreating, but the risk appetite for higher returns in the real estate market has been persistent. Although housing purchase prices have risen at a moderately slower pace recently due to the stricter restrictions on loans and increase in loan interest rates, they remain at a high level.

20) The share of household loans with fixed interest rates by deposit-taking banks (based on new loans) has declined from 48.4% at the end of 2019 to 31.9% at the end of 2020 and 20.7% in October 2021.

Box 4.

Background and Implications of Recent Expansion of Housing Finance

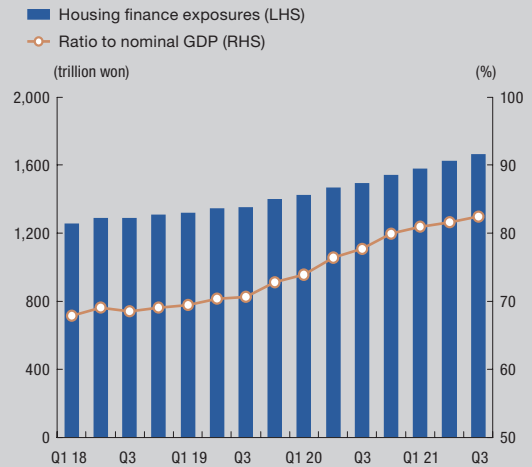
Since the COVID-19 outbreak, the growth of housing finance has been accelerating in tandem with rising housing prices. Housing finance is defined as the sum (“housing finance exposure”) of housing-related loans to households and corporations by financial institutions and credit guarantee institutions, and housing-related financial investment products. Hereunder, the current status and causes of the surge in housing finance are examined, and policy implications for mitigating the risk of a possible adjustment of housing prices spreading to the financial system are derived.

Status of housing finance

At the end of September 2021, housing finance amounted to KRW 1,667.1 trillion, or 82.5% of nominal GDP. By type, household loans (KRW 1,048.4 trillion) occupied the largest share (62.9%), followed by corporate loans (KRW 418.1 trillion) and financial investment products (KRW 200.6 trillion), representing 25.1% and 12.0%, respectively.

Housing finance has steadily risen at an increasing pace since the outbreak of COVID-19. From January to September 2021, housing finance soared by KRW 122.1 trillion, 2.8 times more than the increase recorded during the same period of 2019 (KRW 43.3 trillion). Housing finance’s share of nominal GDP rose substantially from 72.8% in the fourth quarter of 2019 to 82.5% in the third quarter of 2021.

Amount and ratio to nominal GDP¹⁾ of housing finance exposures²⁾



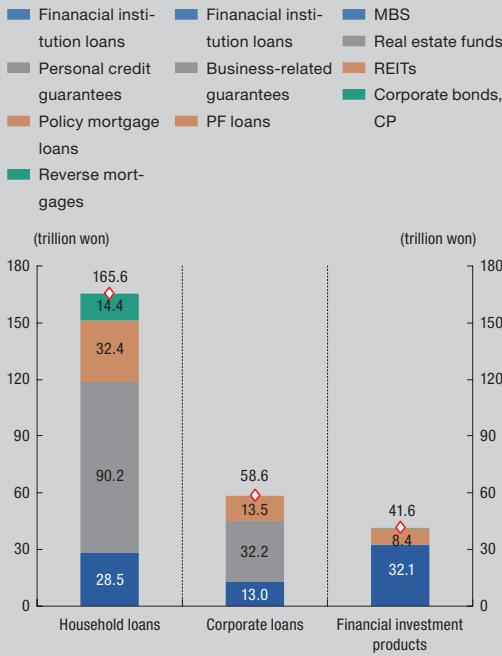
Notes: 1) Sum of nominal GDPs in quarter concerned and in immediately preceding three quarters.

2) End-period balance basis.

Source: Bank of Korea.

Breaking down the increase (KRW 265.8 trillion) from January 2020 (outbreak of COVID-19) to September 2021 by sector, household loans took up the largest portion (KRW 165.6 trillion), followed by corporate loans (KRW 58.6 trillion) and financial investment products (KRW 41.6 trillion). Specifically, the growth of household loans was led by personal guarantees (KRW 90.2 trillion) and policy mortgage loans (KRW 32.4 trillion), owing to the rise in leasehold deposit (jeonse) prices and increase in housing demand among young people. The growth of corporate loans (KRW 58.6 trillion) was driven by guarantees for businesses (KRW 32.2 trillion) amid an increase in the volume of new housing sales, while the expansion of financial investment products (KRW 41.6 trillion) was mostly due to the increase in mortgage-backed securities (KRW 32.1 trillion) issued to securitize policy mortgage loans.

Changes in volume of housing finance exposures after COVID-19, by sector



Note: 1) From Jan. 2020 to Sep. 2021 basis.
Source: Bank of Korea.

Relationship between housing finance and the housing market

Housing finance (growth rate of household loans) and the housing market (growth rate of housing prices and trade volume) similarly generally move in tandem. In particular, the correlation between housing finance and housing prices is greater than that between housing finance and trade volume.¹⁾

Growth rate¹⁾ of household loans²⁾ and growth rate of housing prices, housing market trade volume

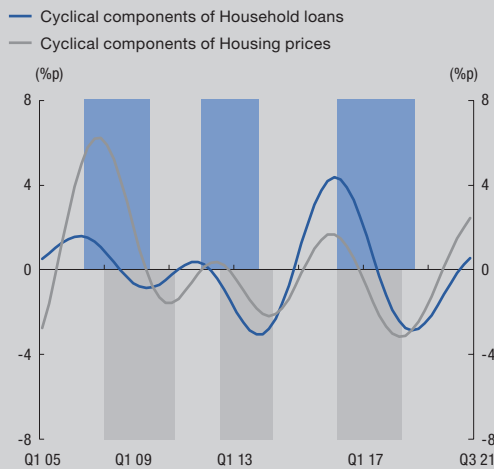


Notes: 1) Year-on-year basis.
2) Deposit-taking institution basis.
Sources: Bank of Korea, Korea Real Estate Board.

When the cyclical components of household loans and housing prices are calculated and compared, it can be seen that, overall, they similarly, tooalso tend to move in the same direction. Notably, since the second half of 2019, household loans and housing prices have both been on an expansionary path.

1) From January 2011 to September 2021, the correlation coefficient between the growth rate of household loans (year on year) and the growth rate of housing prices (year on year) stood at 0.52, higher than that between the growth rate of household loans and the housing trade volume (0.31).

Cyclical components¹⁾²⁾ of household loans and housing prices



Notes: 1) Calculating by applying the CF filter (16-64 quarter) on household loans by deposit-taking institutions and growth rate of housing prices from Q4 2004 to Q3 2021.

2) Blue shaded areas indicate the contradiction path of household loans and housing prices, respectively.

Sources: Bank of Korea, Korea Real Estate Board.

Causes of the recent expansion of housing finance

The recent expansion of housing finance is attributable to the expectation of higher housing prices associated with the imbalance between the supply of and demand for housing, increase in public guarantees related to housing, and inflow of ample liquidity into the housing market.

Expectation of price appreciation due to imbalance between supply and demand

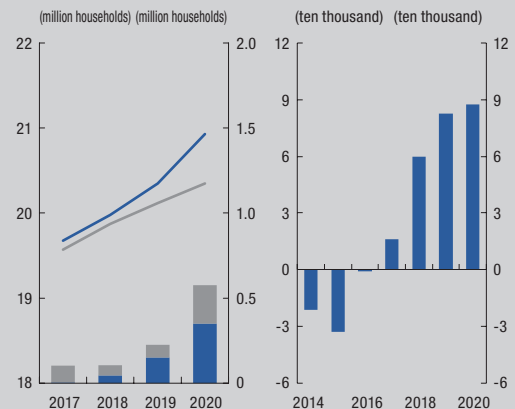
Korea is undergoing structural changes where the number of households is increasing amid stalled population growth. In 2020, the number of households significantly exceeded that of the past estimate, driven up by the rapid increase

in one-person households among those in their 20s and 30s, leading to greater-than-expected pressure for housing demand. The population of the Seoul metropolitan area has shifted to a net influx since 2017 amid the completion of the relocation of the administrative capital and public institutions to regional areas. Meanwhile, the demand for improved residential environments, including the preference²⁾ for apartment housing, is on the rise. Despite these structural changes in housing demand, such as the changes in population by region, number of households, and preferences in terms of the quality, shape, and location of housing, the housing supply has been inelastic, and thus the imbalance between supply and demand has been the main issue in the housing market.

Number¹⁾ of actual and estimated households nationwide

Population inflow and outflow in Seoul metropolitan area

— Actual households (A, LHS)
 — Estimated households (B, LHS)
 ■ Gap(A-B, RHS)
 ■ Gap between one-person households in their 20s and 30s (RHS)

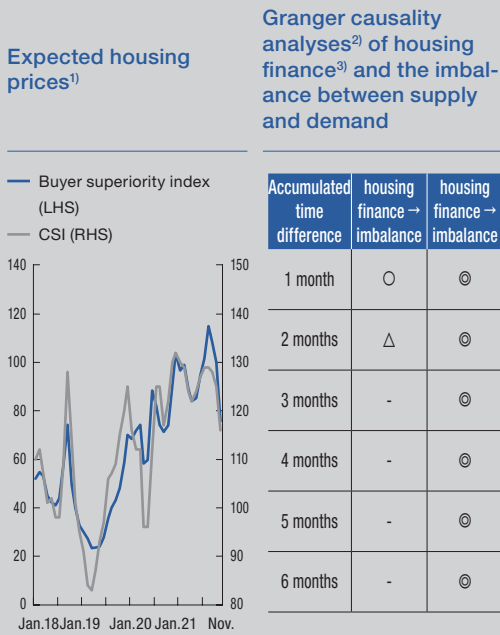


Note: 1) 2017 basis.

Source: Statistics Korea.

2) According to the residential status survey conducted by the Ministry of Land, Infrastructure and Transport, the portion of people who prefer apartment housing for relocation climbed from 62.6% in 2017 to 65.4% in 2020. In particular, among people in the upper 20% income quintile, the preference for apartment housing surged significantly from 82.4% to 87.2%.

An imbalance between housing supply and demand accompanied by the expectation of price increases is associated with increases in housing prices and housing finance. Short- and long-term Granger causality analyses of housing finance and the imbalance between supply and demand show that such imbalance will lead to an increase in housing finance in the long run.



Notes: 1) Consumers' expectations for housing sales prices after one year, ranging from 0 to 200. An index higher than 100 means expectations for rising prices are dominant.
 2) ◎, ○, △ mean statistically significant at significance level 1%, 5% and 10%, respectively.
 3) Growth rate of household loans by deposit-taking institutions and buyer superiority index from Nov. 2003 to Sep. 2021 are used.

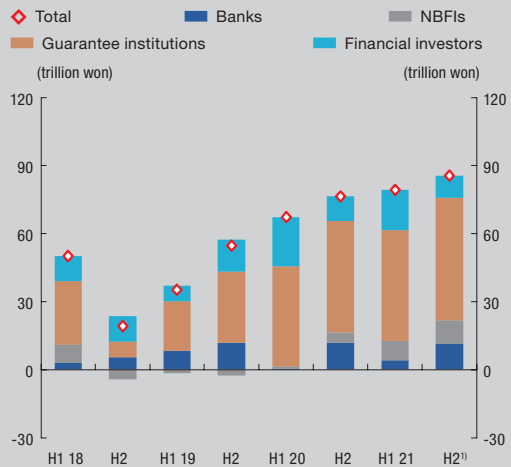
Sources: Bank of Korea, KB Kookmin bank.

(Expansion of housing-related public guarantees)

In order to stabilize the housing situation, the government increased the supply of public guarantees related to housing such as leasehold deposit guarantees and policy mortgage loans. The proportion of housing finance occupied by

public guarantees climbed from 16.9% at the end of 2019 to 20.1% at the end of September 2021. Since most housing-related risks of financial institutions are transferred to and concentrated in public guarantee institutions through public guarantees, the sensitivity of financial institutions to housing-related risk is low. As for policy mortgage loans, claims on loans issued by financial institutions are transferred to public guarantors, and default risk is transferred to the Korea Housing Finance Corporation. Regarding leasehold deposit loans that cannot be repaid by tenants, guarantee institutions repay them on their behalf, meaning that the credit risk borne by financial institutions is limited. As a result, despite the downside risk of housing prices following a sharp price increase, financial institutions can afford to continue providing housing finance amid a housing business boom.

Changes in volume of housing finance exposures, by ultimate risk bearer

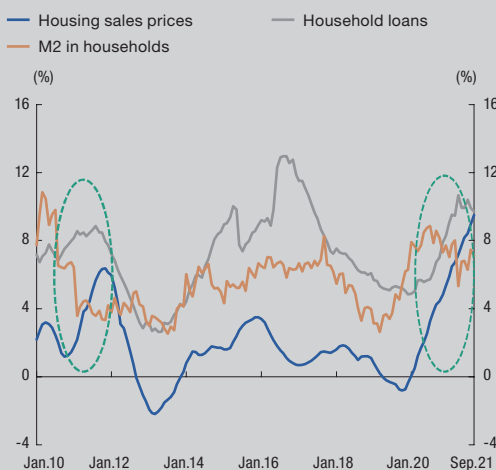


Note: 1) Figure for Q3 2021 converted to half-year figure.
 Source: Bank of Korea.

(Influx of ample liquidity into the housing market)

With the accommodative financial conditions and supply of ample liquidity by the government and the overseas sector following the outbreak of COVID-19, liquidity increased substantially.³⁾ Some of this liquidity was directed to the housing market, driven by economic entities' elevated propensity to take risks in pursuit of higher returns after the outbreak, strengthening the reciprocal relationship between housing prices and housing finance. The fact that the M2 growth of households remained low despite the high growth rate of household loans suggests that the proceeds of household loans were invested in non-monetary assets such as housing and stocks.⁴⁾

Household loans,¹⁾ growth rate²⁾ of M2 in households growth rate²⁾ of housing sales prices



Notes: 1) Deposit-taking institutions basis.

2) Year-on-year basis.

Sources: Bank of Korea, Korea Real Estate Board.

Implications

In Korea, housing finance tends to expand significantly with rising housing prices. Hence, to contain contagion of the negative impact of changes in housing market conditions, efforts to reduce the volatility of housing finance and promote stability in the housing market are necessary.

To alleviate instability in housing supply and demand, a consistent housing supply policy commensurate with the changes in the real demand for housing associated with the change in the number of households and preferences for types of residences needs to be implemented. In addition, the financial relief measures implemented to cope with the pandemic need to be phased out gradually in consideration of financial and economic conditions.

Furthermore, to ensure that the government's public guarantees aimed at supporting residential stability do not undermine financial stability, their supply volume and eligibility need to be adjusted. For example, related systems need to be supplemented to prevent tenant support measures, such as leasehold deposit (jeonse) loans, from being misused by lessors as channels for securing liquidity for the purchase of additional housinglessors. To ensure that residential stability is not disturbed in the course of adjusting the public guarantee system, it is necessary to supply rental housing through the promotion of rental REITS and construction of public rental housing.

Meanwhile, macroprudential policy related to housing needs to be supplemented and

3) After undergoing gradual upward growth in September 2021, M2 reached 12.8%, the highest level since the global financial crisis (December 2008: 13.1%).

4) In 2011, when housing prices surged, while household loans rose rapidly, the growth of M2 in households slowed.

strengthened so that the rapid expansion of housing finance does not pose a potential risk to the financial system. While Korea used restrictions on loans such as LTV and DTI as a macroprudential policy for housing, the effectiveness of such regulatory tools weakened after the COVID-19 outbreak in terms of reducing the volatility of housing finance. From 2017 to 2019, the growth of household loans issued by deposit-taking institutions slowed amid stringent regulations, but household loans increased at a faster pace after COVID-19 despite the strict regulations. While this is partly attributable to the relaxation of the LCR at banks to implement financial support to cope with the pandemic, coupled with the inevitable continuation of the accommodative monetary policy stance for a considerable period, it also suggests that macroprudential policy needs to be strengthened.

In particular, since the loan limit is linked to housing prices under the LTV ratio, this regulation is not effective in curbing the growth of housing finance when housing prices are rising. Hence, instead of the LTV ratio, the main regulatory tool should be the DSR, which measures borrowers' debt repayment ability. Nonetheless, as a balloon effect due to regulatory differences in terms of the types of borrowers and loan products subject to regulation could weaken the effect of regulations, continued efforts are needed to supplement macroprudential policy by narrowing such regulatory differences.

Growth rate of¹⁾ household loans by deposit-taking institutions



Note: 1) Year-on-year basis.
Source: Bank of Korea.

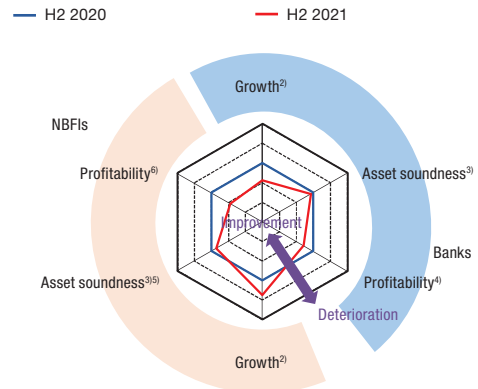
III. Financial Institutions

With the accelerated growth of assets, the management soundness of commercial banks¹⁾ appeared satisfactory as the financial support and relief measures implemented by the financial authorities helped boost asset soundness, while their profitability was lifted by an increase in interest income.

Regarding the management soundness of non-bank financial institutions (NBFIs) amid adequate asset soundness, profitability has improved significantly, while growth has moderated.

As the funds supplied by financial institutions to households and the corporate sector have increased, the growth of inter-institutional transactions has slowed, and the share of inter-institutional transactions relative to the financial sector's total assets has subsided (Figure III-1).

Figure III-1. Map¹⁾ of changes in financial soundness conditions of financial institutions



Notes: 1) Extents of change as of end-Q3 2021 compared to end-Q3 2020 indexed.
 2) Rate of increase in total assets.
 3) Substandard-or-below loan ratio.
 4) Return on assets (ROA).
 5) Excluding securities companies.
 6) Average of each NBFI sector's ROA weighted by the amounts of their total assets.
 Sources: Bank of Korea, Financial institutions' business reports.

1. Banks

Accelerated rate of asset growth

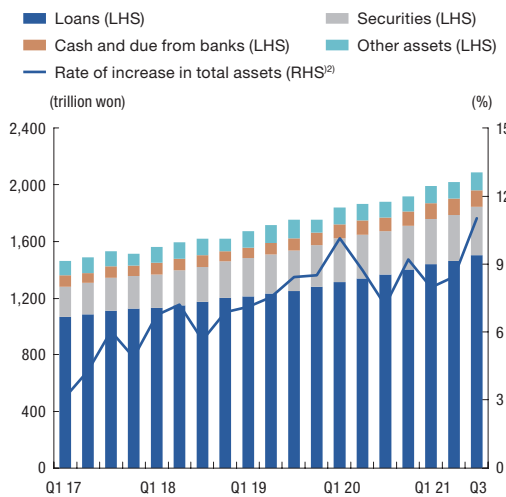
At the end of the third quarter of 2021, the total assets (banking account basis) of commercial banks reached KRW 2,087.6 trillion, growing at a rate of 11.0% year on year, representing the steepest increase since the first quarter of 2009 (+14.8%).

By asset type, loans grew by around 10.0% year on year, albeit at a slower pace recently. Corporate loans have increased amid the

1) The banking sector analysis of this financial report considers only commercial banks (nationwide and regional banks). Specialized banks (Korea Development Bank, Industrial Bank of Korea, Export-Import Bank of Korea, Non-ghyup Bank, and Suhyup Bank), whose business models differ from those of commercial banks, are excluded from its scope. Internet-only banks (K-Bank and Kakao Bank) are included among nationwide banks, but Toss Bank, which was launched in October, is excluded).

resurgence of COVID-19 and rise of investment in facilities²⁾ and real estate. Both home mortgage loans and unsecured household loans continued their upward momentum.³⁾ Meanwhile, securities surged by 11.5%, partly due to banks' increased holdings of Treasury bonds and public bonds⁴⁾ to prepare for the reinstatement of the liquidity coverage ratio (LCR) requirements in the event of the termination of the financial relief measures slated for next year. Cash and cash equivalents rose dramatically by 26.2% (Figure III-2).

Figure III-2. Commercial bank total assets¹⁾



Notes: 1) End-period banking account balance basis.

2) Year-on-year basis.

Sources: Commercial banks' business reports.

When loan assets (Korean won-denominated loan basis) are broken down by borrower type, loans to large enterprises grew by KRW 3.1 trillion during the first to third quarters of 2021, increasing at a slower rate than during the same period a year earlier (KRW 9.0 trillion). On the other hand, loans to small- and medium-sized enterprises (SMEs) rose at a faster rate than during the same period last year (KRW 42.5 trillion), growing by KRW 46.5 trillion. While large enterprises raised funds⁵⁾ mainly by increasing stocks or bond issues, SMEs relied largely on loans to meet their growing loan demand,⁶⁾ along with continued loan support related to COVID-19 (supply of new loans). Meanwhile, household loans climbed by KRW 39.3 trillion, rising at a faster pace than in the same period of the previous year (KRW 38.6 trillion), owing to the increase in leasehold deposit prices and enduring demand for purchasing assets amid the persistent impact of COVID-19 (Figure III-3).

2) From the first to third quarters of 2021, domestic facilities investment (chained 2015 year prices, not seasonally adjusted) rose by 9.8% year on year, and the value of facilities loans by commercial banks at the end of the third quarter of 2021 surged by 12.1% year on year.

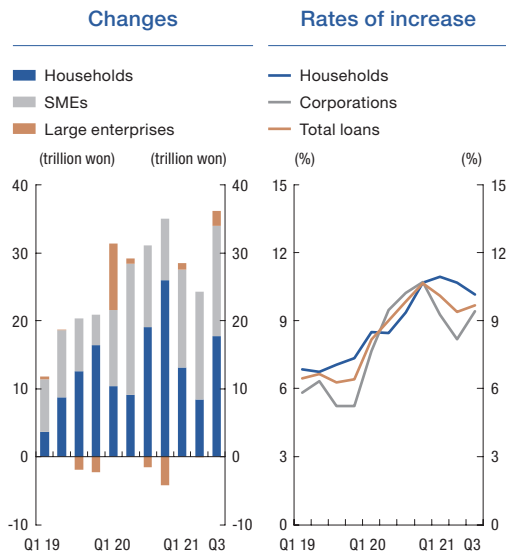
3) At the end of the third quarter of 2021, home mortgage loans of commercial banks rose by 9.5% year on year, and unsecured loans jumped by 13.1%.

4) At the end of September 2021, the value of Treasury bonds held by commercial banks stood at KRW 84.0 trillion, up 34.0% from the same period a year earlier (KRW 62.7 trillion).

5) From January to September of 2021, the value of stocks and corporate bonds issued by large enterprises jumped to KRW 60.4 trillion, up 51.4% from KRW 39.9 trillion on a year-on-year basis.

6) From the first to third quarters of 2021, Demand for Loans Lending Indexes (according to the Loan Officer Survey on Financial Institution Lending) was 6 for large enterprises and 26 for SMEs.

Figure III-3. Changes¹⁾ and rate of increase²⁾ in commercial bank loans³⁾



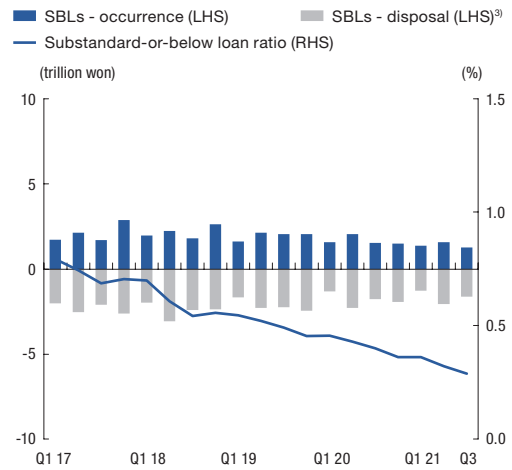
Notes: 1) Compared to previous quarters.

2) Year-on-year basis.

3) Banking account won-denominated loan basis.

Sources: Commercial banks' business reports.

Figure III-4. Commercial bank occurrence and disposal of loans¹⁾ classified as substandard or below (SBLs) and substandard-or-below loan ratio²⁾



Notes: 1) During the period basis.

2) End-period basis.

3) Including those disposed of through loan withdrawals, loan loss write-offs, loan sales, soundness reclassifications, debt restructurings, etc.

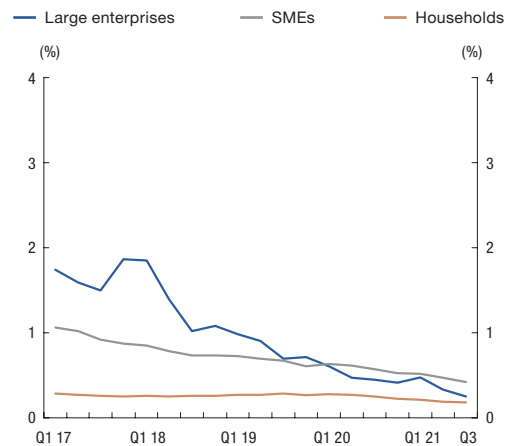
Sources: Commercial banks' business reports.

Satisfactory asset soundness

The substandard-or-below loan ratio, an indicator of commercial banks' asset soundness, dropped 0.11%p from the same period last year (0.40%), falling to 0.29% at the end of the third quarter of 2021 (Figure III-4).

The substandard-or-below loan ratio continued falling⁷⁾ on a year-on-year basis across all borrower types, including households, SMEs, and large enterprises (Figure III-5).

Figure III-5. Commercial bank substandard-or-below loan ratios, by borrower type

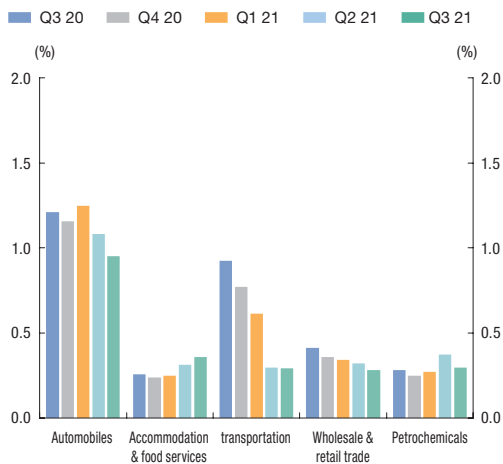


Sources: Commercial banks' business reports.

7) In the third quarter of 2021, the substandard-or-below loan ratio recorded declines of 0.19%p (0.44% → 0.25%) for loans to large enterprises, 0.15%p (0.57% → 0.42%) for SME loans, and 0.07%p (0.25% → 0.18%) for household loans.

By industry, the substandard-or-below loan ratio fell in most sectors, including manufacture of motor vehicles, trailers, and semitrailers (1.21% at end of third quarter of 2020 → 0.95% at end of third quarter of 2021), transportation and storage (0.92% → 0.29%), and wholesale and retail trade (0.41% → 0.28%). A notable exception was accommodation and food service activities (0.26% → 0.36%), which was significantly affected by COVID-19, leading to an uptick in the substandard-or-below loan ratio (Figure III-6).

Figure III-6. Commercial bank substandard-or-below loan ratios in major industries



Sources: Commercial banks' business reports.

The substandard-or-below loan ratio maintained its favorable trajectory thanks to the economic recovery and the extension of financial support and relief measures by the policy authorities.⁸⁾ However, in some sectors that were affected by the resurgence of COVID-19, loan defaults increased. Banks need to closely examine the debt repayment capacity of borrowers in vulnerable sectors and present soft

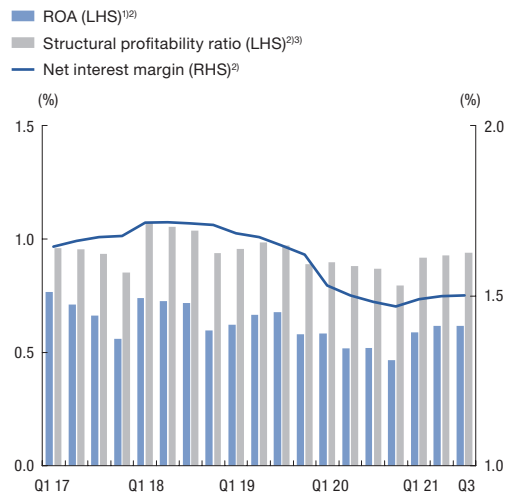
landing strategies for borrowers who received financial support, build up sufficient and preemptive provisions for loan losses, and be prepared for defaults in the event of the deterioration of external conditions or termination of financial relief measures.

Improved profitability

Commercial banks' profitability continued improving compared to the same period last year.

In the third quarter of 2021, banks' return on assets (ROA) improved by 0.10%p year on year, rising to 0.62% (annualized basis), and the structural profitability ratio, which gauges banks' capacity to generate profits in a sustained manner, ticked up by 0.07%p year on year to 0.94% (annualized basis) (Figure III-7).

Figure III-7. Commercial bank profitability



Notes: 1) Loan loss reserves excluded.

2) Accumulated quarterly incomes annualized.

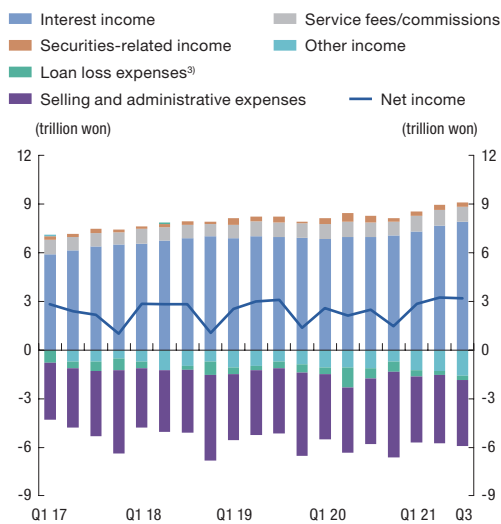
3) (Interest income + Service fees/commissions + Trust service income - Operating expenses) / Total assets.

Sources: Commercial banks' business reports.

8) The government extended the financial forbearance and deferment measures and most of the financial regulation (loan-deposit ratio and liquidity coverage ratio) relief measures until the end of March 2022.

From the first to third quarters of 2021, the net income of commercial banks reached KRW 9.3 trillion, up KRW 2.1 trillion from the same period of the previous year (KRW 7.2 trillion). This is attributable to the growth of loan assets, rise of loan interest rates, and increase⁹⁾ in the net interest margin caused by lower funding costs,¹⁰⁾ which led to an increase in interest income (+KRW 2.1 trillion) year on year, while loan loss expenses fell by KRW 1.5 trillion year on year due to the base effect of the increase in loan loss provisions last year and the continuation of satisfactory asset soundness (Figure III-8).

Figure III-8. Commercial bank net income composition¹⁾²⁾



Notes: 1) Loan loss reserves excluded.

2) During the period basis.

3) Including bad debt expenses and net provisions transferred.

Sources: Commercial banks' business reports.

Meanwhile, with the recent rise of the base rate and higher interest rate spread on the back of more stringent restrictions on household loans imposed by the government, the loan interest rate is rising.¹¹⁾ Although this may be positive in terms of banks' profitability, backed by increased interest income, it may trigger loan defaults in the event of an external shock. Therefore, the change in borrowers' debt repayment capacity needs to be continuously monitored.

Favorable foreign currency funding conditions overseas

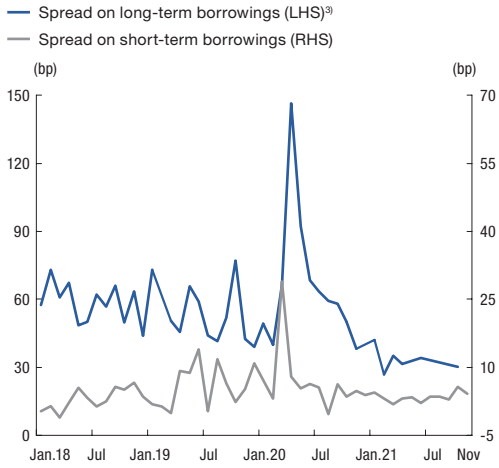
The foreign currency funding conditions of commercial banks remained favorable. The spreads of both long-term and short-term foreign currency borrowings stabilized at a rate lower than the pre-pandemic level (Figure III-9). The CDS premium of commercial banks remained at a lower level than that observed prior to COVID-19 (Figure III-10).

9) The net interest margin (NIM) of commercial banks stood at 1.50% (annualized rate) in the third quarter of 2021, having transitioned to an upward trend since the fourth quarter of last year (1.47%).

10) The reduced funding costs of commercial banks can be attributed to the surge in the share of transferable deposits. At the end of the third quarter of 2021, the share of transferable deposits in the total Korean won-denominated deposits of commercial banks reached 52.2%, up 4.1%p from the 48.1% recorded in the previous year. As of September 2021, the interest rates of demand deposits, savings deposits, and company savings were 0.27%, 0.13%, and 0.27%, respectively, well below that of time & savings deposits except savings deposits with transferability (1.05%).

11) In September 2021, the weighted average loan interest rate of deposit-taking banks (based on new loans) stood at 2.96%, up 0.30%p from the same period of the previous year (2.66%).

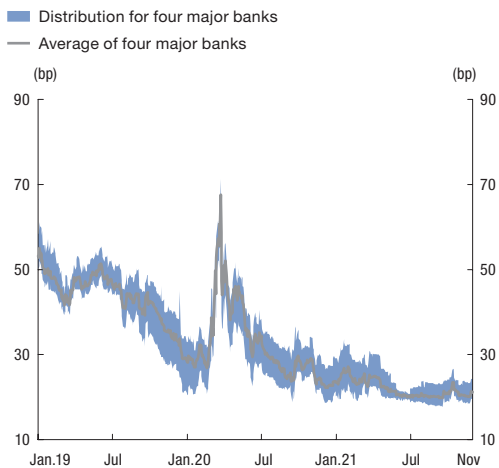
Figure III-9. Commercial bank short- and long-term foreign currency borrowing spreads¹⁾²⁾



Notes: 1) Borrowing spreads based on LIBOR (average of the spreads borne by Kookmin, Shinhan, Woori and Hana Banks weighted by the amounts of their US dollar borrowings).
 2) Excluding borrowings between domestic financial institutions, inter-office borrowings (between head office and foreign branches) and overnight (O/N) borrowings.
 3) For the long-term borrowing spread, February 2019, December 2020, May 2021 and July-September 2021 and November 2021 lack borrowings.

Source: Bank of Korea.

Figure III-10. Commercial bank¹⁾ CDS premia²⁾



Notes: 1) Based on Kookmin, Shinhan, Woori and Hana Banks.

2) 5-year maturity basis.

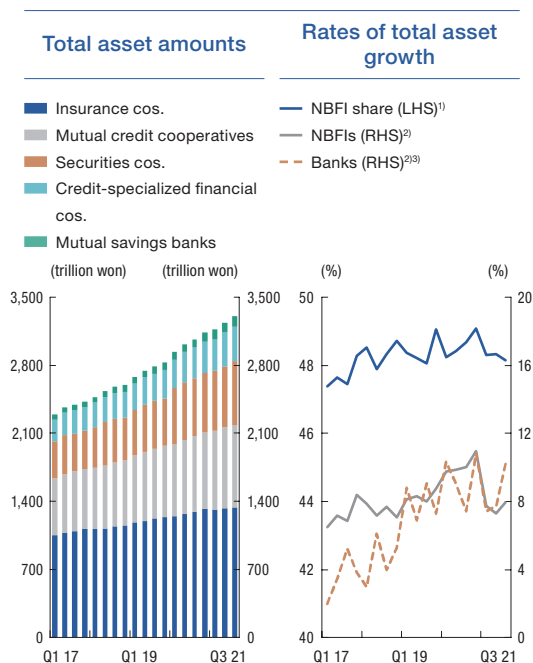
Source: Markit.

2. Non-bank Financial institutions

Continued growth of assets

At the end of the third quarter of 2021, the total assets of NBFIs increased by 7.9% year on year, reaching KRW 3,311.5 trillion, continuing¹²⁾ the growth trend. However, as the assets of banks increased at a faster pace than those of NBFIs, the share of NBFIs in the total assets of the financial sector¹³⁾ (KRW 6,878.4 trillion) slid to 48.1% at the end of the third quarter of 2021, down from the 48.7% recorded at the end of the same period of the previous year (Figure III-11).

Figure III-11. NBF total assets



Notes: 1) Total assets of NBFIs / (Total assets of banks + Total assets of NBFIs).

2) Year-on-year basis.

3) Including commercial banks, specialized banks and foreign bank branches.

Sources: Financial institutions' business reports.

By type of NBF, the assets of mutual savings banks rose by 32.1%¹⁴⁾ year on year by the end of the third quarter of 2021 thanks to the growth of unsecured household loans and real estate-related corporate loans, while the assets of mutual credit cooperatives surged by 9.3% year on year, driven by corporate loans. The assets of specialized credit finance

12) The growth of the total assets of NBFIs has been driven by corporate loans rather than household loans. For details, refer to Box 5. "Corporate Loans Extended by NBFIs and the Background of Continued Growth" (p.81).

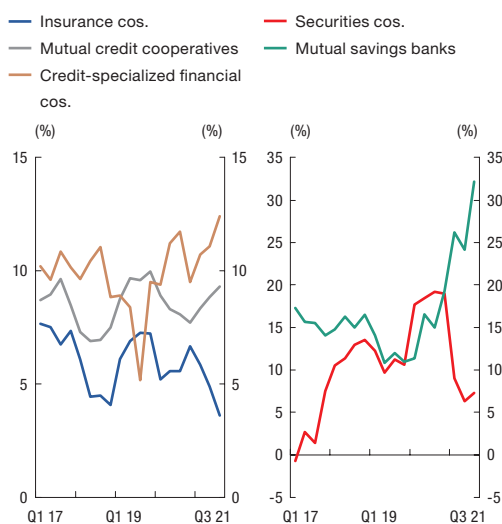
13) Encompasses banks and NBFIs, with banks including commercial banks, specialized banks, and domestic branches of foreign banks.

14) Loans by mutual savings banks have increased dramatically amid the increase in loan demand for investment and livelihood funds, stricter restrictions on bank loans, impact of policy support for loan products in the mid-tier interest range, and efforts of large mutual savings banks to strengthen their loan businesses. For details, refer to Box 4, "Background of Recent Growth of Loans by Mutual Savings Banks and Default Risk Assessments," in the Financial Stability Report for September 2021 (BOK press release, September 24, 2021).

companies (SCFCs) grew by 12.4% year on year on the back of the rise of receivables on credit card sales and card loans by credit card companies and growth of corporate loans¹⁵⁾ by other SCFCs.

On the other hand, although the assets of securities companies rose by 7.3% year on year, growth has slowed considerably relative to the previous year due to the base effect¹⁶⁾ of the sharp inflow of stock investment funds last year and continued contraction¹⁷⁾ of assets related to derivatives-linked securities. Insurance companies' assets expanded by only 3.6% owing to the slower pace¹⁸⁾ of new insurance policies sold, coupled with the impact¹⁹⁾ of valuation losses from securities amid the rising market interest rates²⁰⁾ (Figure III-12)

Figure III-12. NBF1 rates of total asset growth¹⁾²⁾



Notes: 1) Year-on-year basis.

2) Excluding accounts receivable for securities companies.

Sources: Financial institutions' business reports.

Favorable asset soundness

The asset soundness of NBFIs was favorable overall as the delinquency rate and substandard-or-below loan ratio in all sectors of NBFIs declined.

At the end of the third quarter of 2021, the delinquency rate and substandard-or-below loan ratio of mutual savings banks were 2.78% and 3.54%, respectively, down 0.97%p and 1.11%p

15) At the end of September 2021, corporate loans extended by capital companies rose by 25.6% year on year.

16) With the inflow of stock investment funds from individual investors amid the steep rise of stock prices during the second half of last year, cash and cash equivalents at securities companies rose by 53.5% year on year at the end of the third quarter of 2020. However, at the end of the third quarter of 2021, as the inflow of stock investment funds slowed, they recorded year-on-year growth of 16.1%.

17) The value of derivatives-linked securities issued by securities companies stood at KRW 82.7 trillion as of the end of September 2021, down by KRW 21.6 trillion from the same period of last year (KRW 104.2 trillion).

18) From January to September of 2021, the value of new policies sold by life insurance companies (general accounts) decreased by 6.5% year on year.

19) The value of securities held by insurance companies at the end of September 2021 rose by 2.1% year on year, recording slower growth than in the previous quarter (3.2%).

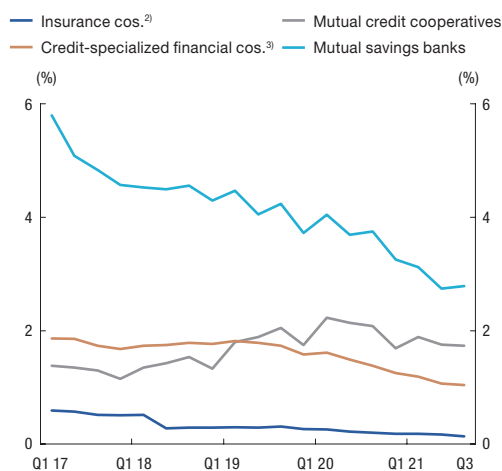
20) The yield of 10-year Treasury bonds climbed from 1.675% at the end of December 2020 to 2.061% at the end of September 2021.

year on year. However, this is largely attributable²¹⁾ to the significant increase in new loans rather than the decrease in delinquent loans and substandard-or-below loans.

The delinquency rate and substandard-or-below loan ratio of mutual credit cooperatives fell by 0.35%p and 0.38%p year on year, respectively, recording 1.73% and 2.04%.

The delinquency rate and substandard-or-below ratio of SCFCs and insurance companies declined gradually (Figures III-13 and III-14).

Figure III-13. NBF delinquency rates¹⁾



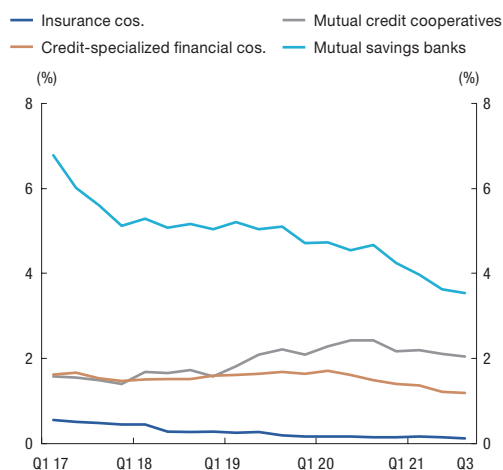
Notes: 1) Based on delinquencies of one month and longer (for mutual credit cooperatives and mutual savings banks, principal delinquencies of one day and longer or interest delinquencies of one month and longer).

2) Excluding insurance contract loans.

3) Including card (excluding merchandise credit), installment and lease assets.

Sources: Financial institutions' business reports.

Figure III-14. NBF substandard-or-below loan ratios



Sources: Financial institutions' business reports.

Upturn in profitability

Profitability showed an improvement across all non-bank financial sectors, with particularly strong growth seen among mutual savings and specialized credit finance companies (SCFCs).

From the first to third quarter of 2021, mutual savings banks' return on assets (ROA) rose by 0.46%p year on year to 2.16%, boosted by an increase²²⁾ in unsecured household loans carrying higher interest rates.²³⁾ SCFCs' ROA improved by 0.38%p year on year to 1.90%, driven by an increase in the fee income of credit card companies and interest income of other SCFCs. Securities companies' ROA also increased by 0.60%p year on year to

21) At the end of the third quarter of 2021, while the value of delinquent loans and the substandard-or-below loan ratio of mutual savings banks declined by only 5.5% and 3.4% year on year, respectively, the value of total loans jumped by 27.5% year on year.

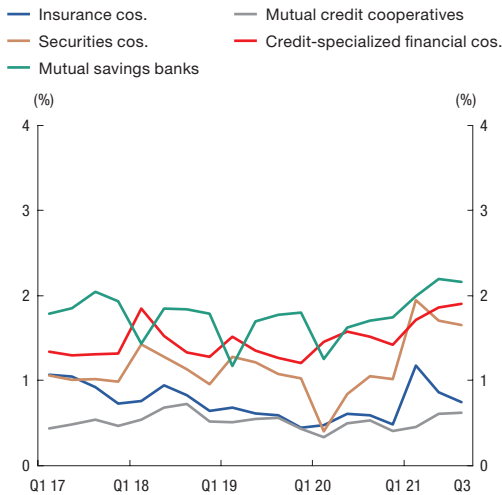
22) The share of unsecured household loans by mutual savings banks at the end of the third quarter of 2021 was 28.1%, up 2.7%p year on year.

23) In the third quarter of 2021, the interest rate of unsecured household loans by mutual savings banks was 15.11% (based on new loans), which is significantly higher than those of corporate loans (6.70%) and home mortgage loans to households (4.93%).

1.66%, primarily due to a significant rise in fee income²⁴⁾ associated with the expansion of stock investment by individuals. Mutual credit cooperatives' ROA edged up 0.10%p year on year to 0.62%, as the growth of loans resulted in an increase in interest income.

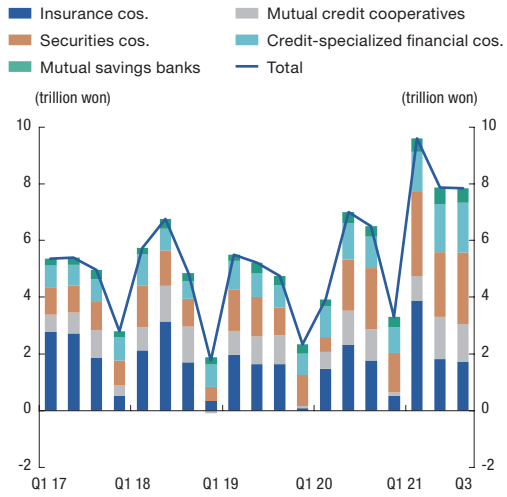
Meanwhile, insurance companies' ROA reached 0.75%, up 0.16%p year on year during the first to third quarter of 2021, which represents a moderate slip from the first six months, amid the dissipation of special factors²⁵⁾ observed during the first half of the year and valuation losses on securities caused by the rise of the market interest rate (Figures III -15 and III-16).

Figure III-15. NBFIs ROAs¹⁾



Note: 1) Accumulated quarterly incomes annualized.
Sources: Financial institutions' business reports.

Figure III-16. NBFIs net incomes¹⁾



Note: 1) During the quarter basis.
Sources: Financial institutions' business reports.

24) The fee income of securities companies amounted to KRW 4.2 trillion during the third quarter of 2021, showing a year-on-year increase of 10.9%.

25) As the burden placed on life insurance companies from having to set aside statutory reserves was significantly lessened by rising stock prices in the first quarter of 2021, the amount of such reserves reclassified as income increased.

Box 5.

Corporate Loans Extended by NBFIs¹⁾ and the Background of their Continued growth

Non-bank financial institutions (hereinafter “NBFIs”) had focused on household loans until 2016, when they began to expand their issuance of corporate loans.²⁾ A corporate loan is larger on average than a household loan, and the soundness of corporate loans is more sensitive to changes in economic conditions. Hence, the rapid growth of corporate loans extended by NBFIs that have less capital than banks is raising concern.

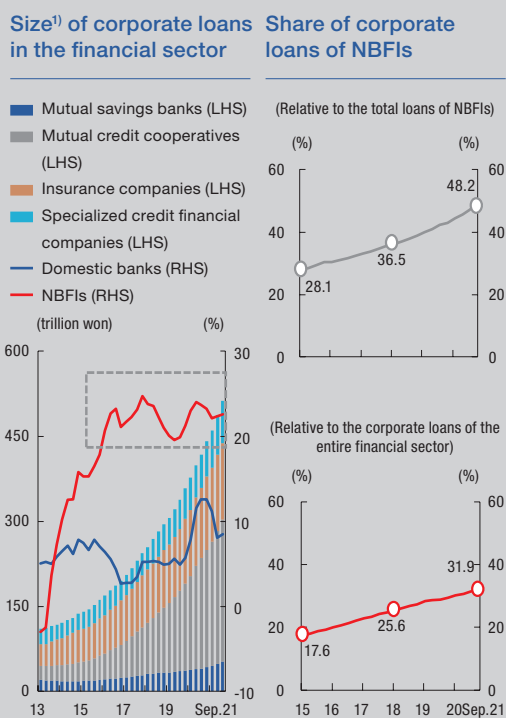
Hereunder, the major characteristics of corporate loan issuance by NBFIs and the causes of its rapid expansion are reviewed, and related policy implications are derived.

Status and characteristics of corporate loans issued by NBFIs

At the end of September 2021, NBFIs' corporate loans amounted to KRW 512.2 trillion, having grown rapidly³⁾ by over 20% annually, reaching 3.2 times the amount at the end of 2015 (KRW 161.4 trillion). As a result, the share of total loans occupied by corporate loans rose from 28.1% at

the end of 2015 to 48.2% at the end of September 2021, in contrast⁴⁾ to the decline in the share of corporate loans issued by banks.

In addition, as the growth rate of NBFIs' corporate loans far exceeded that of banks' corporate loans, the share of NBFIs' corporate loans in corporate loans of all financial institutions jumped from 17.6% at the end of 2015 to 31.9% at the end of September 2021.



Note: 1) Bar graphs show the balance at the end of each period; line graphs show the growth rate on year-on-year basis.

Sources: Financial institutions' business reports.

1) Non-bank financial institutions comprise mutual credit cooperatives (Nonghyup, Suhyup, Forestry Cooperatives, credit unions, and MG community credit cooperatives), insurance companies, specialized credit finance companies (hereinafter “SCFCs”), and mutual savings banks.

2) Corporate loans consist of loans issued to corporations (large enterprises and small and medium-sized enterprises) and sole proprietor loans, including loans to financial and insurance companies.

3) From January 2016 to September 2021, the monthly average growth rate of corporate loans (year on year) was 22.3%, while that of household loans was a mere 5.5%.

4) For banks, corporate loans' share of total loans during the same period (Korean won-denominated loans excluding interbank loans) declined slightly (end of 2015: 55.9% → end of September 2021: 54.1%).

(By type of NBFi: growth driven by mutual credit cooperatives)

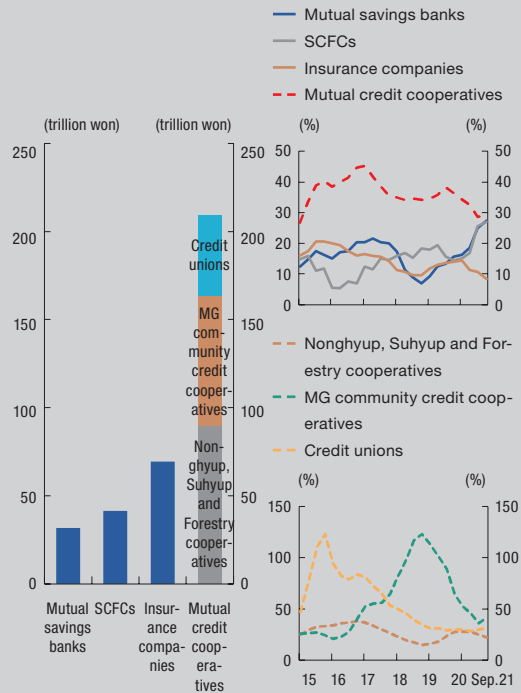
By type of NBFi, mutual credit cooperatives led the growth of corporate loans of NBFis, while corporate loans issued by specialized credit finance companies (hereinafter “SCFCs”) and mutual savings banks rose sharply as well.

From January 2016 to September 2021, corporate loans extended by mutual credit cooperatives increased by KRW 209.0 trillion, accounting for 59.6%⁵⁾ of the increase in total corporate loans issued by NBFis (+KRW 350.8 trillion). In particular, corporate loans of credit unions and MG community credit cooperatives grew sharply.⁶⁾ Consequently, the share of corporate loans issued by mutual credit cooperatives, which had focused largely on household loans, climbed⁷⁾ to 41.4% of total loans.

The growth of corporate loans issued by SCFCs and mutual savings banks has accelerated since 2020. Meanwhile, insurance companies have seen corporate loans grow at a slow rate since 2020, but that rate has been higher than that of household loans.

Changes¹⁾ in corporate loans of NBFis

Growth rate²⁾ of corporate loans of NBFis



Notes: 1) Balance increase from Jan. 2016 to Sep. 2021.

2) Year-on-year basis.

Sources: Financial institutions' business reports.

(By business sector: growth led by the real estate sector)

By business sector, real estate-related corporate loans (in terms of the real estate and construction sectors, excluding MG community credit cooperatives⁸⁾) dominated the growth of NBFis' corporate loans.

5) The share of corporate loans of mutual credit cooperatives in total corporate loans of NBFis rose from 26.0% at the end of 2015 to 49.0% at the end of September 2021.

6) From January 2016 to September 2021, corporate loans of credit unions and MG community credit cooperatives increased by KRW 46.0 trillion and KRW 73.1 trillion, respectively, recording annual average growth rates of 57.8% and 59.9%.

7) By sector of mutual credit cooperatives, the share of corporate loans in Nonghyup's total loans more than doubled from 14% at the end of 2015 to 33% at the end of September 2021, and the same share for credit unions (11% → 57%) and MG community credit cooperatives (7% → 48%) also increased significantly.

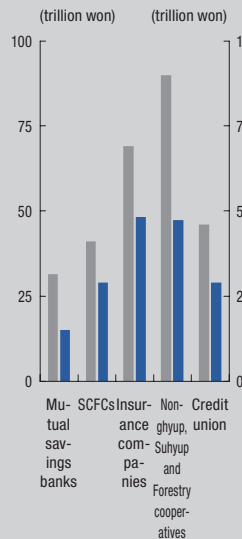
8) Due to limited data availability, corporate loans of MG community credit cooperatives were excluded from the corporate loan analysis by business sector.

From January 2016 to September 2021, real estate-related corporate loans of NBFIs increased by KRW 169.0 trillion, or 60.8% of the increase of NBFIs' corporate loans (+KRW 277.7 trillion). As a result, the share of real estate-related loans in total corporate loans of NBFIs rose from 34.5% at the end of 2015 to 51.4% at the end of September 2021.⁹⁾ During the same period, real estate project financing (PF) loans jumped by KRW 48.1 trillion, representing 28.5% of the increase in real estate-related loans.

Meanwhile, after 2020, corporate loans extended to sectors sensitive to the business cycle, including wholesale & retail trade, accommodation & food services, and transportation & storage, also increased significantly.

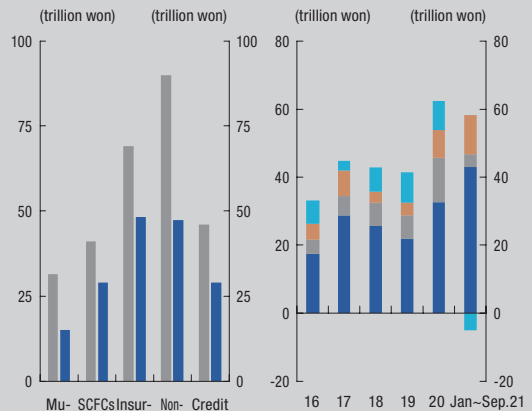
Changes¹⁾ in real estate-related NBF corporate loans

■ Total corporate loans
■ Real estate-related corporate loans



Changes²⁾ in NBF corporate loans by sector

■ Construction and real estate sector
■ Finance and insurance sector
■ Sensitive sectors to the business cycle³⁾
■ Others



Notes: 1) Changes in balance during Jan 2016 ~ Sep 2021 (excluding MG community credit cooperatives).

2) Based on the balance during the period.

3) Sum of wholesale & retail trade, accommodation & food services, and transportation & storage.

Sources: Financial institutions' business reports.

(By type of borrower: growth led by small and medium-sized enterprises)

By type of borrower, corporate loans issued to small and medium-sized corporations (small and medium-sized corporations and sole proprietors; "SMEs" hereafter) showed rapid growth, while the growth rate of corporate loans to large enterprises slowed.¹⁰⁾

9) As for the share of real estate-related loans in total corporate loans of each sector, insurance companies rose from 37.2% at the end of 2015 to 54.1% at the end of September 2021, along with similar increases for SCFCs (23.7% → 49.7%), Nonghyup, Suhyup, and Forestry Cooperatives (37.3% → 48.7%), credit unions (10.5% → 58.5%), and mutual savings banks (43.8% → 46.2%), showing that the share jumped in most NBF sectors.

10) This is largely attributable to the slow growth of assets of insurance companies that extended loans mostly to large enterprises.

Sole proprietor loans increased rapidly in 2017 and 2018 and then slowed gradually, while loans issued to SMEs have accelerated since 2020. The share of corporate loans by the borrower as of the end of September 2021, compared with that seen at the end of 2015, remained unchanged overall for mutual credit cooperatives and mutual savings banks, but SCFCs saw their share of loans to small and medium corporations surge (56% → 76%).¹¹⁾ For insurance companies, the share of loans issued to large enterprises declined (39% → 35%), and the share of loans to small and medium-sized corporations edged up (60% → 64%).

Causes of the continued growth of corporate loans issued by NBFIs

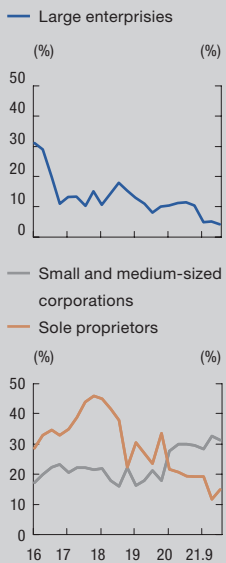
The dramatic increase in corporate loans issued by NBFIs is the result of three factors: demand for funds for real estate purchases and development, efforts of financial institutions to raise profitability amid the persistent low-interest-rate trend in terms of fund supply, and strict restrictions on household loans in terms of the regulatory environment.

(Demand for funds)

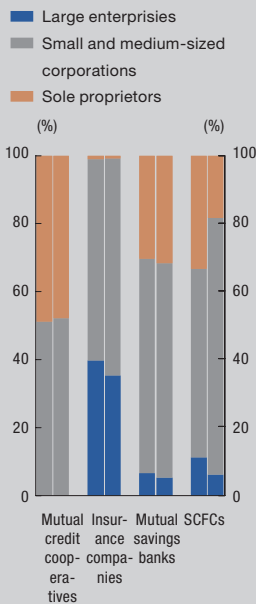
With the sharp increase in the expected rate of return on real estate investment, the demand for funds to purchase or develop real estate rose.

Amid anticipation of real estate prices continuing to push higher, loans issued to real estate rental businesses for the purchase of housing and commercial properties increased rapidly. While the demand for housing purchases by sole proprietors increased due to the increasingly stringent restrictions on household loans,¹²⁾ the widening gap between investment yields and funding costs for commercial real estate elevated the demand for investment in commercial real estate. Whereas the growth of loans issued to the real estate rental sector has slowed due to stricter regulations¹³⁾ since 2018, the optimism surrounding real estate development projects prompted a sharp increase in loans (PF loans) to fund real estate development projects.

Growth rate¹⁾ of NBFi corporate loans by borrower



Share²⁾ of NBFi corporate loans by borrower



Notes: 1) Year-on-year basis.

2) For each NBFi sector, the left bar represents the end of year 2015 and the right Sep. 2021.

Sources: Financial institutions' business reports.

11) For SCFCs, corporate loans to small and medium corporations were mainly provided by other SCFCs.

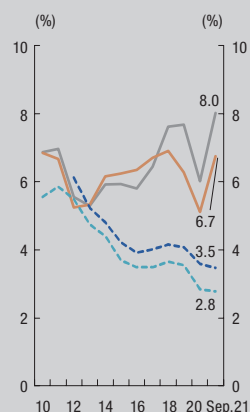
12) For details, refer to the explanation of the regulatory environment.

13) After the guideline on corporate loan review by mutual credit cooperatives was implemented in July 2018, with the aim of regulating the real estate rental sector, the growth of sole proprietor loans related to the real estate rental sector slowed significantly.

quire in-person contact with customers, such as wholesale & retail trade and accommodation & food services, also jumped significantly,¹⁴⁾ meaning that the demand for working capital loans added to the demand for loans.

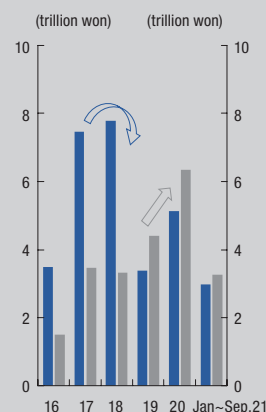
Investment return¹⁾ on commercial facilities and corporate loan interest rate²⁾ in financial sector

— Return on investment (offices)
— Return on investment (medium and large retail stores)
- - Interest rate on corporate loans in NBFIs
- - Interest rate on corporate loans in banks



Changes of real estate loans in mutual credit cooperatives³⁾

■ Real estate leasing sector
■ Real estate development sector



Notes: 1) Investment return of September 2021 is a yearly estimate.

2) NBFIs only include mutual credit cooperatives.

3) Excludes MG community credit cooperatives.

Sources: Bank of Korea, Korea Real Estate Board, Financial institutions' business reports.

(Supply of funds)

The persistently low-interest rates and downward pressure on profitability caused by competition prompted NBFIs to seek to expand corporate loans with higher expected rates of return than securities.

Mutual credit cooperatives significantly expanded real estate-related loans, which offer higher rates of return and whose collateral value is easier to appraise, on the back of stricter regulation of household loans. Individual cooperatives increased¹⁵⁾ their large-value loans related to real estate through co-lending¹⁶⁾ in order to overcome constraints in terms of asset size.

Insurance companies increased¹⁷⁾ their corporate loans such as real estate PF loans as an alternative due to the sharp rise in their debt¹⁸⁾ for which yields are below the minimum guaranteed interest rate amid persistently low-interest rates. SCFCs, particularly other SCFCs, also strived to expand¹⁹⁾ their corporate loans as they faced difficulty in generating profits from their existing lines of business due to the fierce competition over installment finance and stalled profit growth from leases.

Mutual savings banks need to expand their

14) Loans issued to the wholesale & retail trade sector (2019: +KRW 2.2 trillion → 2020: +KRW 4.9 trillion → January to September 2021: +KRW 7.3 trillion) and accommodation & food services sector (+KRW 1.4 trillion → +KRW 2.9 trillion → +KRW 2.9 trillion) showed high growth.

15) The value of co-lending by Nonghyup, Suhyup, Forestry Cooperatives, and credit unions increased from KRW 6.8 trillion at the end of 2016 to KRW 15.6 trillion at the end of 2020, and that for MG community credit cooperatives jumped from KRW 3.3 trillion at the end of 2018 to KRW 31.0 trillion at the end of September 2021.

16) Refers to collateralized loans issued by at least two lenders (cooperatives) to the same borrower with the right to collateral security for the same collateral being established with an equal priority of security interest.

17) The value of real estate PF loans issued by insurance companies reached KRW 40.0 trillion at the end of September 2021, representing a 3.4-fold increase from the KRW 11.6 trillion recorded at the end of 2015.

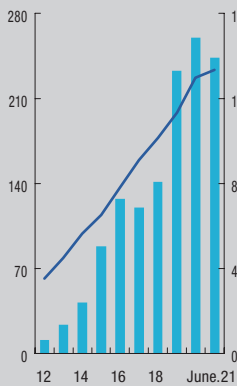
18) Refers to debts for which the rate of return (disclosed interest rate) is less than the lowest interest rate (guaranteed minimum rate promised to customers).

19) The share of corporate loans for other SCFCs' loan portfolios stood at 36.9% at the end of September 2021, surging by 8.8%p from the end of 2016 (28.1%), while the shares of installment finance assets (18.3% → 15.3%) and lease assets (22.0% → 20.3%) both shrank.

corporate loans, owing to the massive inflow of large-value deposits (over KRW 50 million) from retirement pension funds and trust funds of financial institutions, although they were already increasing unsecured loans to households in tandem with the government's policy to boost mid-range interest rate loans.

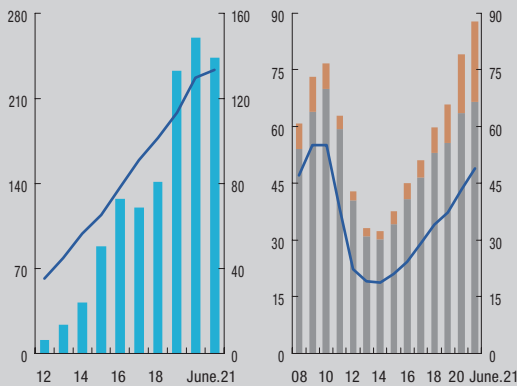
Insurance companies' minimum guaranteed interest rate liabilities

Minimum guaranteed interest rate liabilities (LHS)
Corporate loans (RHS)
(trillion won) (trillion won)



Balance of deposits-corporate loans in mutual savings banks

Small-value deposits
Large-value deposits¹⁾
Corporate loans
(trillion won) (trillion won)



Note: 1) Over 50 million won.

Sources: Financial institutions' business reports.

behind the expanded corporate loans issued by NBFIs. While the growth of household loans has slowed substantially since 2016, corporate loans of NBFIs, mostly in the real estate rental sector, have risen by a large margin, which is likely attributable to the fact that, given the strong restrictions on household loans, part of households' demand for funds to purchase housing has shifted²⁰⁾ from home mortgage loans to corporate loans related to real estate rental issued by NBFIs. Moreover, the relaxed regulations²¹⁾ on real estate-related corporate loans extended by NBFIs appears to be one of the factors promoting the rise in corporate loans of NBFIs.

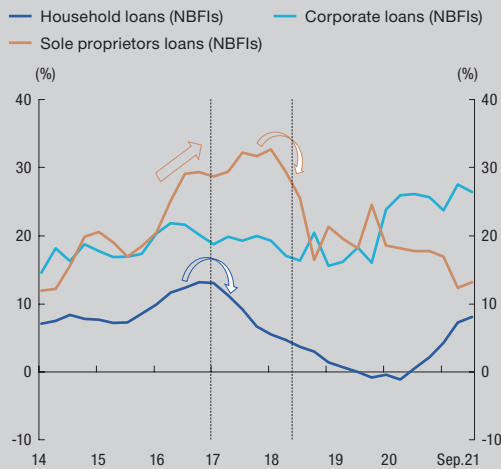
(Regulatory environment)

The stringent restrictions placed on household loans by the policy authorities are likely a factor

20) After the guideline on the issuance of household loans by mutual credit cooperatives was implemented in March 2017, the growth rate of household loans of NBFIs started to decline. Meanwhile, after the guideline on the issuance of corporate loans by mutual credit cooperatives, aiming to regulate loans to real estate rental businesses, was implemented in July 2018, sole proprietor loans related to the real estate rental sector grew at a much slower rate. Furthermore, because home mortgage loans for housing transaction/rental business operators have been banned since June 2020, excluding exceptions permitted by the Ministry of Land, Infrastructure and Transport, the demand for loans collateralized with housing issued to housing rental businesses has subsided substantially.

21) Recently, the supervisory authorities have been revising the Enforcement Decree of the Credit Unions Act to set a credit line for the real estate business since mutual credit cooperatives have rapidly increased their real estate loans by taking advantage of the fact that credit lines are not required to be set in the real estate business sector. The revised bill restricts loans extended by mutual credit cooperatives to the real estate and construction sectors to up to 30% of total loans for each sector (the sum of loans to the real estate and construction sectors combined should not exceed 50% of total loans).

Growth rate¹⁾ of household loans and corporate loans in NBFIs



Note: 1) Year-on-year basis; dotted line indicates the implementation of the guideline on loan review for mutual credit cooperatives (March 2017 for household loans, July 2018 for sole proprietor loans).

Sources: Financial institutions' business reports.

Assessment and implications

Corporate loans of NBFIs have risen steeply since 2016, with corporate loans' share of NBFIs' total loan portfolios soaring substantially. Given the demand for loans related to real estate development and the impact of stricter regulations on household loans, corporate loans of NBFIs are likely to continue rising for the time being.

The increase in corporate loans of NBFIs is meaningful in that funds that were concentrated mostly in the household sector flowed into small and medium enterprises, but it should be noted that most of these loans were used to invest in real estate.

In particular, in addition to loans to the real estate rental sector, loans to the real estate development sector, such as real estate PF loans,

which carry relatively high risk, have recently increased at a rapid pace. As a result, the risk of default of corporate loans at NBFIs is estimated to be rising, pending changes in economic conditions. Furthermore, since mutual credit cooperatives and mutual savings banks have less capital capacity than banks, and SCFCs heavily rely on short-term wholesale funding, the possibility of default of corporate loans may be larger than for other types of financial institutions.

In addition, while NBFIs are excessively boosting their share of real estate-related corporate loans, their basic role as financial institutions serving ordinary people, which includes the provision of necessary funds to communities, households, and self-employed business owners, may be weakened.

Going forward, the growth trend of NBFIs' corporate loans should be closely monitored, and the supervisory monitoring of corporate loans with higher risk such as PF loans needs to be strengthened. Moreover, the ability of mutual credit cooperatives and mutual savings banks to conduct corporate loan reviews should be examined and, if necessary, related systems revamped.

3. Interconnectedness

Slower rate of increase in inter-institutional transactions

At the end of the second quarter of 2021, the value of transactions²⁶⁾ between financial institutions rose by 6.5% year on year, recording KRW 3,090 trillion, as the pace of growth has slowed recently.²⁷⁾ This is largely attributable to the significant increase in the funds supply to households and enterprises after the outbreak of COVID-19, which has brought a relative decrease in inter-institutional transactions.²⁸⁾ As a result, the share of inter-institutional transactions in the financial sector's total assets (KRW 9,448 trillion, flow of funds statistics basis) declined by 0.5%p, falling from

33.2% in the second quarter of 2020 to 32.7% in the second quarter of 2021.²⁹⁾

By sector, inter-institutional transactions between the banking and non-banking sectors rose by 8.4% year on year due to the non-banking sector's expansion of investment in bank bonds and time deposits,³⁰⁾ with such transactions' share of total inter-institutional transactions climbing by 0.6%p to 35.6% during the same period. Inter-institutional transactions within the non-banking sector grew by 5.9%³¹⁾ year on year, driven by insurance companies' investment in investment funds and securities companies' placement of investors' deposits with the Korea Securities Finance Corp., but at a slower pace than the transactions between the banking and non-banking sectors, leading to such

26) Estimated based on data from key survey questionnaires used to compile flow of funds statistics- financial assets and liabilities tables, cash and deposit statements, borrowings statements and securities holdings statements, etc.-by classifying products into 48 categories, including deposits, loans, and derivatives, and institutions into 19 individual banks, 34 types of financial institutions, and 9 other sectors. For details, refer to "Financial Stability Report (December 2016), <Analysis of Financial Stability Issues> Ⅲ. Analysis of Banking System Interconnectedness and Measurement of Cross-sectional Systemic Risk, (p.122)."

27) The year-on-year rate of increase in transactions between financial institutions fell gradually from 14.0% at the end of the second quarter of 2019 to 10.4% at the end of the second quarter of 2020 and 6.5% at the end of the second quarter of 2021.

28) At the end of June 2021, financial institutions' funds supply to households and enterprises soared by 12.0% and 10.9% year on year, respectively, rising at a faster pace than the 6.9% and 8.1%, respectively, observed at the end of the second quarter of 2020. For details regarding factors of change in the interconnectedness of the financial sector, refer to <Analysis of Financial Stability Issues> Ⅳ. Recent Trends in Interconnectedness in the Financial Sector and Risk Assessment, (p.173)."

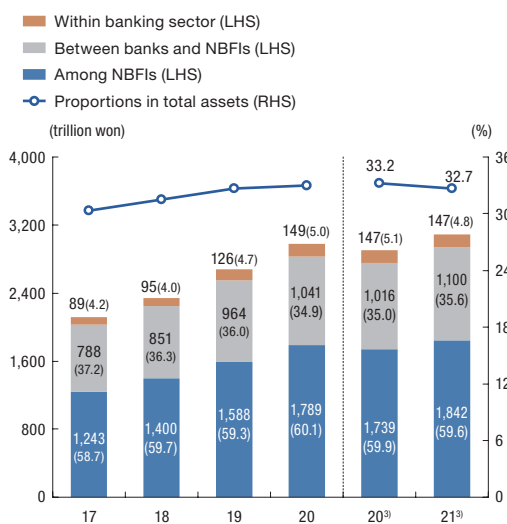
29) On the other hand, the shares of financial institutions' funds supply to households and enterprises were 21.7% and 27.8%, respectively, up 0.7%p each during the same period.

30) From the third quarter of 2020 to the second quarter of 2021, the increase in inter-institutional transactions between the banking and non-banking sectors was most prominent in transactions between banks and investment funds (KRW 34.3 trillion), followed by transactions between banks and trusts (KRW 24.0 trillion). Transactions between banks and investment funds included investment funds' investment in bank bonds (KRW 14.3 trillion) and banks' purchase of repos for investment funds (KRW 11.2 trillion). Transactions between banks and trusts included time deposits in investment portfolios of trust products (KRW 22.9 trillion).

31) From the third quarter of 2020 to the second quarter of 2021, the increase in inter-institutional transactions within the non-banking sector was led by transactions between insurance companies and investment funds (KRW 23.8 trillion), followed by investment within securities companies (KRW 18.8 trillion). Transactions between insurance companies and investment funds rose owing to insurance companies' funds operation in investment funds, including alternative investment (KRW 22.4 trillion), and transactions within securities companies were driven by securities companies' deposit of funds with the Korea Securities Finance Corp. (KRW 18.6 trillion).

transactions' share of total inter-institutional transactions sliding by 0.3%p to 59.6%. Meanwhile, inter-institutional transactions within the banking sector decreased by 0.2% year on year, with their share declining by 0.3%p to 4.8% (Figure III-17).

Figure III-17. Mutual transactions among financial institutions and across sectors¹⁾²⁾



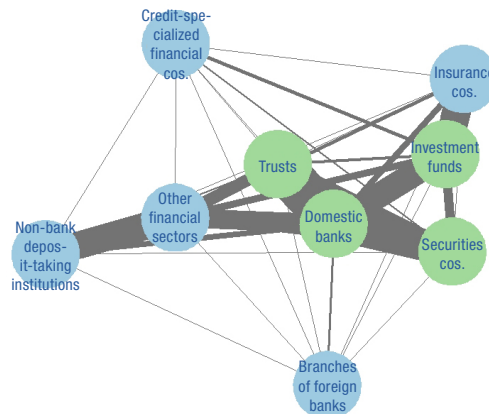
Notes: 1) Mutual transaction amounts are on an end-period basis (flow of funds statistics).
 2) Figures within parentheses are the proportion of the total amount of mutual transactions.
 3) Based on end-Q2 of each year.

Source: Bank of Korea.

By type of institution, domestic banks, securities companies, trusts, and investment funds appeared to be the main drivers of inter-institutional transactions during this period. At the end of the second quarter of 2021, the aggregate value of transactions was the highest for transactions between domestic banks and trusts, at KRW 255.9 trillion, followed by transactions between domestic banks and securities companies (KRW 214.0 trillion), between insurance companies and investment funds (KRW 206.0 trillion), and between

banks and investment funds (KRW 192.9 trillion) (Figure III-18).

Figure III-18. Financial sector interconnectedness map¹⁾²⁾³⁾⁴⁾



Notes: 1) ● indicate the four highest-ranked financial sectors in terms of their mutual transaction volumes.
 2) Using network visualization analysis, with centrality, concentrations and line thicknesses all proportional to the mutual transaction volumes.
 3) "Trusts" refers to trust accounts of banks, securities and insurance companies; "Non-bank deposit-taking institutions" to MG community credit cooperatives, credit unions, mutual savings banks, etc.; and "Other financial sectors" to public financial institutions, holding companies, the national federations of each non-bank deposit-taking institution, etc.
 4) End-Q2 2021 basis.

Source: Bank of Korea.

By type of financial product, deposits and bonds accounted for the vast majority of inter-institutional transactions. At the end of the second quarter of 2021, transactions involving deposits and bonds represented 23.6% and 22.5%, respectively, of all transactions between financial institutions, up 0.2%p and 0.3%p, respectively, year on year. Meanwhile, the share of repo transactions in total inter-institutional transactions climbed by 0.7%p year on year thanks to banks' purchase of investment funds and repos from securities companies. The share of derivatives in total transactions between financial institutions

dropped by 0.9%p due to the decrease³²⁾ in foreign currency swap transactions by banks and domestic branches of foreign banks (Table III-1).

Table III-1. Volumes of mutual transactions among financial sectors, by product

(trillion won, %, %p)

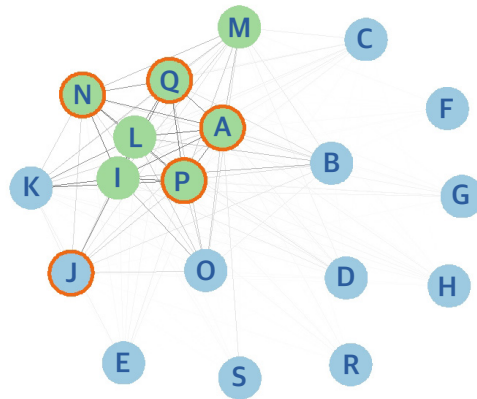
Product	End-Q2 2020		End-Q2 2021		B-A
	Amount	Share (A)	Amount	Share (B)	
Deposits	680.0	23.4	728.3	23.6	0.2
Bonds	643.0	22.2	695.2	22.5	0.3
Stocks ¹⁾	570.6	19.7	613.2	19.8	0.1
Loans	147.1	5.1	153.0	5.0	-0.1
Repos	140.7	4.8	168.5	5.5	0.7
Derivatives	80.4	2.8	57.6	1.9	-0.9

Note: 1) Including investment fund shares, equity-linked securities (ELS), etc.

Source: Bank of Korea.

In the banking sector, the structure of interconnectedness between domestic banks showed a pattern of concentration around some nationwide banks and specialized banks (Figure III-19). By share of products in inter-institutional transactions, bonds accounted for the largest share (58.5%), followed by loans (18.4%) and stocks (5.0%).

Figure III-19. Domestic banking sector interconnectedness map¹⁾²⁾³⁾



Notes: 1) Using network visualization analysis, with centrality, concentrations and line thicknesses all proportional to the mutual transaction volumes.

2) ○ indicate D-SIBs, and ● the seven highest-ranked banks in terms of their mutual transaction volumes.

3) End-Q2 2021 basis.

Source: Bank of Korea.

Default contagion risk remaining at a similar level to last year

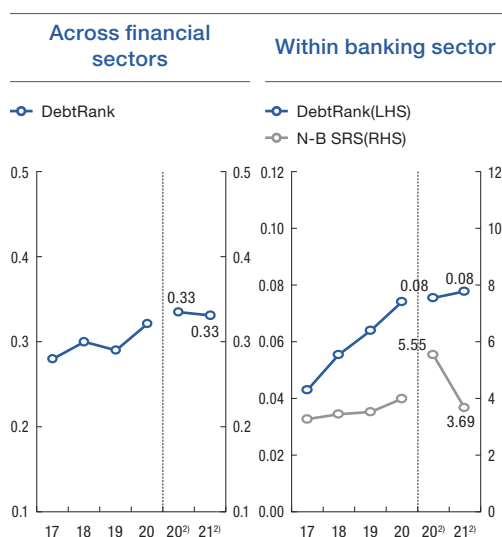
The analysis of default contagion risk and concentration risk based on the structure of interconnectedness between financial institutions found that the risk of default contagion and the concentration risk remained roughly the same as last year.

32) From the third quarter of 2020 to the second quarter of 2021, the value of inter-institutional derivatives transactions fell by KRW 22.8 trillion, comprised of KRW 13.7 trillion from domestic branches of foreign banks and KRW 6.6 trillion from domestic banks. The stability of the foreign currency market appears to be the key factor : the supply of swap funds by domestic branches of foreign banks and domestic banks increased with the relaxation of regulations on foreign currency liquidity due to market instability upon the COVID-19 outbreak, but such transactions returned to the pre-pandemic level with the stabilization of the foreign currency market (share of derivatives assets in total assets of foreign banks' domestic branches: 15.1% at end of June 2019 → 20.2% at end of June 2020 → 12.9% at end of June 2021).

33) Calculated as the simple average of the ratio of aggregate losses arising from the spread of a shock caused by the insolvency of an individual sector (bank) to its transaction counterparties through their mutual exposure, relative to the financial (banking) sector's total assets under management, a DebtRank of 0.05 means that losses following the insolvency of an individual sector (bank) will, on average, give rise to a loss of 5% of the total assets under management of the financial (banking) sector (Battiston, Stefano, et al. "DebtRank: Too Central to Fail: Financial Networks, the Fed, and Systemic Risk," 2012).

Debt Rank,³³⁾ an indicator of default contagion risk, remained at a level similar to that in the same period last year for risks both between financial sectors and within the banking sector. Network-Based Systemic Risk Scoring (N-B SRS),³⁴⁾ an indicator of aggregate contagion risk within the banking sector, dropped to the pre-pandemic level as the spread on bank bonds stabilized³⁵⁾ relative to the same period last year (Figure III-20).

Figure III-20. Default contagion risks¹⁾



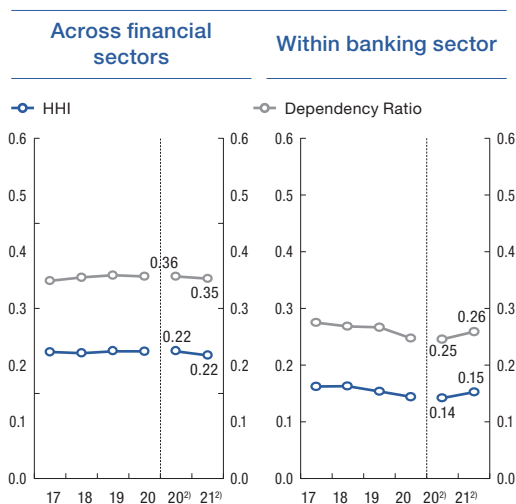
Note: 1) End-year basis.

2) End-Q2 basis.

Source: Bank of Korea.

As for concentration risk indicators, both the Herfindahl-Hirschman Index (HHI)³⁶⁾ and the dependency ratio³⁷⁾ remained largely unchanged year on year for risk between financial sectors, while they showed a modest rise for risk within the banking sector, although deviating little from levels seen in average years (Figure III-21).

Figure III-21. Concentration risks¹⁾



Note: 1) End-period basis.

2) End-Q2 basis.

Source: Bank of Korea.

34) N-B SRS is the aggregate risk of the banking sector resulting from the amplification of the probability of default of a specific bank (estimated based on spreads on bank bonds) through the mutual exposure it has with other banks, defined as the square root of the value calculated by multiplying the default probabilities of two banks with mutual exposure by the total value of the transactions between the two banks for all pairs of banks and adding up the results (Das, Sanjiv Ranjan. "Matrix Metrics: Network-Based Systemic Risk Scoring," 2015).

35) Average spreads on bank bonds (rated AAA, 3-year) against 3-year Treasury bonds: 15.4bp in second quarter of 2019 → 28.6bp in second quarter of 2020 → 18.3bp in second quarter of 2021.

36) Measured by the weighted average value of the summed squares of shares in a sector's (bank's) total transactions with other sectors (banks), accounted for by each of the sectors (banks), the HHI index indicates the level of dependency on a small number of transaction counterparties. The shares of transactions and weight were calculated based on fund management transactions.

37) The dependency ratio is the weighted average share of a sector's (bank's) total transactions accounted for by the sector (bank) with which it has the largest amount of transactions, indicating the level of dependency on a single transaction counterparty. The share of transactions and weight were calculated based on fund management transactions.

IV. Capital Flows

From January to November of 2021, foreigners' domestic portfolio investment recorded a net outflow from stocks and a net inflow into bonds. Foreigners' stock investment shifted to a net outflow amid concerns over the overvaluation of domestic stocks and slowing growth of corporate earnings and possible changes in the monetary policy stances of advanced economies. On the other hand, the bond market saw a continuous net inflow of foreign portfolio investment, driven mainly by public investment funds attracted by the favorable external soundness of Korea and relatively high domestic interest rate.

Overseas portfolio investment by residents increased mainly in terms of stocks. Investment in stocks increased, driven by rising stock prices in major economies. Meanwhile, investment in bonds surged as the National Pension Service raised the share of overseas bonds investment in its portfolio.

Continuous foreign portfolio investment in domestic securities

From January to November of 2021, foreigners' portfolio investment in domestic securities¹⁾ recorded a net inflow of USD 30.2 billion (-USD 21.1 billion in stocks, +USD 51.3 billion in bonds). Foreigners' stock investment re-

corded a net outflow position at the beginning of the year on profit-taking after the increase in domestic stock prices. From May to July, the outflow increased amid the spread of the Delta variant of COVID-19, instability in the Chinese stock market and concerns over US inflation. In particular, in August, as worries over the sluggish semiconductor business heightened, the net outflow accelerated, centered on related companies. In September, foreigners' portfolio investment in domestic securities shifted to a net inflow as they bought the dip, but in October, it transitioned to a net outflow as investment sentiment cooled amid concern over the slowing growth of corporate earnings and expectation of tapering by the US Federal Reserve. In November, it shifted to a net inflow buoyed by the anticipation of improvement in some business sectors.

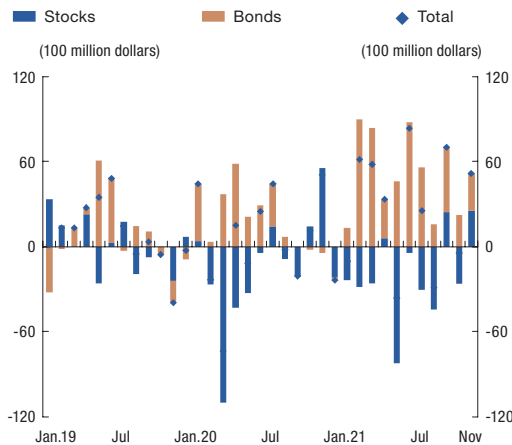
On the other hand, the inflow of foreigners' investment in domestic bonds surged, driven by public investment funds aiming to capture higher treasury bond yields²⁾ than those of other countries with the same sovereign rating despite Korea's favorable external soundness and basic economic conditions. The inflow that started in January 2021 continued until November (Figure IV-1). In the second half of 2021, however, the inflow slowed relative to the first half of the year due to the reduction³⁾ of incentives for arbitrage transactions.

1) In this section, stock investment includes exchange and OTC transactions in KOSPI- and KOSDAQ-listed stocks as well as initial public offerings (IPOs) (but excludes ETFs, ELWs, ETNs, etc.), while bond investment is based on exchange and OTC transactions in listed bonds (with repo transactions and amounts reaching maturity also taken into consideration).

2) Treasury bond yields of countries with an S&P sovereign rating of AA (10-year, as of November 30, 2021) were 2.21% for Korea, 0.81% for the UK, 0.01% for France, and 0.55% for Taiwan.

3) Incentives for undertaking arbitrage transactions (three-month, daily averages during the period) declined from 38bp in June to 18bp in July, going on to record 9bp in August, 12bp in September, 7bp in October, and 17bp in November.

Figure IV-1. Changes¹⁾ in foreigners' domestic portfolio investment

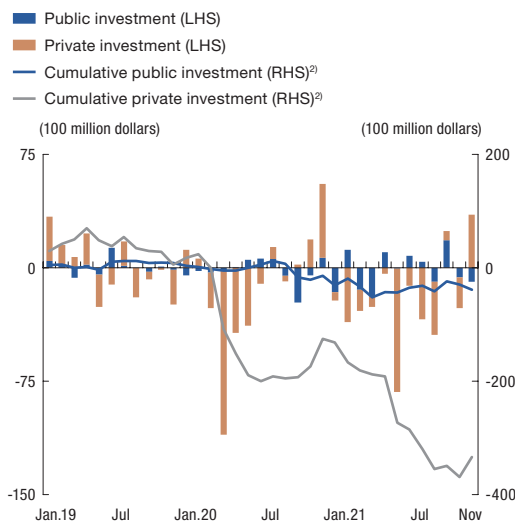


Note: 1) A "+" means net inflow, and a "-" net outflow.

Source: Bank of Korea.

By type of investor, the net outflow of stock investment was led by private investors, while the net inflow of bond investment was led by public investors (Figures IV-2 and IV-3).

Figure IV-2. Net foreigners' stock investment inflows¹⁾ by investor type

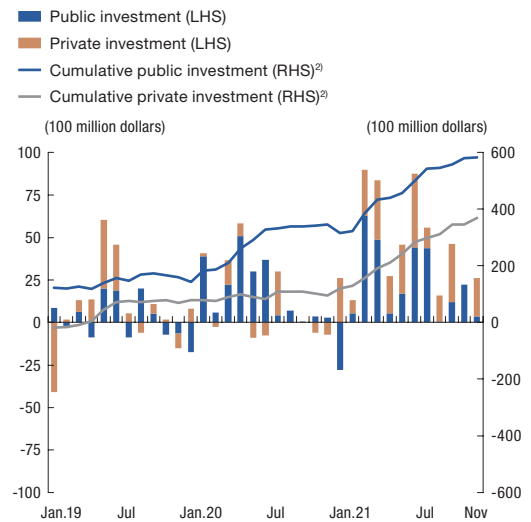


Notes: 1) A "+" means net inflow, and a "-" net outflow.

2) Cumulative sums of monthly net inflows since January 2019.

Source: Bank of Korea.

Figure IV-3. Net foreigners' bond investment inflows¹⁾ by investor type



Notes: 1) A "+" means net inflow, and a "-" net outflow.

2) Cumulative sums of monthly net inflows since January 2019.

Source: Bank of Korea.

As of the end of November 2021, the balance of foreigners' stock investment stood at KRW 734 trillion, representing 28.3% of stock market capitalization,⁴⁾ a decrease of 3.1%p from the end of 2020 (31.4%). Meanwhile, the balance of foreigners' bond investment amounted to KRW 208 trillion, corresponding to 9.3% of the total balance of listed bonds, an increase of 2.0%p from the end of 2020 (7.3%).

Foreigners' portfolio investment in domestic stocks is likely to see elevated volatility, depending on the pace of the monetary policy normalization by central banks in advanced economies to contain inflation, expectations of economic recovery at home and abroad, and continuation of strong corporate earnings. On the other hand, the net inflow of foreign portfolio investment into domestic bonds is likely to continue for the time being, given the level

4) Sum of total market capitalizations of KOSPI and KOSDAQ markets.

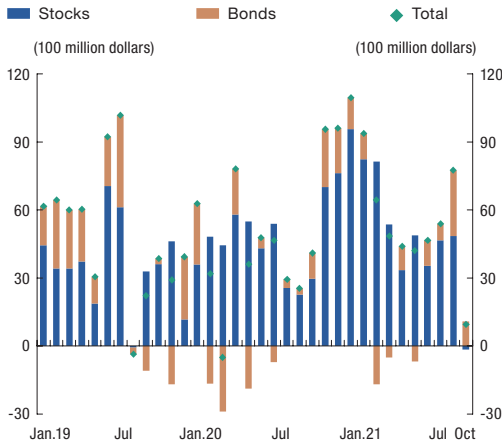
of the domestic interest rate.

Accelerated growth of overseas portfolio investment by residents

94

From January to October of 2021, overseas portfolio investment by residents soared to USD 58.9 billion (USD 52.4 billion in stocks, USD 6.6 billion in bonds), showing a sharp increase (USD 19.5 billion) from the same period a year earlier (USD 39.4 billion) (Figure IV-4). This is primarily explained by a surge in investment in overseas equities as stocks rose in major economies, buoyed by the expectation of economic recovery on the back of soaring vaccination rates and strong corporate performance.

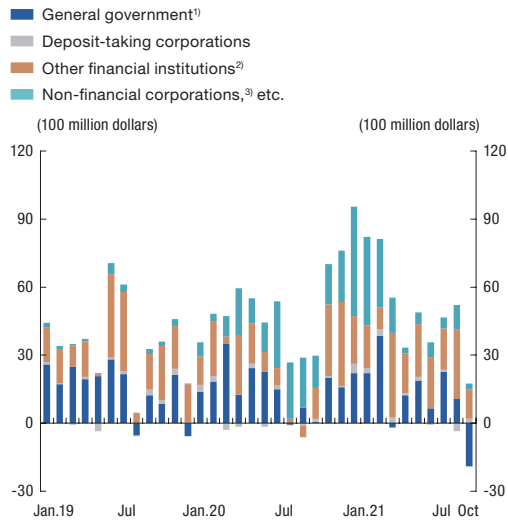
Figure IV-4. Changes¹⁾ in residents' overseas portfolio investment



Note: 1) A "+" means net investment, and a "-" net withdrawal.
Source: Bank of Korea.

By type of investor, the sharp increase in stock investment was driven mainly by other financial corporations, such as asset management companies, and non-financial corporations, etc (Figure IV-5).

Figure IV-5. Net residents' overseas stock investment outflows, by investor type

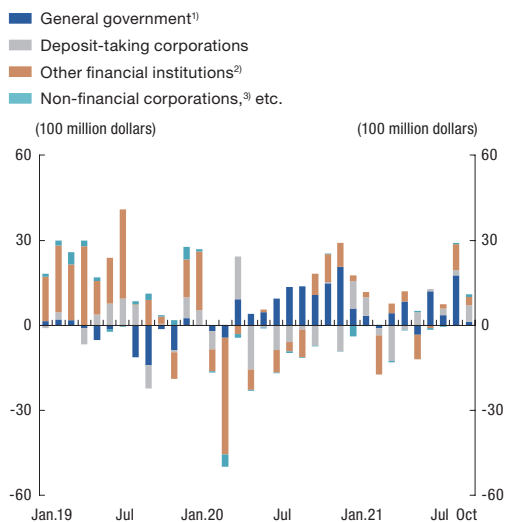


Notes: 1) National Pension Service (NPS), Korea Investment Corporation (KIC), etc.
2) Insurance companies, asset management companies, etc.
3) Including individual investors.
Source: Bank of Korea.

Meanwhile, the general government was the main driver of the increase in bond investment, with the National Pension Service lifting⁵⁾ the allocation of overseas bonds in its portfolio investment (Figure IV-6). Other financial corporations, including insurance companies, also saw a moderate increase in their bond investment, reversing the downward trend from a year earlier.

5) The National Pension Service raised the target share of overseas bonds in its investment portfolio from 5.5% at the end of 2020 to 7.0% at the end of 2021 (Mid-term Asset Allocation for Funds Operation of the NPS for 2021-2025).

Figure IV-6. Net residents' overseas bond investment outflows, by investor type



Notes: 1) National Pension Service (NPS), Korea Investment Corporation (KIC), etc.

2) Insurance companies, asset management companies, etc.

3) Including individual investors.

Source: Bank of Korea.

Overseas portfolio investment by residents is expected to continue on an upward path going forward. However, the trend is likely to be restrained by the possible escalation of volatility in the international financial market associated with monetary policy normalization in major economies.

Resilience of Financial System

I. Financial Institutions	99
II. External Payment Capacity	119
III. Financial Market Infrastructures	123

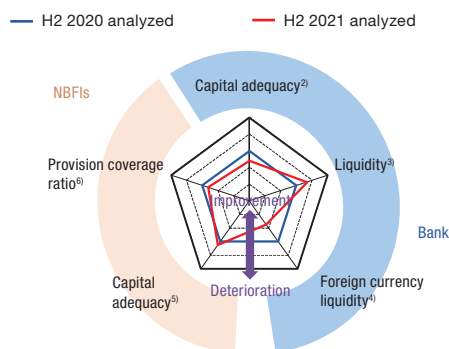
I. Financial Institutions

The resilience of commercial banks has remained satisfactory overall. The capital adequacy ratio, which is an indicator of loss absorbing capacity, increased, and the liquidity ratio, which measures the capacity to respond to sudden outflows of funds, was in excess of the regulatory minimum.

The resilience of NBFIs has remained adequate, as indicated by the loan loss provision coverage ratio showing improvementimproving and the capital adequacy ratio exceeding the supervisory requirements.

With the termination of various financial supports and relief measures slated for March 2022 and the beginning of tapering by the US Federal Reserve, credit risk is likely to increase mainly in vulnerable sectors. Hence, loss absorbing capacity needs to be bolstered by increasing loan loss provisions and building up capital buffers (Figure I-1).

Figure I -1. Map¹⁾ of changes in financial institution resilience



Notes: 1) Extent of change as of end-Q3 2021 (end-October 2021 for banks' liquidity and foreign currency liquidity) compared to end-2020 indexed.
 2) Total capital ratio under Basel III.
 3) Liquidity coverage ratio (LCR).
 4) Foreign currency LCR.
 5) Weighted average of NBFIs sectors' capital adequacy ratios by their total assets.
 6) Excluding securities companies.
 Sources: Bank of Korea, Financial institutions' business reports.

1. Banks

Sound loss absorbing capacity

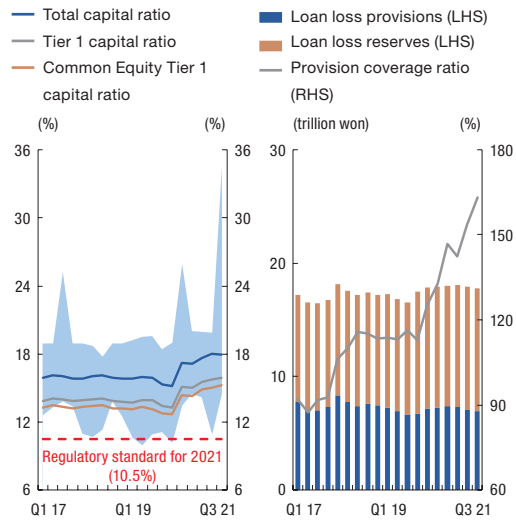
At the end of the third quarter of 2021, commercial banks' capital adequacy ratio (BIS total capital ratio) stood at 17.98%, up 0.83%p from the end of 2020 (17.15%). The Common Equity Tier 1 capital ratio edged up to 15.26%, an increase of 0.98%p from the end of last year. The total capital ratio was in excess of the regulatory minimum for 2021 for all banks (10.5%; 11.5% for D-SIBs¹⁾ and 9.25% for Internet-only banks).

This is attributable to the growth of capital, boosted by the improvement of net profits,

1) The domestic systemically important banks (D-SIBs) are Shinhan/Jeju Bank (Shinhan Financial Group), Hana Bank (Hana Financial Group), KB Kookmin Bank (KB Financial Group), Nonghyup Bank (NH Financial Group), and Woori Bank (Woori Financial Group).

outpacing the increase in risk-weighted assets associated with the expansion of loans. The provision coverage ratio (loan loss provisions / substandard-or-below loans), which measures banks' capacity to absorb expected losses, jumped 16.3%p from the end of the previous year (146.8%), to 163.1%. That is mainly due to²⁾ the fact that despite the decrease in loan provisions, substandard-or-below loans decreased further, thanks to the extension of financial supports such as the deferment of principal and interest payment, maturity extension, and supply of new loans, coupled with economic recovery (Figures I-2 and I-3).

Figure I-2. Commercial bank Basel III capital ratios¹⁾²⁾³⁾ and provision coverage ratio¹⁾⁴⁾



Notes: 1) End-period basis.

2) Regulatory standards for 2021: Common Equity Tier 1 capital ratio 7%, Tier 1 capital ratio 8.5%, and total capital ratio 10.5% (8%, 9.5% and 11.5% for D-SIBs, respectively).

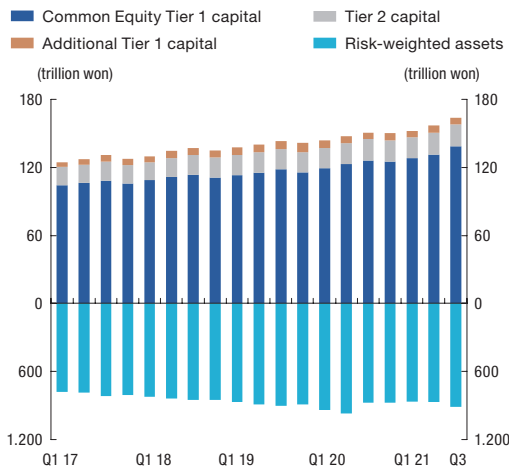
3) Shaded area indicates distribution of individual banks' total capital ratios.

4) Provision coverage ratio = Loan loss provisions / Substandard-or-below loans. Loan loss reserves were included in loan loss provisions until Q3 2016, and loan loss reserves have been included in common equity Tier 1 capital since then.

Sources: Commercial banks' business reports.

2) As defaults are likely to increase amid the growing uncertainties at home and abroad, the protracted COVID-19 pandemic, and normalization of financial relief measures, loan loss provisions need to be set aside under stricter standards than the current default rates would dictate. To cope with the credit risk surge amid the COVID-19 crisis, large banks of major economies have also preemptively set aside loan loss provisions commensurate with the credit risk surge (BIS report, May 2021).

Figure I -3. Commercial bank capital ratio decomposition¹⁾²⁾



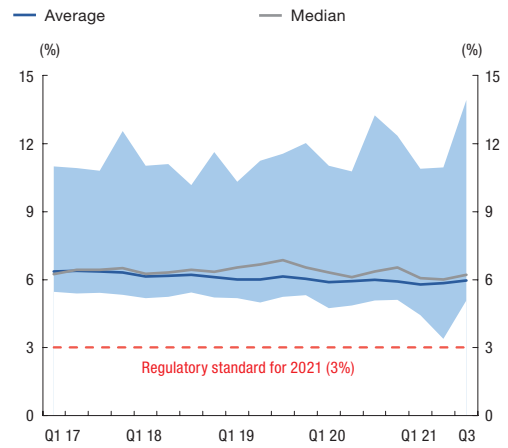
Notes: 1) End-period basis.

2) From Q4 2016, Common Equity Tier 1 capital includes loan loss reserves.

Sources: Commercial banks' business reports.

At the end of the third quarter of 2021, the leverage ratio³⁾ of commercial banks recorded 5.96%, edging up 0.04%p from the end of last year (5.92%) as the increase in capital boosted by improvement in net profits exceeded the increase in total exposure. The leverage ratio remains above the regulatory minimum requirement (3%) for all banks (Figure I-4).

Figure I -4. Commercial bank leverage ratios¹⁾²⁾³⁾



Notes: 1) Tier 1 capital (Common Equity Tier 1 capital + Additional Tier 1 capital) / Total exposure; end-period basis.

2) Auxiliary indicator until 2017, implemented as regulatory standard from 2018.

3) Shaded area indicates distribution of individual banks' leverage ratios.

Sources: Commercial banks' business reports.

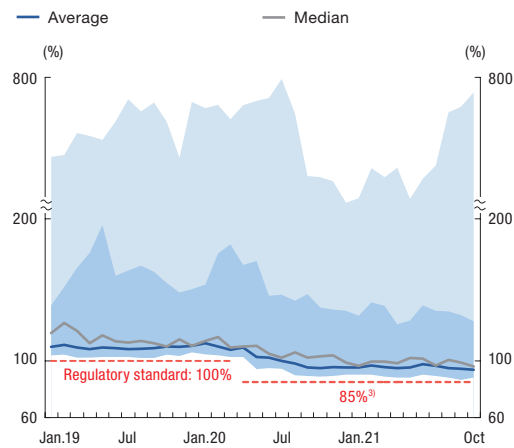
Adequate liquidity response capacity

At the end of October 2021, the liquidity coverage ratio (LCR) of banks dropped 1.2%p from the end of last year (95.1%), recording 93.9%. This year, the rise in net cash outflows caused by the increase in the standby money of corporations outpaced the growth of banks' high-quality liquid assets. The LCR of banks has remained above the regulatory minimum (temporarily lowered from 100% to 85% for the period of April 2020 through March 2022), but the LCRs of some banks were near the temporary regulatory minimum (85%), suggesting that such banks need to preemptively

3) Here, the leverage ratio refers to the simple Tier 1 capital ratio under the "Banking Business Supervision Regulations." This ratio was introduced to limit excessive leverage in the banking sector for the purpose of preventing abrupt deleveraging in times of crisis and the resulting amplification of shocks to the financial system. Calculated based on total exposure, the leverage ratio plays a supplementary role to the standard capital adequacy requirements. In Korea, it was selected as a supplementary indicator from the first quarter of 2015 and officially adopted as a regulatory measure in 2018. The leverage ratio also started to be applied to Internet-only banks in January 2020.

prepare for the phase out of the mitigation of the LCR regulation (Figure I-5). At the end of October 2021, banks' foreign currency LCR⁴⁾ inched up by 14.4%p from the end of 2020 (107.3%), to 121.7%, which is higher than the regulatory minimum (temporarily lowered from 80% to 70% for the period of April 2020 through March 2022) for all banks (Figure I-6). The net stable funding ratio⁵⁾ (NSFR), which measures the long-term stability of banks' funding structure, stood at 110.1% at the end of the third quarter of 2021, with all banks satisfying the regulatory minimum (100%) (Table I-1).

Figure I -5. Commercial bank LCRs¹⁾²⁾



Notes: 1) High-quality liquid assets/Total net cash outflows over next 30 calendar days; monthly average balance basis.

2) Shaded area indicates distribution of individual banks' LCRs, and deep shaded area indicates distribution with Internet-only banks excluded.

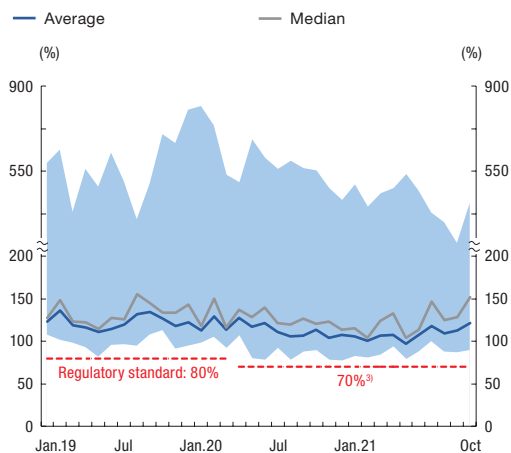
3) Temporary adjustment in place from April 2020 through March 2022.

Sources: Commercial banks' business reports.

4) Although the foreign currency LCR is not a part of the Basel III requirements, it became an official requirement in Korea, effective as of January 2017, to ensure the steady supply of foreign currency to the real sector even under a stress situation. The foreign currency LCR is a requirement for most domestic banks, with the exception of Korea Eximbank, Internet-only banks, and some regional banks with only small amounts of foreign currency liabilities (Kwangju Bank and Jeju Bank). The regulatory standard was raised incrementally from 2017 until 2019, when the fully phased-in level (80% for commercial banks) became effective. Meanwhile, to allow banks to sufficiently use their high-quality liquid assets in response to the economic fallout of COVID-19, the supervisory authorities temporarily lowered the foreign currency LCR by 10%p.

5) The NSFR limits banks' overreliance on short-term wholesale funding by requiring them to fund some of their long-term assets under management using stable debt and capital. The NSFR was introduced for domestic banks in January 2018 (2020 for Internet-only banks).

Figure I -6. Commercial bank foreign currency LCRs¹⁾²⁾



Notes: 1) High-quality liquid foreign currency assets/Total net cash outflows in foreign currency over next 30 calendar days; monthly average balance basis.

2) Shaded area indicates distribution of individual banks' foreign currency LCRs.

3) Temporary adjustment in place from April 2020 through March 2022.

Sources: Commercial banks' business reports.

Table I -1. Commercial bank NSFRs¹⁾²⁾

(%)

	2019	2020				2021		
		Q1	Q2	Q3	Q4	Q1	Q2	Q3
Average	113.5	111.7	111.6	111.1	112.2	111.2	111.7	110.1
Median	111.3	111.9	110.1	109.4	110.3	108.2	109.6	106.9

Notes: 1) Available stable funding / Required stable funding; end-period basis.

2) Regulatory standard for 2021 is 100%.

Source: Commercial banks' business reports.

Box 6.

Impact of Fintech and Big Tech on Banks

Generally, a new company entering a financial industry faces high initial fixed costs and strict financial regulations such as a minimum capital requirement. They have worked as a barrier blocking the entry of new firms into the financial sector.

However, thanks to digital transformation¹⁾ in finance promoted by the latest IT developments, especially in online and mobile communications and data storage and processing, it is now much easier for companies to enter the financial sector. The development of online and mobile technology could have created various interfaces between financial companies and consumers without the help of physical branch offices. The decrease in data storage costs and the faster data processing substantially reduced³⁾ the fixed costs in entering financial markets, as financial companies can now use IT systems by paying fees (SaaS: System-as-a-Service)²⁾ instead of internally developing and establishing such ser-

vices systems to engage in the finance market.

Moreover, the government has relaxed the qualification review and related regulations to increase the efficiency of the financial sector with the development of digital technology by enacting the Special Act on Support for Financial Innovation (effective enforcement 2019) and the Act on Special Cases Concerning Establishment and Operation of Internet-only Banks (effective enforcement 2019).⁴⁾

1) Financial innovation in decentralized finance (DeFi) resulting from the development of blockchain-based distributed ledger technology is not covered in this section.

2) According to an estimate by Gartner, the value of the global SaaS market grew from about USD 100 billion in 2019 to USD 150 billion in 2021 from about USD 100 billion in 2019.

3) While commercial banks' average fixed assets for business, such as business property and facilities, and leasehold deposits of rented branch offices amounted to KRW 2.4 trillion (as of the end of September 2021), the average fixed assets of Internet-only banks (Kbank, Kakao Bank, and Toss Bank) were merely KRW 27 billion.

4) The Special Act on Support for Financial Innovation includes a regulatory sandbox granting regulatory exceptions for innovative financial service providers. The Act on Special Cases Concerning Establishment and Operation of Internet-only Banks sets the minimum capital of Internet-only banks at KRW 25 billion, one-fourth of that for banks subject to the Banking Act, and exempts them from the prudential requirements of Basel III to relieve the burden of financial regulations in the early phase of Internet-only banks.

Major fintech deregulation policy trends by year

Year	Main contents
2015	Revision of the Electronic Financial Transactions Act. Abolishing the obligation to use an authorized certificate.
	Authoritative interpretation of the Act on Real Name Financial transactions and confidentiality Allowance of non-face-to-face real-name confirmation
2016	Authorization of internet-only banks Permission of Kbank banking business
2017	Suggestion of P2P lending guidelines Implementation of P2P lending service
	Amendment of the Enforcement Decree of the Financial Investment Services and Capital Markets Act and the Regulations on Financial Investment Business. allowance of Robo-advisor's investment advice to and discretionary investment for clients.
2018	Enactment of the Special Act on Support for Financial Innovation. Introduction of financial regulatory sandbox(2019)
	Enactment of the Internet-only Banks Act. Mitigation of the separation of banking and commerce and suspension of the regulation
2019	Plans for establishing an open banking system Implementation of open banking
2020	Revision of the Credit Information Use and Protection Act. Introduction of MyData business
2021	Revision of the Special Act on Support for Financial Innovation. extension of designation period on innovative financial services

Source: Financial Services Commission.

Entrance of fintech and Big Tech firms into financial markets

As a result, small fintech firms equipped with IT technology and new ideas and Big Tech firms with market dominance in Internet portal service markets actively entered financial markets.

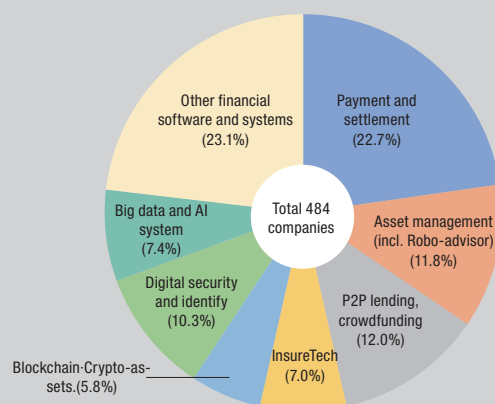
(Fintech firms)

Small-scale fintech firms, with less recognition and money, have been growing, instead of traditional financial intermediation to avoid direct competition with banks, by providing financial

services that improve or supplement the existing financial system (“unbundling”) through the application of digital technology and new ideas. The number of fintech companies has increased by 1.7 times, from 288 at the end of 2017 to 484 at the end of 2020. 110 easy payment and settlement service providers account for the largest share, and 59 firms are operating in asset management; Robo-advisors using big data, artificial intelligence (AI), and machine learning (ML); and micro-investment services, which allow buying a tiny share of large buildings, stocks, and copyrights

Moreover, regarding financial intermediation, several P2P lending and crowdfunding companies offer financial services connecting lenders or investors with borrowers without raising their own funds. In addition, some fintech companies are providing software or systems related to big data, AI, and digital identity and security to banks or other fintech firms (B2B: Business-to-Business).

Proportion¹⁾ of domestic fintech companies by business



Note: 1) End-2020 basis.

Source: Fintech Center Korea, 2020 Korea Fintech Company Handbook

(Big Tech firms)

Before Big Tech firms entered financial markets, Big Tech firms secured market dominance with platform strategy in the previous markets, for example, Internet portal service markets. With digital technology, they attracted many customers by offering easy-to-access, highly convenient, and differentiated services in the internet and mobile environments. In addition, Big Tech firms enabled customers to receive services on platforms by inducing various goods and services providers to join their platforms and increased the network effect⁵⁾ by creating interactions among users.

Meanwhile, Big Tech firms have increased consumer loyalty by providing customized products while accumulating data on customer preferences based on customers' activities on their platforms. As a result, the Big Tech platforms have become the first place customers visit to buy goods or services.

Current financial services of Naver and Kakao

	Payment and settlement	Deposit	Loan	Security	Insurance
Naver	O	X	O	X	X
Kakao	O	O	O	O	Δ ¹⁾

Notes: 1) It obtained preliminary permission from a digital insurance company in June 2021 and applied for final approval in December.

Source: Korea Insurance Research Institute, "Big Tech in Insurance - Opportunities and Risks", 2021.
Korea Capital Market Institute, "Analysis on Financial Risks from Regulatory Divergence between Big Techs and Financial Firms", 2021.

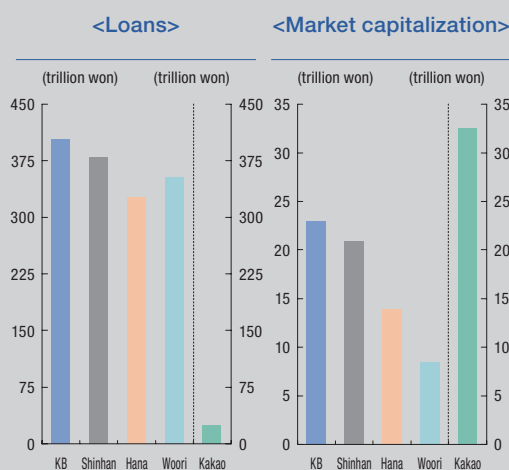
Big Tech firms do not change their platform-based business model in financial markets as well. For instance, Naver and Kakao operate highly accessible and convenient "easy payment and settlement" services, Naver Pay and Kakao pay. The services play a key role in the platforms because, running the services, Big Tech firms can gain new customers on top of their original customer bases from the previous markets, generate the network effect, and reinforce the interconnectivity among users. The data on consumption habits accumulated on the platforms are the basis on which the firms can directly offer or recommend customized financial products such as loans, investment funds, and insurance products, prompting their customers to use more services.⁶⁾⁷⁾

5) As the number of uses increases, information exchange among users happens more often, and thus the quality of services is enhanced, which creates a positive externality among users. Reviews on products and services posted by users of e-commerce and car-hailing services or content produced by social media users are the main channels through which such externality is generated.

6) The number of users increases due to the inherent network effects, and so do their activities, which become the source of data analysis by Big Tech firms. Then, the firms can offer more diverse services upon the analyzed data and attract new users. This is so-called the "Data-Network-Activities loop" or the "DNA" loop, one of the main characteristics of Big Tech platforms. (Shin, "Big tech in finance: opportunities and risks," BIS, 2019).

This platform strategy appears to hold true effective in financial markets as well. For example, Kakao Bank has a larger market capitalization than each of the four major financial holding companies in Korea, while despite having a much smaller loan amount is. This seems to reflect market expectations concerning the effectiveness of Kakao Bank's platform strategy.

Loans and market capitalization¹⁾ of financial holding companies and Kakao Bank



Note: 1) End-Q3 2021 basis.

Source: Financial Supervisory Service Data Analysis, Retrieval and Transfer system, Korea Exchange market data system.

Furthermore, Big Tech firms will be able to access the financial data of their customers more easily thanks to the MyData project. As they can more precisely assess the credit levels using AI and ML, financial intermediation without collateral will be available based on data, enabling more efficient financial services.⁸⁾

Impact on financial intermediation and banks

(Change in financial intermediation)

Along with the progress in the digital transformation of finance, as mentioned above, the entrance of fintech and Big Tech firms into financial markets has caused significant changes in financial intermediation in the following two ways.

First, the matching between loan supply and demand is changing substantially. In current bank-oriented financial system, depositors and borrowers visit bank branches to secure or borrow money. Hereafter, however, it is likely to be the Big Tech platforms, the first places to visit to find customized financial services. In addition, instead of traditional bank intermediation, brokerage funding through small fintech firms, where they find prospective borrowers and link them to funds suppliers, is spreading, such as P2P lending and crowdfunding.

Moreover, with the development of big data, AI, and ML, the production and utilization of data on financial consumers are gaining importance in credit assessment. Previously, the ability to offer collateral and the history of financial transactions were criteria in credit assessment for borrowers. Henceforward, the use of data on the purchase of goods and services or social media activities will emerge as an alternative to credit assessment.⁹⁾

7) Naver Financial Corp. and Woori Bank signed an MoU on inclusive financial support for small businesses and launched an loan service for online small businesses on the Naver Smart Store (July 2021).

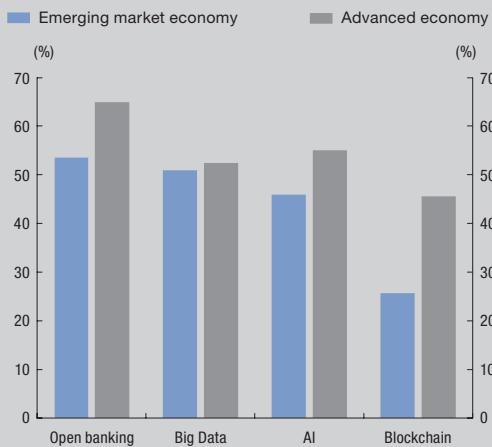
8) Gambacorta, L., Y. Huang, Z. Li, H. Qiu and S. Chen, "Data vs. collateral", BIS Working Papers, No. 881, 2020

9) For example, Naver Financial Corp. uses data on Smart Store, its e-commerce platform, for credit assessment, and Kakao Bank plans to apply non-financial information such as the purchase histories obtained via Kakao Pay to assess the credit of borrowers with low or middle credit ratings. In addition, fintech firms are using diverse non-financial information, including the frequency of mobile phone charging and the ratio of messages sent to messages received (Crepass Solutions Inc.) as well as the number of SNS followers, period of use, and amount of content (Lenddo), for credit assessment.

(Impact on banks)

These changes in financial intermediation will likely have a significant impact on the banking business. Above all, the role of banks as the most preferred financial intermediary, connecting financial consumers to suppliers in the markets, may shrink significantly. While banks still act as “safe vaults,” there is a concern that customized financial products based on digital technology such as big data and AI may disrupt banks’ deposit-taking.

Digital technology¹⁾ disruptive for short term deposit taking



Note: 1) Based on the response of 39 emerging market economy banks and 42 advanced economy banks.

Source: BCBS, “Impact of digitalisation and disintermediation of finance on retail banking”, BIS, 2021.

Secondly, banks need to explore new sources to add value amid the accelerating financial digital transformation. Banks have added value by searching for the less risky borrowers, pricing risks through credit assessment, and taking credit and liquidity risks. However, banks may lose some of their roles to search for consumers

to Big Tech and fintech firms. Also, as data other than the financial information of borrowers, such as information on consumer expenditure, are increasingly supplementing the current credit assessment, banks may be limited in their ability to produce new data except for financial information, resulting in reduced competitiveness.

Lastly, there is a high possibility that banks face more difficulties in terms of risk management than in the past. While financial efficiency will increase by providing customized financial products to financial consumers by banks themselves or through the Big Tech platforms, their products may become highly complicated and varying, undermining the effectiveness of their traditional risk management relying on the pooling of their loans.

(Response of banks)

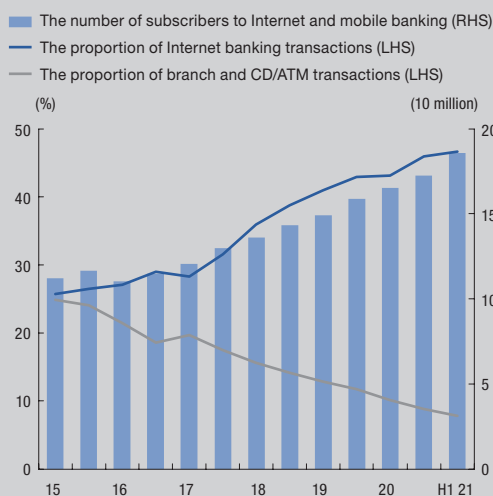
In response, banks are increasing their investment in and collaboration with fintech firms to raise their digital competitiveness.

Banks are striving to prevent the loss of customers to fintech and Big Tech firms by allowing them to process deposits, loans, and remittances through the internet and mobile in tandem with the rising demand for speedy and convenient transactions in highly digitalized environments. Furthermore, financial holding companies are investing in and acquiring fintech firms specialized in AI, the internet of things, and healthcare, or they establish their fintech promotion centers to explore or collaborate with promising fintech firms.¹⁰⁾

10) Financial holding companies have established fintech cultivation centers, such as the KB Innovation HUB, Shinhan Future’s Lab, 1Q Agile Lab (Hana Bank), and DinnoLab (Woori Bank), to explore and support promising fintech firms.

Meanwhile, in response to threats posed by Big Tech firms, banks are boosting user convenience by allowing customers to access a wide range of the financial products of their financial groups and non-financial services through partnerships with other companies, such as health-care, used car transactions, and parcel delivery reservation services, in a single application. Still, banks are facing financial regulatory hurdles that prevent their mobile applications from evolving into standalone platforms, which can gain and use customer data from financial and non-financial products and services offered in them.¹¹⁾

Number¹⁾ of electronic financial service subscribers at commercial banks and proportion²⁾ of transactions by financial service channel



Notes: 1) Total number of subscribers to each bank service (double-counted).

2) Proportion of transactions.

Sources: Commercial banks' business reports.

Implications

The entrance of Big Tech and fintech firms into financial markets amid the development of digital technology is expected to increase financial efficiency. However, in terms of regulatory arbitrage related to financial innovation, whether there exists a level playing field between banks and Big Tech firms needs to be carefully examined. In particular, while the prudential regulations are temporarily relaxed to induce the entry of new financial firms, the existence of regulatory barriers to incumbent banks' efforts toward digital innovation should be reviewed.

Furthermore, the impact of Big Tech platforms on banks' profitability in the course of financial market restructuring needs to be closely analyzed. Notably, as in the case of shadow banking before the global financial crisis, it is necessary to be vigilant against the possibility of banks seeking excessive profits if their profitability deteriorates. In addition, the possible emergence of cyber and operational risks associated with financial markets' increasing reliance on digital technology must be noted.

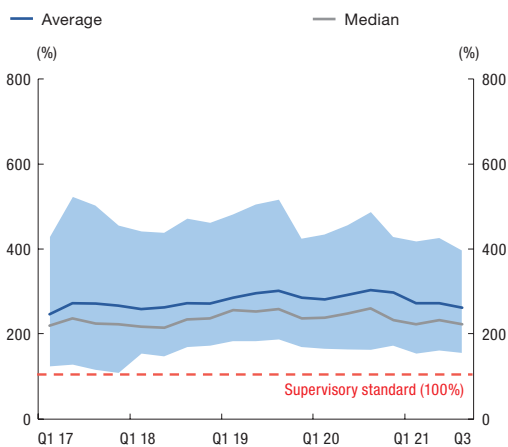
11) Regarding the provision of "one app" by financial holding companies, Article 15 of the Financial Holding Companies Act and Article 11 of the Enforcement Decree of the Act prevent a financial holding company engaging in other profit-making business affairs except for business affairs incidental to managing its subsidiaries. Banks have to file an application for concurrent business with the financial authorities under Article 28 of the Banking Act to operate securities and insurance services using their mobile applications. Concerning these circumstances, the chairman of the Financial Services Commission said that he will provide active support for banks' digital transformation by reforming institutional conditions so that banks can grow as digital universal banks with "one app" (Oct. 28, 2021).

2. Non-bank financial institutions

Overall satisfactory level of resilience

At the end of the third quarter of 2021, the risk-based capital ratio⁶⁾ (RBC ratio) of life insurance companies, an indicator of loss absorbing capacity, stood at 262.2%, down by 35.1%p from the end of 2020 (297.3%), as rising market interest rates resulted in valuation losses on bonds (Figure I-7).

Figure I-7. Life insurance company resilience indicator¹⁾



Note: 1) Amount of available capital / Amount of required capital; shaded area indicates highest and lowest value of RBC ratios among companies with assets of more than 1 trillion won.

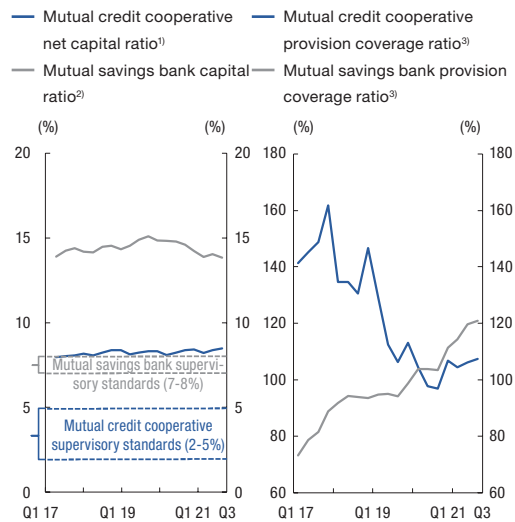
Sources: Financial institutions' business reports.

The net worth ratio of mutual credit cooperatives edged up 0.1%p from the end of 2020 (8.4%) to 8.5% at the end of the third quarter

of 2021. Meanwhile, the provision coverage ratio climbed 0.7%p from the end of 2020 (106.8%), recording 107.5%.

The BIS capital adequacy ratio of mutual savings banks edged downward by 0.4%p⁷⁾ from the end of last year (14.2%) to 13.8% at the end of the third quarter of 2021, on the sharp growth of loans assets, but the provision coverage ratio (120.9%) soared by 9.5%p from the end of last year (111.4%) (Figure I-8).

Figure I-8. Mutual credit cooperative and mutual savings bank resilience indicators



Notes: 1) Supervisory standard 2% (4% for MG community credit cooperatives, 5% for Nonghyup).

2) Capital / Risk-weighted assets; supervisory standard 7% (8% for institutions with assets of more than 1 trillion won).

3) Loan loss provisions / Substandard-or-below loans.

Sources: Financial institutions' business reports.

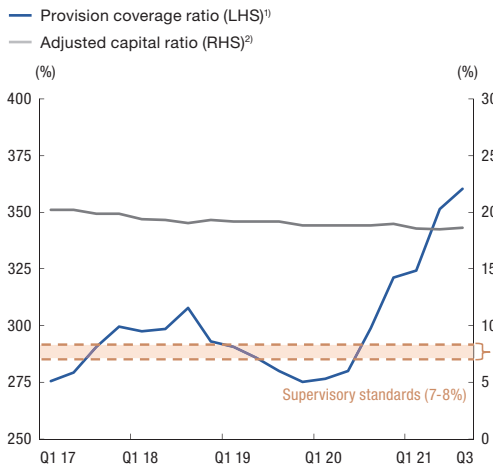
At the end of the third quarter of 2021, the adjusted capital ratio of specialized credit finance

6) The RBC ratio is the amount of available capital divided by required capital. Required capital, the denominator, is calculated by measuring the total amount of insurance risk, interest rate risk, credit risk, market risk, and operational risk.

7) As both unsecured household loans and corporate loans rose sharply this year, the risk-weighted assets of mutual savings banks reached KRW 94.4 trillion as of the end of the third quarter of 2021, soaring by 22.2% from the end of last year, outpacing the capital growth rate during the same period (18.9%).

companies (SCFCs) dropped 0.3%p from the end of 2020 (18.9%), falling to 18.6%, as assets such as receivables on credit card sales and credit card loans grew. The provision coverage ratio for the same period stood at 360.3%, up 39.3%p from the end of 2020 (321.0%), driven largely by other SCFCs⁸⁾ (Figure I-9).

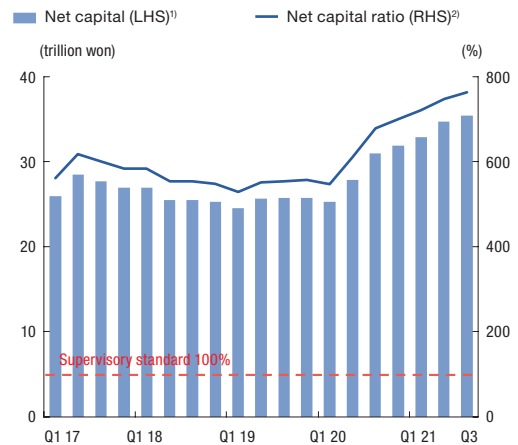
Figure I-9. Credit-specialized financial company resilience indicators



Notes: 1) Loan loss provisions / Substandard-or-below loans.
 2) Adjusted capital / Adjusted total assets; supervisory standard 7% (credit card companies 8%).
 Sources: Financial institutions' business reports.

At the end of the third quarter of 2021, the net capital ratio of securities companies rose 64.1%p from the end of last year (698.6%) to 762.7%, bolstered by rises in brokerage fees and interest income related to margin loans (Figure I-10).

Figure I-10. Securities company resilience indicators



Notes: 1) Net operating capital minus total risk.
 2) (Net operating capital - total risk) / Required maintenance equity.
 Sources: Financial institutions' business reports.

NBFI resilience is assessed as being at an adequate level overall in that the capital adequacy ratios in each sector are well above their respective supervisory minimum requirements. Nevertheless, since NBFIs have a larger share of vulnerable borrowers than banks as well as rapidly expanded corporate loans related to real estate, careful consideration needs to be given to the possibility that their resilience may deteriorate in the event of changes in domestic and global conditions and external shocks such as a market interest rate hike.

8) This is largely attributable to the write-off of a significant amount of non-performing loans by other SCFCs this year.

Box 7.

Impact of Inflationary Pressure on the Financial System and its Implications

Recently, the US consumer price index for November 2021 rose by 6.8% year on year, signaling growing global inflationary pressure. Rising prices in major economies are expected to increase domestic inflationary pressure through rising import prices and the impact on expected inflation.¹⁾ In addition, the consumer price index in Korea for November 2021 rose 3.7% (year on year), recording the highest increase since December 2011 (4.2%). This upward inflationary pressure at home and abroad may hasten the normalization of monetary policy and heighten uncertainty in domestic and global financial markets. If the market interest rate rises rapidly amid this process,²⁾ investors' risk appetite will change swiftly, leading to a decrease in asset prices and deleveraging, which will adversely affect the domestic financial system. Furthermore, the uncertainty surrounding the global economic recovery

amid the enduring spread³⁾ of COVID-19 variants coupled with the risk posed by the Chinese economic slowdown could weigh on domestic economic growth.

Hereunder, the upside risk of domestic inflation based on current economic conditions is examined, based on which, the impacts of a potential (i) inflation shock and (ii) complex shock caused by the simultaneous occurrence of inflation and an economic downturn on the domestic financial system are assessed using stress tests.

Examination of the upside risk of inflation

The probability distribution of future inflation for one year based on current macroeconomic conditions was estimated, and the upside risk of domestic inflation was defined and calculated as the upper 10% boundary value⁴⁾ (Inflation-at-Risk (IaR) 90% quintile) of the probability distribution. The future distribution of inflation was estimated by adding⁵⁾ the corporate credit index to a traditional Phillips curve with explanatory variables such as past inflation, inflation expectations, import prices, and unemployment rate gap (augmented Phillips curve model) and using quantile

1) As for the paths through which global inflationary pressure is passed on to domestic inflation, refer to the BOK Issue Note of July 2021, "Theoretical background of recent discussions on inflation and the possibility of inflation in the Korean economy." Meanwhile, as the share of Korea's GDP occupied by exports and imports rose from 56.4% (average, 2000 to 2007) to 79.6% (average, 2010 to 2021), it is likely that the impact of changes in export and import prices on domestic inflation has increased.

2) A recent BIS report (BIS Quarterly Review, September 2021) warned against snapback risk where interest rate volatility escalates significantly as markets respond hysterically to small changes in expectations.

3) Some European countries such as Ireland, the Netherlands, Austria, and Germany withdrew their coronavirus response policies due to the recent surge in cases, implemented mandatory booster shots, and tightened social distancing regulations.

4) The models in "Inflation and Activity: Two Explorations and Their Monetary Policy Implications" (Blanchard et al., 2015) and "Inflation at Risk" (Lopez-Salido et al., 2020) were modified in consideration of domestic conditions.

5) This is to reflect recent discussions on how the financial conditions of businesses facilitate analysis of inflation dynamics. This section used the corporate credit component of the financial vulnerability index (FVI) based on corporate loans as a proxy variable for the corporate credit index. That is, a deterioration (improvement) of corporate funding conditions indicated by a widening (narrowing) credit spread pushes inflation down (up). For details, refer to the articles listed in footnote 4 above.

regression.⁶⁾

Using a quantile regression model based on quarterly data from the first quarter of 2001 to the third quarter of 2021, the probability distribution of inflation for one year was estimated, finding that the upside risk of domestic inflation and uncertainty over its future path has recently increased significantly. The upside risk of inflation had steadily decreased since 2019, but in the first quarter of 2022 (estimated in the fourth quarter of 2021), it transitioned to an upward trend. In the third quarter of 2022, it rose 4.6%.⁷⁾ This risk may materialize if the increase in the cost of raw materials such as crude oil persists and the global supply chain disruptions endure for a considerable period of time, resulting in dramatic increases in import prices and expect-

ed inflation. Furthermore, the tail section on the right-hand side of the probability distribution curve is much higher and stretches more broadly than in the past, indicating an increase in the uncertainty of the expected path of inflation.

6) The estimated formula for the probability distribution of forecast inflation and explanatory variables are listed below.

$$\widehat{Q}_\tau(\overline{\pi}_{t,t+4} | x_t) = c_\tau + \widehat{\alpha}_\tau \pi_{t-1} + \widehat{\beta}_\tau \pi_t^{LTE} + \widehat{\theta}_\tau (u_t - u_t^N) + \widehat{\gamma}_\tau (\pi_t^R - \pi_t) + \widehat{\delta}_\tau F_t$$

	Variables	Description	Source of data
Dependent variable	$\overline{\pi}_{t,t+4}$	Mean of inflation for next four quarters (t+1~t+4) predicted at time t	-
	C_τ	Constant term	-
	π_{t-1}	Average inflation during preceding four quarters	Statistics Korea
Explanatory variables	π_t^{LTE}	Inflation expectations	Long -term forecasts of Consensus Economics
	$(u_t - u_t^N)$	Unemployment rate gap: actual unemployment rate - natural rate of unemployment	Natural rate of unemployment is estimated through HP filtering
	$(\pi_t^R - \pi_t)$	Import price growth rate - domestic inflation rate	Bank of Korea
	F_t	Corporate credit index	Corporate credit section of FVI (financial vulnerability index)
Others	\mathcal{T}	Quintile	-

The estimated results of the linear regression model (OLS) for the modified Phillips curve are as follows.

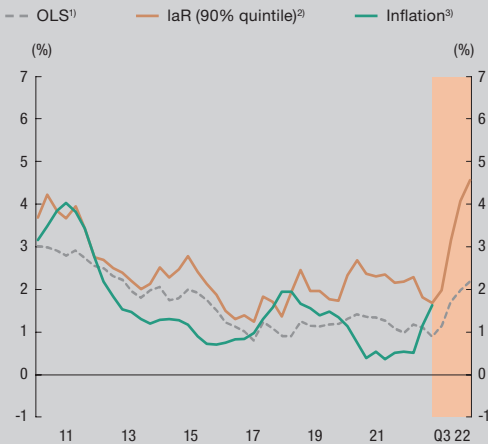
C	Coefficients					R-Squared
	π_{t-1}	π_t^{LTE}	$(u_t - u_t^N)$	$(\pi_t^R - \pi_t)$	F_t	
0.89*	-0.02	0.83***	0.14	0.02**	3.19***	0.63
(0.47)	(0.15)	(0.23)	(0.30)	(0.01)	(0.73)	

Note: 1) Estimated using quarterly data from Q1 2001 to Q3 2021.

2) () indicate standard error, with *, **, and *** representing significance levels of 10%, 5%, and 1%, respectively.

7) The value belongs to the upper 10% of the probability distribution of inflation for the next four quarters (Q4 2021 to Q3 2022) estimated in the third quarter of 2021. Also, it should be noted that the value differs from the inflation forecasts made by domestic and foreign institutions.

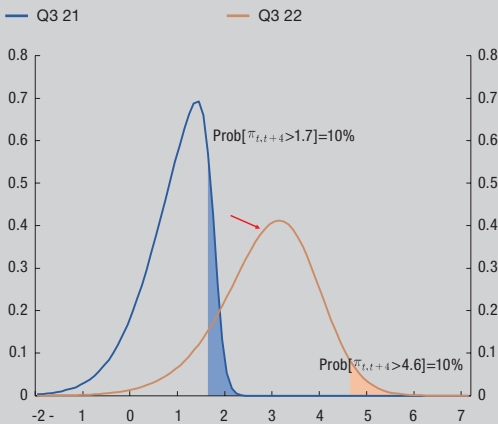
Inflation estimation results



Notes: 1) The average value of the inflation probability distribution over the next year as predicted before the fourth quarter.
 2) The 90% quintile of the inflation probability distribution over the next year as predicted before the fourth quarter.
 3) Consumer price index increase/decrease rate compared to the same period last year; moving average in the fourth quarter.

Sources: Bank of Korea, Statistics Korea Survey.

Probability distribution¹⁾²⁾ of inflation



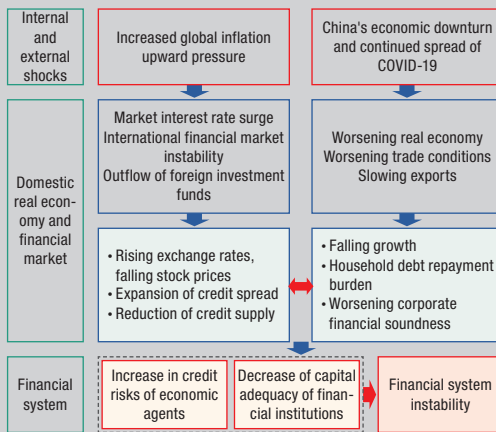
Notes: 1) The predicted probability distribution of the inflation over the next year as predicted before the fourth quarter.
 2) The horizontal axis is inflation, and the vertical axis is the probability density function value.

Impact of inflationary pressure on the financial system

(Paths of transmission of internal and external shocks)

A rise in global inflationary pressure would prompt the central banks of major economies to normalize their monetary policy, leading to a sharp increase in market interest rates. This would increase the burden of households and businesses to repay principal and interest and raise the volatility of price variables in financial markets on the back of the exodus of foreign investment funds and instability in the international financial market, driving up instability in financial markets through the decline of stock prices, widening of credit spreads of corporate bonds, and increase in exchange rates. Meanwhile, in addition to such inflation shock, a complex shock of slower domestic economic growth amid the spread of coronavirus variants and the risk of a Chinese economic slowdown is another possibility. In this case, corporate earnings would deteriorate and the unemployment rate would climb, putting further pressure on the credit risks of financial institutions. Ultimately, these internal and external shocks would likely weaken the debt repayment capacity of households and businesses through the paths of the real economy and finance and undermine the capital adequacy of financial institutions.

Impact of inflationary pressure on domestic economy and the financial system



(Stress test scenario)

The stress test assumed the following two scenarios: (i) an inflation shock where the upward pressure of inflation is realized and remains at a high level for a considerable period of time and the market interest rate rises rapidly and (ii) a complex shock⁸⁾ where inflation and an economic downturn occur simultaneously. The test period was set from the first quarter of 2022 to the fourth quarter of 2023. The inflation shock scenario assumed that an inflation rate of 3.0% (laR 60%) continues throughout the test period, and the average yields of Treasury bonds (3-year) and corporate bonds (3-year, AA-) reach 3.6% and 4.6%, respectively. The economic growth

rate was adjusted down slightly to reflect internal and external uncertainties. Under the complex shock scenario, the average inflation rate is assumed to remain at 4.6% (laR 90%) during the test period, and the average yields of Treasury bonds (3-year) and corporate bonds (3-year, AA-) to reach 4.1%⁹⁾ and 5.4%, respectively.¹⁰⁾ The economic growth rate is assumed to decline due to the impact of the ongoing COVID-19 crisis on the real economy.

Scenarios of main macro-financial variables¹⁾

	Q3 2021	Average of test period	
		Inflation shock	Combined shock
Inflation ²⁾	2.6	3.0	4.6
Economic growth rate ²⁾	4.0	2.2	1.0
Return ³⁾ on Treasury bond	1.4	3.6	4.1
Credit growth rate ²⁾	8.5	2.8	-1.7
Credit spread ⁴⁾	41	93	134

Note: 1) Quarterly average basis.

2) Year-on-year basis.

3) Treasury bond (3-year) yield.

4) Corporate bond (3-year, AA-) - Treasury bond (3-year) yield.

(Results of stress test)

The results of the stress test¹¹⁾ showed that, under the inflation shock, while the capital ratios of

8) It was assumed that, amid the global resurgence of coronavirus variants such as Omicron, intensifying global supply chain disruptions, and slower Chinese economic growth amid real estate debt risks, the Korean economy is hit hard because of its large share of exports to China. The IMF warned that if the COVID-19 pandemic and travel restrictions persist, the global economic growth rate will likely further decline by 0.9%p (2022) and 1.6%p (2023) from the base-line forecast (IMF WEO, October 2021).

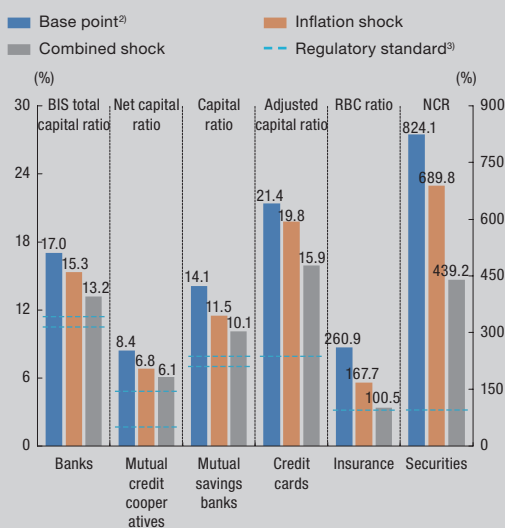
9) Despite the high inflation rate, Treasury bond yields were set to remain below inflation, considering the slower economic growth rate.

10) Given the economic structural change, a regression equation was estimated with inflation, the call interest rate, and the economic growth rate as independent variables. It was further assumed that, due to the increase in interest rates, the credit growth rate declines and the credit spread widens significantly.

11) This stress test was conducted using the systemic risk assessment model for macroprudential policy (SAMP) that the Bank of Korea launched in the second half of 2018 to conduct quantitative assessments of the impacts of macroeconomic and financial shocks on the resilience of banks and non-bank financial institutions.

financial institutions declined slightly, the average capital ratios by type of financial institution were all above the regulatory levels. Deposit-taking institutions such as banks suffered credit losses owing to the higher market interest rate,¹²⁾ but as the increase in interest income offset part of such losses, the capital ratios slid by only a small margin. Still, insurance companies, which have a larger share of marketable securities in their asset portfolios, are predicted to experience a significant amount of valuation losses amid the interest rate rise, which will drag down their capital ratios by a relatively large margin (260.9% → 167.7%, -93.2%p). Hence, with inflation accompanied by a somewhat steady economic recovery, the negative impact of the interest rate rise on the financial system is expected to be limited.

Results¹⁾ of stress test



Note: 1) Banks-mutual credits-mutual savings banks-credit cards are LHS; insurances-securities are RHS.

2) Q2 2021 basis.

3) Regulatory standards: 10.5% for banks (D-SIBs 11.5%), 2-5% for mutual credit cooperatives, 7% for mutual savings banks, 8% for credit card companies, and 100% for insurance companies and securities companies.

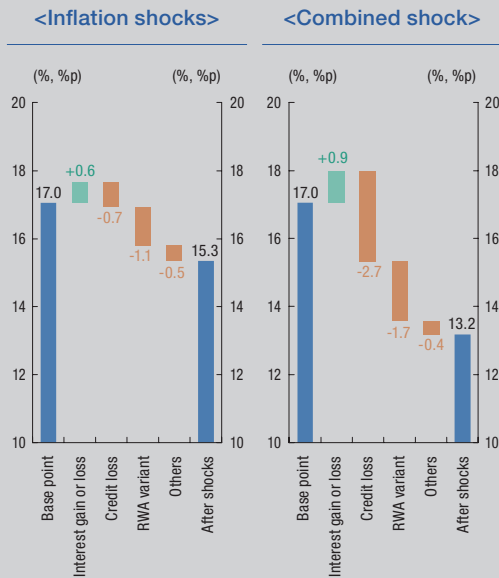
Meanwhile, under the complex shock scenario, the resilience of the entire financial sector is expected to be affected by the inflation shock. Deposit-taking institutions are likely to experience a surge in credit risk due to the increased credit risk of borrowers amid the declining economic growth rate. In addition, the average capital ratio of banks is projected to fall¹⁴⁾ to 13.2% as the increase in credit losses (-2.7%p),¹³⁾ due to the higher interest rate, exceeds the increase in interest income (+0.9%p).

12) The default rates of household loans and corporate loans are estimated to rise by 0.19%p and 0.51%p, respectively, compared with a no-shock situation (baseline).

13) This is attributable to the sharp rise in the default rates of households and businesses by 0.50%p and 1.42%p, respectively, due to the impact of the higher interest rate and decline in the economic growth rate, compared with the no-shock situation (baseline).

14) The higher interest rate boosts the interest income of deposit-taking institutions such as banks due to the widening net interest margin between the deposit and lending rates, leading to a higher capital ratio, but it could also raise credit losses and risk-weighted assets, thus depressing capital ratios.

Causes¹⁾ of fluctuation of banks' capital ratio



Note: 1) Q2 2021 basis.

The capital ratios of insurance companies and securities companies would fall sharply by 198.2%p and 310.1%p, respectively, on valuation losses caused by the stock price decline and widening credit spreads. Insurance companies' average capital ratio (100.5%) are seen to approach the regulatory level (100%). However, if the IFRS 17 international financial reporting standard is introduced, which requires the mark-to-market valuation of liabilities of insurance companies by 2023, the decline in the capital ratios of insurance companies as a result of interest rate hikes would be slightly smaller.¹⁵⁾

Effect¹⁾ of market loss on changes in capital ratio



Note: 1) Q2 2021 basis.

Assessment and implications

If the market interest rate rises sharply with the growing inflationary pressure at home and abroad, it will likely have a significant effect on financial institutions and economic entities that have raised and invested funds amid low-interest rates.

As discussed above, if the inflation shock leads to a rise in the market interest rate, it could increase the debt-servicing burden of households and enterprises and have a negative impact on the resilience of the real economy and financial institutions. Given these possibilities, a stress test was conducted to measure the impact of an inflation shock on the resilience of financial insti-

15) If insurance liabilities posted using the cost method under the current regulation are assessed based on market prices, the discount rate to be applied to liabilities subject to mark-to-market valuation rises due to the higher interest rate, which reduces the value of liabilities and thus offsets some of the valuation losses of marketable securities due to interest rate hikes.

tutions, finding that even higher-than-expected inflation, if accompanied by economic recovery, would not seriously undermine the resilience of financial institutions. Still, in the event of a complex shock brought on by rapid inflation and an economic downturn, banks would likely suffer credit losses, and insurance and securities companies would experience market losses, leading to a decline in their capital ratios.

Accordingly, deposit-taking institutions such as banks need to be prepared for a surge in the credit risk of vulnerable borrowers with rises in inflation and the market interest rate. Insurance and securities companies, which hold a larger share of marketable securities in total assets, should be more prudent in managing interest rate risk. Furthermore, some financial institutions with relatively low loss-absorption capacities should supplement their capital preemptively.

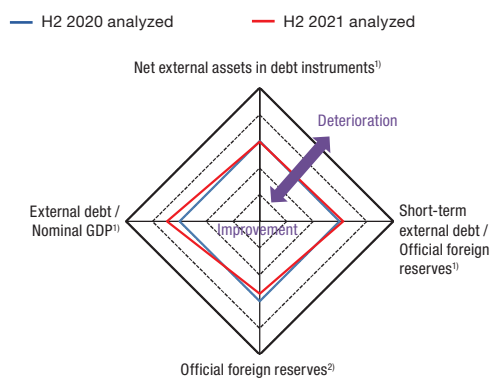
II. External Payment Capacity

Korea's external payment capacity appeared sound overall.

Amid an increase in net external assets year on year, the share of short-term external debt in total external debt decreased with the rapid increase in long-term external debt. The external debt-to-nominal GDP ratio was pushed higher by the rise in foreigners' portfolio investment in domestic bonds, but generally remained at an adequate level.

The official foreign exchange reserves surged to USD 463.9 billion at the end of November 2021, rising by USD 20.8 billion from the end of last year, while the ratio of short-term external debt relative to official foreign exchange reserves edged up year on year at the end of the third quarter of 2021 (Figure II-1).

Figure II-1. Map of changes in external payment capacity indicators



Notes: 1) Extent of change as of end-Q3 2021 compared to end-Q3 2020 indexed.

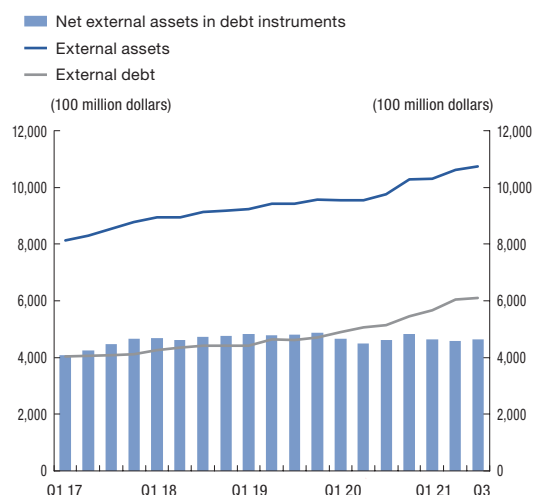
2) Extent of change as of end-November 2021 compared to end-December 2020 indexed.

Source: Bank of Korea.

Rise in net external assets

At the end of the third quarter of 2021, Korea's net external assets (external assets - external debt) stood at USD 464.6 billion, representing a year-on-year increase of 0.4% (+USD 1.8 billion) (Figure II-2).

Figure II-2. Net external assets in debt instruments¹⁾



Note: 1) End-quarter balance basis.

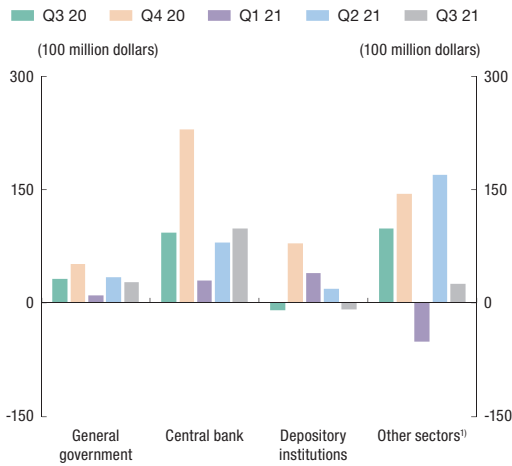
Source: Bank of Korea.

External assets rose 10.1% (+USD 98.2 billion) year on year, reaching USD 1,075.4 billion at the end of the third quarter of 2021.

Breaking down the change in external assets (+USD 44.7 billion) from the second quarter of 2021 to the third quarter of 2021 by sector, the external assets of other sectors increased by USD 19.5 billion due to the increase in foreign currency deposits and trade credit. Meanwhile, the central bank's external assets grew by USD 17.9 billion on the back of rising foreign exchange reserves, and the external assets of general government and depository institutions rose by USD 6.2 billion and USD

1.0 billion, respectively (Figure II-3).

Figure II-3. Changes in external assets in debt instruments, by sector



Note: 1) Including other financial corporations (securities companies, asset management companies, insurance companies, etc.) and non-financial corporations.

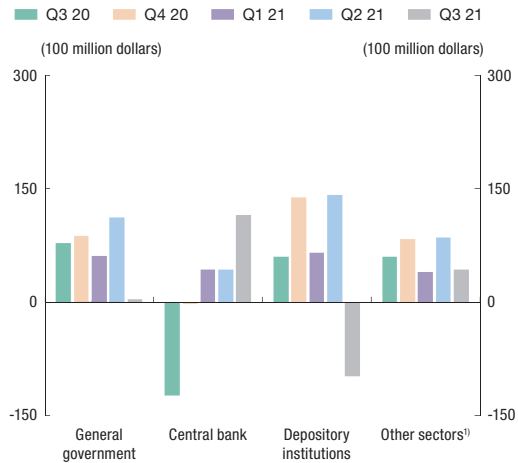
Source: Bank of Korea.

At the end of the third quarter of 2021, external debt reached USD 610.8 billion, recording a year-on-year increase of 18.7% (+USD 96.4 billion).

Breaking down the change in external debt (+USD 44.9 billion) from the second quarter of 2021 to the third quarter of 2021 by sector, the external debt of the central bank increased by USD 15.8 billion due to the allocation of SDRs.¹⁾ Meanwhile, the external debt of other sectors increased by USD 12.9 billion with the issuance of foreign currency securities, and the external debt of general government and depository institutions rose by USD 11.7 billion and USD 4.5 billion, respectively, on the

back of the increase in investment in domestic bonds by foreigners (Figure II-4).

Figure II-4. Changes in external debt, by sector



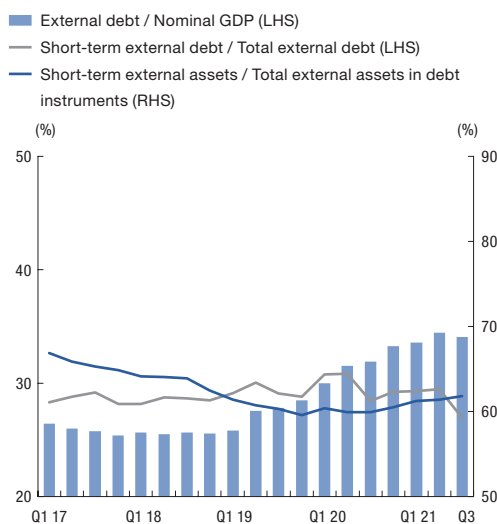
Note: 1) Including other financial corporations (securities companies, asset management companies, insurance companies, etc.) and non-financial corporations.

Source: Bank of Korea.

At the end of the third quarter of 2021, the external debt-to-nominal GDP ratio stood at 34.1%, representing an increase from the same period last year (31.9%). The share of short-term external debt in total external debt declined compared to the third quarter of 2020 (28.4%), falling to 26.9%, and the share of short-term external assets in total external assets rose from the same period a year earlier (59.9%) to 61.8% (Figure II-5).

1) On August 23, 2021, the IMF conducted a general allocation of USD 650 billion worth of Special Drawing Rights (SDRs), with Korea being allocated SDR 8.2 billion (about USD 11.7 billion) commensurate with its quota of 1.80%. This increased both the foreign exchange reserves and external debt and had no impact on net external assets (IMF BPM6).

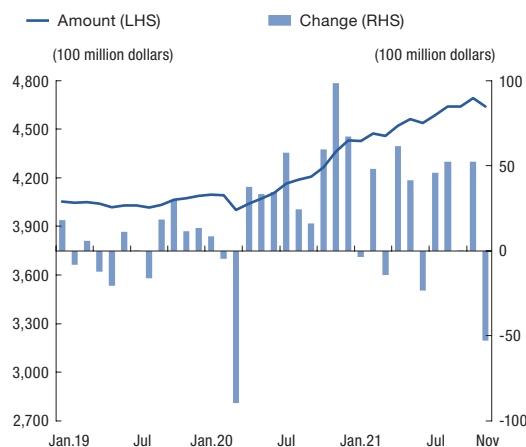
Figure II-5. Proportions¹⁾ of short-term external debt and assets in debt instruments



Overall steady rise in foreign exchange reserves

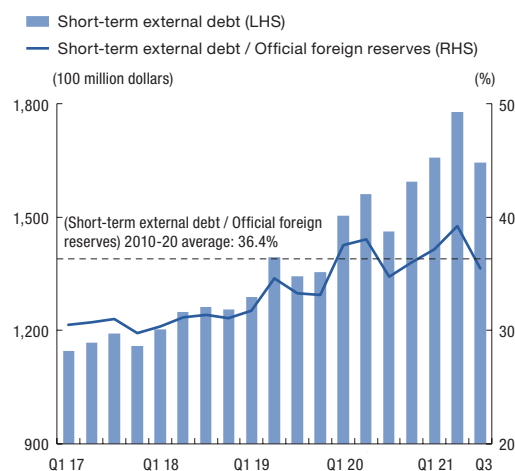
At the end of October 2021, the official foreign exchange reserves reached a record high of USD 469.2 billion. This was mainly attributable to the combination of growth in investment income from foreign currency assets and the general allocation of SDRs by the IMF. At the end of November, however, the official foreign exchange reserves slid to USD 463.9 billion (Figure II-6).

Figure II-6. Balance¹⁾ of and changes in official foreign reserves



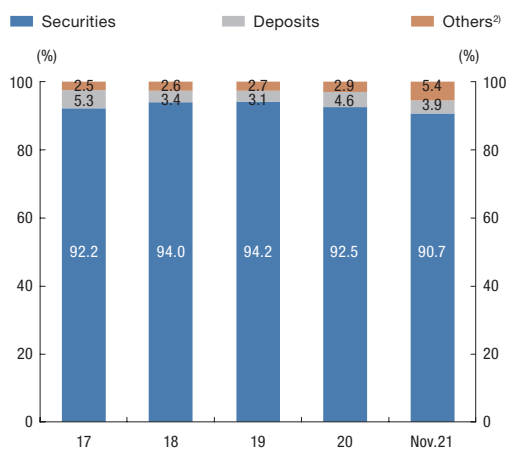
Meanwhile, the ratio of short-term external debt to official foreign exchange reserves climbed by 0.7%p from the same period of last year (34.7%), reaching 35.5% at the end of the third quarter of 2021 (Figure II-7).

Figure II-7. Short-term external debt-to-official foreign reserves ratio¹⁾



Regarding instrument composition, official foreign exchange reserves were held mainly in the form of marketable securities (90.7%) and deposits (3.9%) as of the end of November 2021. Securities consisted primarily of highly liquid safe assets such as government bonds, government agency bonds, and asset-backed securities (Figure II-8).

Figure II-8. Composition¹⁾ of official foreign reserves



Notes: 1) End-period basis.

2) Gold, SDRs, etc.

Source: Bank of Korea.

III. Financial Market Infrastructures

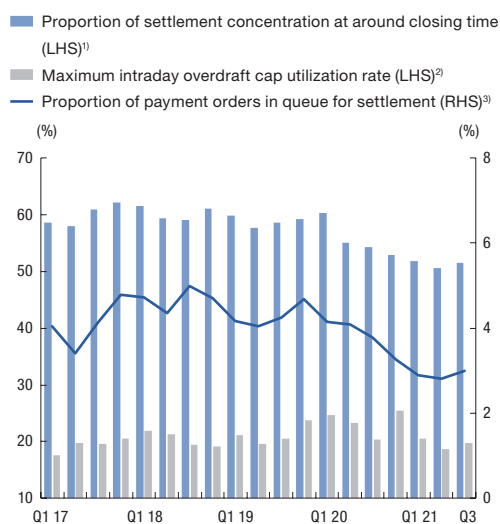
The value of settlement in BOK-Wire+ and other major payment and settlement systems increased steadily, driven by securities settlements by financial institutions and electronic funds transfers by individuals and companies. Settlement risk was managed appropriately, remaining at a stable level.

BOK-Wire+

In the third quarter of 2021, the daily average value of settlement in BOK-Wire+, the large-value payment system providing final settlement for mutual obligations between financial institutions, reached KRW 501.7 trillion, continuing the upward trend observed last year (KRW 423.6 trillion). Settlement risk was managed at a stable level.

The maximum intraday overdraft cap utilization rate and proportion of payment orders in queue for settlement, which are two indicators of the level of liquidity among BOK-Wire+ participants, remained largely stable in the third quarter of 2021, standing at 19.8% and 3.0%, respectively. Of the total settlement value, the portion settled near the closing time (16:00-17:30) decreased during this period, falling to 51.5% from the same period of last year (54.2%) (Figure III-1).

Figure III-1. Risk indicators related to BOK-Wire+



Notes: 1) Amount of settlement processed after 16:00 / Total settlement amount during the period.

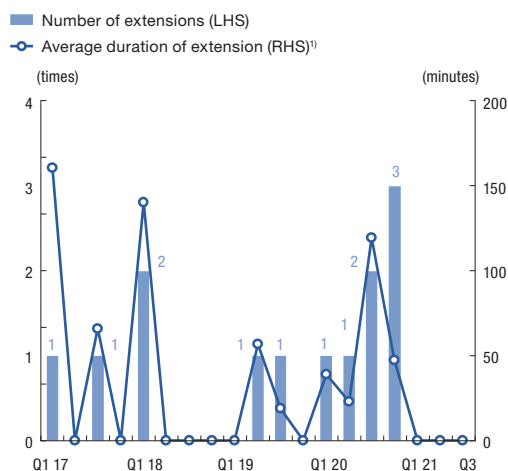
2) Daily average rate of maximum utilization of participants' intraday overdraft caps.

3) Average ratio of the amount of participants' payment orders in queue for settlement / Total settlement amount (excluding payment orders in queue for liquidity savings).

Source: Bank of Korea.

In the third quarter of 2021, there was no instance in which BOK-Wire+'s operating hours were extended (Figure III-2).

Figure III-2. Extension of BOK-Wire+ operating hours



Note: 1) Total duration of extension / Number of extensions during the quarter.

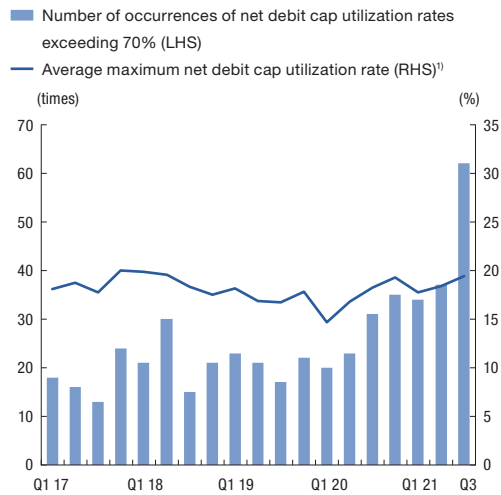
Source: Bank of Korea.

Retail payment systems

In the third quarter of 2021, the daily average value of settlement in the retail payment systems operated by the Korea Financial Telecommunications and Clearings Institute climbed significantly from last year (KRW 80.2 trillion) to KRW 97.1 trillion, driven by an increase in electronic funds transfers by individuals and companies. Related settlement risk was, in general, managed appropriately.

Regarding retail payment system-related risk indicators, in the third quarter of the year, the net debit cap¹⁾ utilization rate of net settlement participants exceeded the cautionary level (70%) 62 times, a noticeable increase from the same period of last year (31 times), as a result of the transfer of large amounts of funds in connection with IPO subscriptions and refunds as the amount of IPOs rose sharply²⁾ during the same period. Consequently, the average maximum net debit cap utilization rate climbed slightly to 19.4% compared to the same period a year earlier (18.2%), but was still managed adequately (Figure III-3).

Figure III-3. Net debit cap utilization rate



Note: 1) Average of daily maximum net debit cap utilization rates of participants during the period.

Source: Bank of Korea.

Securities settlement systems

Settlement risk was kept at a stable level in the securities settlement systems operated by the Korea Exchange and Korea Securities Depository amid a continuous increase in the value of settlement. The daily average value of settlement continued on its upward trend from last year (KRW 205.1 trillion), reaching KRW 229.1 trillion in the third quarter of 2021, driven by inter-institutional repo transactions and transactions in stocks and bonds.

In the third quarter of 2021, settlements on transactions in exchange-traded stocks and exchange-traded government bonds, as well as OTC stock transactions by institutional

1) In the retail payment systems, including the CD Network System, Interbank Remittance System, and Electronic Banking System, a transaction payee is paid immediately, but the credits and debits between financial institutions arising from this payment are settled on the following business day at a designated time (11:00) through BOK Wire+. As this results in the provision of credit between financial institutions, the Bank of Korea requires participants to independently establish ceilings (net debit caps) on their own unsettled net debit positions.

2) The value of IPOs in the third quarter of 2021 totaled KRW 11.4 trillion, showing a 4.9-fold increase year on year.

investors, were completed by their respective deadlines (16:00, 17:00, and 16:50) (Table III-1).

Table III-1. Proportions¹⁾ of securities settlement completed after the deadline

	Penalty deadline ²⁾	Proportions (%)				
		2020		2021		
		Q3	Q4	Q1	Q2	Q3
Exchange-traded stocks	16:00	-	-	-	-	-
Exchange-traded government bonds	17:00	-	-	-	0.014	-
Institutional investors for OTC stocks	16:50	-	-	0.0001	-	-

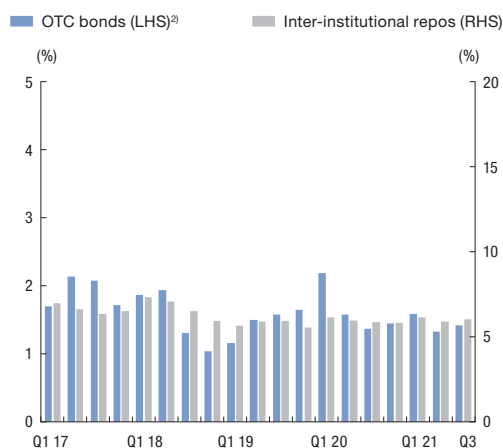
Notes: 1) Amount of settlement processed after deadlines / Total settlement amount during the period.

2) Deadlines after which settlement delay penalties are imposed.

Source: Bank of Korea.

Of OTC bond transactions and inter-institutional repo transactions, the proportions settled on a free-of-payment (FoP) basis remained stable at 1.4% and 6.0%, respectively, in the third quarter of 2021 (Figure III-4).

Figure III-4. Shares¹⁾ of FoP settlement



Notes: 1) Proportion in total settlement amount (of OTC bonds and inter-institutional repos) of settlements not processed through DvP (delivery-versus-payment) system.

2) Based on final settlement after deduction of linked settlements.

Source: Korea Securities Depository.

Foreign exchange settlement systems³⁾

In the third quarter of 2021, the daily average value of settlement in the foreign exchange payment-versus-payment (PvP) settlement system operated by CLS Bank (CLS system)⁴⁾ rose from last year (USD 62.84 billion) to USD 64.43 billion.

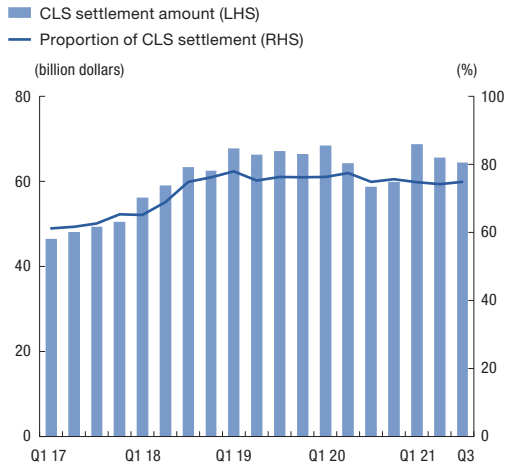
As PvP settlement via the CLS system accounted for a continuously high share (74.8%) in total foreign exchange settlement of 74.8% during this period, foreign exchange transac-

3) Foreign exchange settlements are conducted through the interbank correspondent network, the PvP system operated by CLS Bank, and domestic foreign currency funds transfer systems. In this report, we focus on foreign exchange PvP settlements routed through the CLS System in which the settlement amounts can be accurately determined.

4) To address time differences between countries, which are a fundamental cause of foreign exchange settlement risk, CLS (Continuous Linked Settlement) Bank settles most transactions during a designated settlement period (07:00-12:00 CET). In continuous linked settlement, actual funds transfers (payments) are linked and processed within this settlement period between the accounts of settlement member banks and CLS Bank held with the central banks issuing the currencies concerned. At present, the CLS PvP system is connected to large-value payment systems (including BOK-Wire+) run by central banks issuing the 18 CLS settlement currencies.

tion-related settlement risk appears to have remained stable (Figure III-5).

Figure III-5. Settlement amount¹⁾ and proportion²⁾ made through the CLS system



Notes: 1) Daily average amount of transactions made by domestic banks and foreign bank branches during the quarter.
 2) Proportion in total CLS eligible FX transactions (of domestic banks and foreign bank branches) of those settled through the CLS system.

Source: Bank of Korea.

Box 8.

Assessment of Large and Small and Medium Enterprises' Accessibility to Green Finance and its Implications

The Korean government is actively pursuing a transition to a low-carbon economy with its 2050 Carbon Neutral Strategy and enactment of the Carbon Neutrality Act.¹⁾ The government's regulation of greenhouse gas emissions to achieve carbon neutrality²⁾ will place a heavy-considerable burden on large enterprises that emit significant amounts of greenhouse gases. Moreover, considering the fact that Korea's manufacturing industry structure is based on vertical integration,³⁾⁴⁾ where large enterprises produce final products and small and medium-sized enterprises (SMEs) supply the large enterprises with intermediate goods, the impact

of the government's regulation that largely focuses on large enterprises is highly likely to be transferred to the SMEs that lie at the lower end of the production hierarchy.

Hence, domestic large enterprises are establishing plans to invest in greenhouse gas reduction as part of efforts to respond to the regulation.⁵⁾ On the other hand, in general, SMEs are not subject to regulations on greenhouse gas emissions and are unable to prepare plans to respond to the carbon neutrality policy due to the costs of transitioning to an eco-friendly production structure.⁶⁾

In the financial sector, the green finance market was formed in response to firms' efforts to pursue carbon neutrality and investors' growing interest in environmental issues. Green finance refers to financial activities that consider environment components in funding and financial investments. Promoting green finance is expected

-
- 1) The official title of the Carbon Neutrality Act Framework Act on Carbon Neutrality is "Framework Act on Carbon Neutrality and Green Growth." This Act specifies procedures for implementing the 2050 carbon neutrality vision, including the emission reduction target for 2030, the establishment of a carbon neutrality commission, and the establishment of climate response funds.
 - 2) Major regulations on greenhouse gas emissions are the Emission Trading Scheme (ETS) and the greenhouse gas Target Management System (TMS).
 - 3) According to Jung and Hong (Asia Pacific Journal of Small Business, 2015), the automobile, shipbuilding, other machinery and equipment, electronic component, and electrical equipment manufacturing sectors have a hierarchical production structure where small and medium-sized enterprises supply intermediate goods to large enterprises. In these sectors, large enterprises that supply final products to markets procure intermediate goods from primary subcontractors collaborators, which receive intermediate goods from secondary subcontractors, which, in turn, are supplied by tertiary subcontractors.
 - 4) According to the 2019 Survey on Actual State of SMEs conducted by the Ministry of SMEs and Startups, 42.1% of SMEs in the manufacturing industry are subcontractors that produce and supply products by taking orders from large enterprises, and the sales from subcontract transactions account for 83.3% of their total sales.
 - 5) According to the survey on companies subject to the emissions trading scheme (ETS) conducted by the Korea Chamber of Commerce and Industry (April 2021), 64.8% of respondents said that they are responding to the government's carbon neutrality policy or establishing a response plan. Most of these firms (75.5%) said that, as a way of responding to the carbon neutrality policy, they will make greenhouse gas reduction investments in their business sites.
 - 6) According to a survey of SMEs conducted by the Korea SMEs and Startups Agency (February 2021), 56.1% of respondents said that they have no plan to respond to the carbon neutrality policy, and most of them said that their biggest difficulty was the cost burden regarding the introduction of low-carbon processes and facilities.

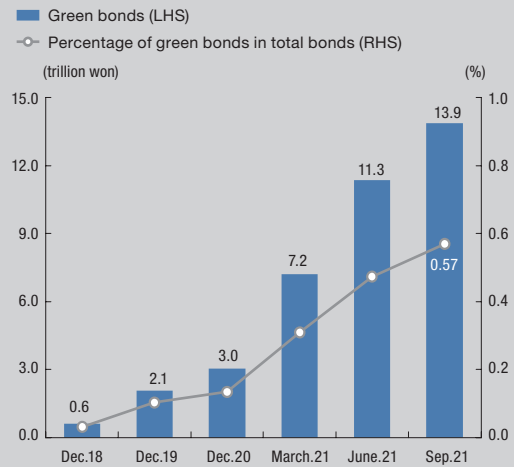
to cause changes in the flow of funds, including the concentration of financial resources in sectors that respond effectively to climate change. The performance of firms' carbon neutrality responses may vary depending on whether they tap into green finance. Hereunder, the status of the green finance market is reviewed, and the ways in which large enterprises and SMEs are responding to climate change are examined.

Status of green finance market

The green finance market consists of the green bond market, green fund market, and green loan market. All three have recently been growing rapidly with the increasing interest of investors in climate change response.

A green bond is a bond whose proceeds are used to fund green projects that satisfy the guideline on green bonds⁷⁾ designated by the Ministry of Environment. As of the end of September 2021, the value of green bonds issued reached KRW 13.9 trillion, up 358% from the end of 2020 (KRW 3.0 trillion). Although the outstanding balance of green bonds issued is only 0.57% of the total outstanding bonds issued (KRW 2,433.4 trillion), the issuance of green bonds is rapidly rising among private firms.⁸⁾

Market size¹⁾ of green bonds



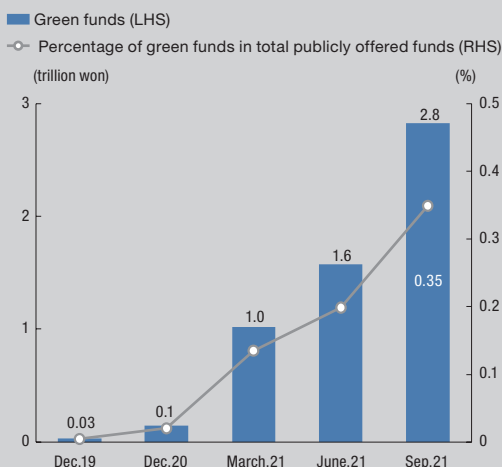
Note: 1) Issuing amount of green bonds listed on the Korea Exchange.
Source: Korea Exchange.

A green fund is a fund for which eco-friendly elements, in addition to firms' financial conditions, are considered in the composition of the fund. Green funds invest mostly in equities of firms that produce goods or services that promote environmental improvement, including greenhouse gas emissions reduction, energy efficiency enhancement, and pollution control. At the end of September 2021, the net assets of domestic green funds were valued at KRW 2.83 trillion, having risen by 1,872% from the end of 2020 (KRW 0.14 trillion), but still remain very low, accounting for only 0.35% of the total publicly offered funds (KRW 810.1 trillion).

7) According to the Ministry of Environment's guideline on green bonds that was unveiled in December 2020, issuers of green bonds are required to be reviewed by external entities such as accounting firms, credit rating agencies, and consulting firms in four areas: (1) use of proceeds, (2) project evaluation and selection process, (3) management of raised funds, and (4) follow-up reports.

8) As of the end of September 2021, the outstanding balance of green bonds issued by the private sector amounted to KRW 10.9 trillion, up 350% from the end of 2020 (KRW 2.4 trillion).

Market size¹⁾ of green funds²⁾

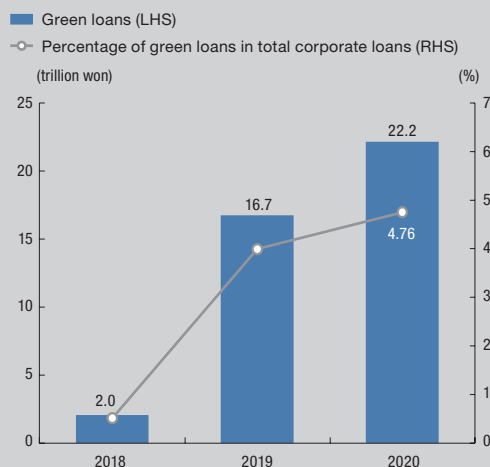


Notes: 1) Domestic funds that invested more than 50% of their stock portfolio in stocks of eco-friendly firms (based on Morning Star classification).
2) Net assets of green funds.

Source: Yonhap Infomax.

A green loan is a loan that offers preferential benefits in terms of interest rate and credit limit to firms with outstanding performance in eco-friendliness. Banks issue green loans based on environmental performance assessments⁹⁾ of borrowers conducted internally or by external entities. The value of green loans¹⁰⁾ issued by four major domestic commercial banks stood at KRW 22.2 trillion at the end of 2020, up 32% from the end of 2019 (KRW 16.7 trillion), representing 4.76% of these banks' total corporate loans at the end of 2020 (KRW 466.2 trillion).

Market size¹⁾ of green loans



Note: 1) Based on green loan balances of KB Kookmin, Shinhan, Hana and Woori banks.

Sources: Homepage of each institution, Financial institutions' business reports.

Assessment of green finance accessibility by large enterprises and SMEs

Green finance for fundraising is mostly used by large enterprises. As large enterprises have built up the capacity and installed dedicated departments to manage environment-related elements such as green finance planning and environmental information disclosure, they can easily raise funds through green finance. On the other hand, SMEs have limited access to the green finance market since they are not yet prepared to manage environment-related elements.

Specifically, large enterprises have actively invested in green projects and proceeded with decarbonization of the production structure through the issuance of green bonds. SMEs, however, have not issued green bonds or made

9) As for the assessment by external institutions, the environmental performance grades of the Korea Environmental Industry & Technology Institute are used.

10) Based on the sum of green loans issued by four major commercial banks: KB Kookmin Bank, Shinhan Bank, Hana Bank, and Woori Bank.

related investments. At the end of September 2021, the value of outstanding green bonds issued by large enterprises reached KRW 10.9 trillion, while the balance of green bonds issued by SMEs was zero.¹¹⁾

Comparison¹⁾ of the issuance of green bonds between large enterprises and SMEs

	(number, trillion won)		
	Large enterprises ²⁾	SMEs ²⁾	Public institutions
Number of issuing institutions ³⁾	50 (84.7%)	0	9 (15.3%)
Issuance amount ³⁾	10.9 (79.0%)	0	2.9 (21.0%)

Notes: 1) End-September 2021 basis.

2) Based on classification standards (NICE Information Service) of the Framework Act on SMEs.

3) () is the proportion of the total number of issuers and the issuance amount.

Source: Korea Exchange.

Furthermore, since large enterprises have actively managed environment-related elements and disclosed them publicly, many have been selected by investors for green investment targets. Notably, they have voluntarily disclosed their environmental information through sustainability reports and received favorable ratings from external assessment institutions. According to the environmental assessment results of the Korea Corporate Governance Service, one of the biggest ESG assessment entities in Korea, as of the end of 2020, there were 765 large enterprises and 137 SMEs that had disclosed environmental

information. Large enterprises received an average rating of “B” for their environmental performance, while SMEs received a rating of “C.”

Comparison¹⁾ of the disclosure and assessment of environment information between large enterprises and SMEs

	(number, grade)		
	Large enterprises ²⁾	SMEs ²⁾	Public institutions
Number of companies evaluated ³⁾	765 (84.2%)	137 (15.1%)	6 (0.7%)
Evaluation results ⁴⁾	B	C	B+

Notes: 1) Based on end-2020 environment information assessment of Korea Corporate Governance Service.

2) Based on classification standards of the Framework Act on SMEs.

3) () is the proportion of the total number of companies evaluated.

4) Average of environmental grades (S, A+, A, B+, B, C, D) by group.

Sources: Korea Corporate Governance Service, NICE Information Service.

Many stocks of large enterprises are included in green index funds, due to active disclosures and assessments of their environmental information.¹²⁾ Regarding the components of green indices listed on the Korea Exchange, of the 621 companies included in those indices, 463 (74.6%) are large enterprises, and 155 (25.0%) are SMEs. A majority of SME's stocks are not included in green index funds due to the poor disclosure and assessment of environmental information.¹³⁾

11) According to the Financial Supervisory Service, firms that raised funds through the issuance of bonds in 2020 included 402 large enterprises and eight SMEs. SMEs are typically less reliant on financing through bond issuance, but in the case of green bond issuance, there are no cases of SMEs.

12) Green funds can be divided into active funds and index funds. However, due to limited data availability, this section analyzed only index funds.

13) Meanwhile, of all SMEs listed on the KOSPI and KOSDAQ markets (1,125), those included in green indices (155) account for 13.8%, which is smaller than the share of large enterprises listed on the markets included in green indices (38.9%).

Composition of Green index¹⁾

	(number)		
	Large enterprises ²⁾	SMEs ²⁾	Public institutions
Number of firms included in green index ³⁾	463 (74.6%)	155 (25.0%)	3 (0.4%)

Notes: 1) Based on 7 green index funds (S&P/KRX Carbon Efficient Capped Index, KRX ESG Leaders 150 Index, KRX Eco Leaders 100 Index, KOSPI 200 ESG Index, KOSPI 200 Climate Change Index, KRX 300 Climate Change Index, KRX Climate Change Solutions Index).

2) Based on classification standards of the Framework Act on SMEs.

3) () is the proportion of the total number of firms included in green index funds.

Sources: Korea Exchange, NICE Information Service.

Given that green loans are executed based on firms' environmental performance, SMEs have less access to green loans as they are less capable of managing environment-related elements. By contrast, large enterprises have good access to green loans and thus easily obtain preferential interest rates and credit limits for green loans.

Assessment and future tasks

As investors and firms are growing increasingly interested in climate change, the green finance market is growing rapidly. However, SMEs are found to have less access to green finance due to their lack of capacity to respond to climate change. If ways of improving SMEs' access to green finance are not devised, the promotion of green finance may result in a disproportionate concentration of funds in large enterprises, and SMEs' fundraising for climate change response

may become increasingly difficult.

Climate change response has emerged as an important issue for SMEs and large enterprises alike. Considering that SMEs account for 99.9% of the total number of firms in the Korean economy and 82.7% of all employees (2019, Ministry of SMEs and Startups), the failure of SMEs to transition smoothly to an eco-friendly production structure would have significant negative consequences for the Korean economy. To ensure an efficient transition of both large enterprises and SMEs to a low-carbon economy, ways of improving access to green finance for SMEs, whose capacity to respond to climate change remains insufficient, need to be devised.

To enhance SMEs' access to green finance, the disclosure of their environmental information needs to be promoted. In October 2021, the G20 SFWG¹⁴⁾ discussed how to increase SMEs' access to sustainable finance. The G20 SFWG listed the challenges of SMEs in disclosing and managing sustainability information and suggested the preparation of a sustainability reporting guidance for SMEs. The government and financial authorities thus need to study ways of improving environmental information disclosure by SMEs.

Moreover, as one of the ways to boost SMEs' access to green finance, the public sector, including the government, could consider supplying green funds to SMEs using policy funds.¹⁵⁾ Supporting SMEs with policy funds would

14) The G20 SFWG (Sustainable Finance Working Group) was established in 2021 by the G20 with the aim of studying the barriers to and solutions for promoting sustainable finance. For Korea, the Bank of Korea and Ministry of Economy and Finance are members participants of the G20 SFWG.

15) The Bank of Korea is considering expanding the supply of green funds to SMEs with limited access to green finance through its Bank Intermediated Lending Support Facility.

strengthen their capability for environmental management and thus improve their access to the green finance market.

Meanwhile, data on green finance for SMEs held by financial institutions should be disclosed. Such data would provide timely information on SMEs' access to green finance. For instance, if banks disclosed their data on green loans issued to SMEs, the government and financial authorities would be able to measure SMEs' access to green finance and identify ways of improving it. However, currently, green loans issued to SMEs are not included among items of disclosure by domestic banks, which is an issue that needs to be addressed.

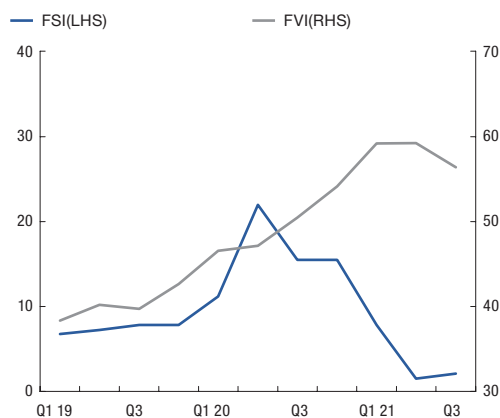
Overall Assessment

Financial Stability Index and Financial Vulnerability Index

As the recovery of the real economy gains momentum amid rising exports, the Korean financial system has appeared generally stable. Although volatility has increased in the financial markets, the assets of financial institutions have remained sound and their profitability robust, permitting them to effectively fulfill their role as intermediaries.

However, given the accelerated growth in household debt and the relentless rise in housing prices, the potential risk of a sudden domestic or external shock adversely impacting the financial system by triggering deleveraging and causing a collapse in asset prices appears to be undiminished. Although the financial stability index (FSI) has decreased since early this year, dropping below the warning stage threshold (8), the financial vulnerability index¹⁾ (FVI), measuring the level of potential vulnerability within the financial system over the medium and long term, has been continuously above²⁾ last year's level.

Financial Stability Index (FSI)¹⁾ and Financial Vulnerability Index (FVI)²⁾³⁾



Notes : 1) A composite index (0-100) calculated by standardizing 20 monthly real and financial sector indicators related to financial stability. The warning and crisis stage thresholds are set at 8 and 22 respectively, using the "noise-to-signal ratio" method.

2) A composite index (0-100) calculated by standardizing 39 indicators related to three valuation factors (asset prices, credit accumulation and financial institutional resilience).

3) Preliminary figure for Q3 2021.

Source: Bank of Korea.

Vulnerability Assessment

By sector, in the credit markets, the unrelenting growth of private credit appears to be a key source of vulnerability.³⁾ In the household sector, although income conditions are improving, the rising demand for housing and living expense-related loans is continuously lifting the debt service burden. Loans to self-employed borrowers are also continuous-

1) The financial vulnerability index (FVI) is an index gauging the stability of the financial system over a medium and long-term horizon by measuring relevant indicators of financial imbalances such as asset prices, credit accumulation, and the resilience of financial institutions, and calculating an aggregate score. An increase (decrease) in financial imbalances causes the FVI to rise (fall). For a more detail description of its purpose and methods of compilation and calculation, refer to the June 2021 Financial Stability Report, <Analysis of Financial Stability Issues> 「I. Financial Vulnerability Index: New Compilation Results and Implications」(page. 131).

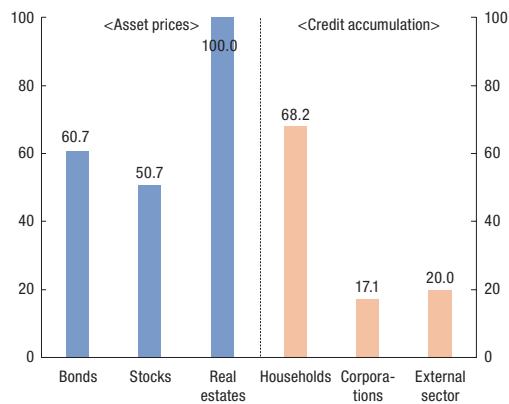
2) Amid the ongoing pandemic, the FVI continued its upward march to hit a high of 59.2 in the first and second quarters of 2021. Although the FVI was brought down to 56.4 during the third quarter by the hike in the Base Rates among other factors, its level still remains elevated.

3) Among the component items of the FVI, the aggregate index of credit accumulation has been slightly above last year's level since early this year (Q4 2020: 29.8 → Q1 2021: 30.1 → Q2 2021: 30.3 → Q3 2021: 30.0) in spite of the increase in the Base Rate and the tightening of household lending rules.

ly increasing as the financial relief program for independent contractors and small businesses has been extended and loan demand related to COVID-19 remains unabated. Amid heightened uncertainty caused by the ongoing COVID-19 crisis, a high level of accumulated debt and the rise in loan interest rates have recently increased the debt service burden for the self-employed. In the corporate sector, in spite of the sustained upward trend in loan growth, the debt service capacity of companies appears overall adequate as the recovery in earnings has improved their financial positions.

In the asset markets, prices have continued to push higher, with a particularly sharp surge seen in real estate prices. The hike in real estate prices is one of the main factors contributing to the buildup of financial imbalances as real estate is not only overvalued relative to economic fundamentals, but also is strongly associated with household loan growth. In terms of sectoral indices, while the FVI in the bond and stock sectors fell entering the third quarter of 2021,⁴⁾ it continued to climb in the real estate sector to reach an all-time high of 100.⁵⁾ Although the upward movement in real estate prices somewhat slowed recently in reaction to the tightening of lending standards and higher loan interest rates, given the current high risk appetite and profit-seeking tendency, this is unlikely to signal the beginning of a long-term trend toward the stabilization of prices.

Financial imbalance-related indices¹⁾



Note: 1) Q3 2021 basis.

Source: Bank of Korea.

The assets of financial institutions continued to remain sound amid the economic recovery and thanks to the extension of financial relief measures. Profitability also appears to have improved on increased lending and growth in fee income. With capital ratios well above regulatory minimums and a higher loan loss reserve ratio, the resilience of financial institutions, in other words, their ability to buffer domestic and external shocks, remains strong. While this situation is expected to continue mostly unchanged for the foreseeable future, as the financial relief measures introduced since early in the pandemic are gradually allowed to expire, there could be a risk of deterioration in the asset soundness and resilience of financial institutions with a higher share of loans to vulnerable borrowers than others.

4) The sectoral FVI for the bond markets, which steadily rose through to the second quarter of this year (Q2 2020: 49.1 → Q4 2020: 55.1 → Q2 2021: 62.3), fell slightly to 60.7 during the third quarter. The FVI for the stock markets, which also continuously increased until the second quarter of 2021 (Q2 2020: 27.3 → Q4 2020: 42.5 → Q2 2021: 54.0), dropped to 50.7 during the third quarter.

5) The FVI uses a Min-Max procedure to produce scores ranging from 0 to 100, 100 being the all-time high value and 0 the lowest value.

Risk Factors

To sum up, although the Korean financial system appears generally stable, the level of medium and long-term vulnerability remains high due to a sustained and accelerated rise in real estate prices and household debt. Vigilance must be exercised against increasing financial imbalances, which can undermine the stability of the financial system in the event of a domestic or external shock.

Recently, there have also been growing concerns about external risks such as bottlenecks in global supply chains, heightened inflationary pressure, monetary policy changes in major countries, and a further deterioration in financial and economic conditions in China. The past global financial crisis have shown that rapidly increasing external uncertainties can cause the investor sentiment to quickly turn negative and volatility in capital flows and asset prices to spike. This can, furthermore, increase funding costs for financial institutions and the resulting deleveraging process can reduce the supply of credit to vulnerable sectors.

Attention must also be paid to the possibility of an increase in credit risk resulting from changes in the domestic financial and economic environment. While the debt service capacity of borrowers is likely to generally improve with the progress in economic recovery, certain borrowers, such as excessively indebted households who have taken on large amounts of debt in connection with the COVID-19 crisis, and self-employed borrowers in sectors where the recovery is slower, may face greater difficulty repaying their loans. Moreover, loan interest rates have been

on the rise and lending standards have been tightened while most financial relief measures are set to expire in March 2022. Therefore, it is important to carefully assess and prepare for the risk of deterioration of loans to vulnerable borrowers experiencing slower improvement in income.

Response Measures

In order to minimize negative impacts from changes in domestic and external conditions on the Korean economy and financial system, policy responses to reduce the buildup of financial imbalances must continue. The method, rate, and the timeline of the normalization of accommodative monetary policies must be decided based on a precise analysis of the effects of the higher Base Rate and tighter lending standards on growth in real estate prices and private credit, and the risk appetite and profit-seeking propensity of economic agents.

It is also important to anticipate problems that may arise from policy responses to mitigate the buildup of financial imbalances. Since reduced relief measures and rising loan interest rates can put further financial strains on vulnerable sectors, it is advisable to continue to provide support selectively to certain sectors. As for financial institutions, while strengthening the management of credit risk among vulnerable borrowers, they must also set aside sufficient amounts of reserves and continuously build up their capital to buffer against a potential surge in loan losses.

Finally, the effort to develop the capacity to detect and respond to a spike in external risks is also crucial. Although Korea's foreign currency liabilities position is currently sound

and the resilience of financial institutions strong, considering lessons from past financial crises when shocks spread through the external sector, it may be necessary to more closely monitor the movement of price variables in the financial and foreign exchange markets, such as market interest rates, exchange rates, and stock prices, as well as trends in capital inflows and outflows, and the external payment capacity.

Analysis of Financial Stability Issues

I. Assessment of Recent Domestic and External Financial Imbalances and Implications	141
II. Financial and Economic Impacts of Household Debt in Korea	152
III. Impacts of the Normalization of Monetary Policy in Major Countries on Foreign Portfolio Investment in the Domestic Securities Markets	161
IV. Recent Trends in Interconnectedness in the Financial Sector and Risk Assessment	173

I. Assessment of Recent Domestic and External Financial Imbalances¹⁾ and Implications

1. Background

2. Assessment of Domestic and External Financial Imbalances

3. Implications

1. Background

After a decade of expansionary fiscal and monetary policy since the global financial crisis, the recent COVID-19 pandemic has caused the macro policy stance to take a further accommodative turn, sparking concerns about financial imbalances in major countries.²⁾

In a situation where there is a large buildup of financial imbalances, a rapid deterioration of domestic and external conditions due to rising inflation and the normalization of monetary policy could deliver a substantial shock to the economy. During past crises including

the foreign currency crisis and the global financial crisis, Korea has also experienced a vicious cycle between financial instability and retrenchment in the real economy, caused by a complex interaction between domestic and external factors.³⁾

This article examines the current level of domestic and external financial imbalances and estimates the downside risk to the real economy by taking into consideration accumulated financial imbalances.

2. Assessment of Domestic and External Financial Imbalances

A. External Conditions

There has been a clearly discernible co-movement between global house price growth and household debt growth in recent times. The global house price index (BIS data) has increased at an accelerated rate since the second half of 2019. During the first quarter of 2021, the global house price index jumped 6.6% year-on-year, with a higher rate of increase recorded in developed countries (8.6%) than

1) Whilst there is no official definition of financial imbalances based on the a consensus of central banks or financial scholars, this term is generally understood to mean excessive leverage, overvaluation of assets, and excessive risk-taking propensity (BIS, FRB).

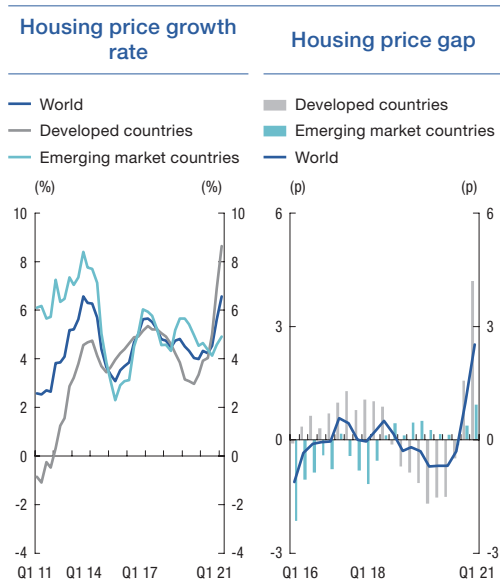
2) The US Federal Reserve Board (FRB), noting continuously rising housing valuations, expressed concerns for asset prices which “remain vulnerable to significant declines should investor risk sentiment deteriorate, progress on containing the virus disappoint, or the recovery stall” (Financial Stability Report, November 2021). The European Central Bank (ECB) assessed that there was a high level of risk regarding the rise in asset prices and debt growth in the private and public sectors in the Eurozone (Financial Stability Report, November 2021). The Bank of England (BOE) pointed out that the strong appetite for risky assets and the appreciation in their prices could lead to a sudden correction should economic prospects deteriorate (Financial Stability Report, June 2021).

3) The causes of financial imbalances varied somewhat depending on the crisis. During the foreign currency crisis, corporate credit, the stock market, and the external sector were the main culprits, but during the global financial crisis, it was the real estate market, stock market, and the external sector that were the chief contributors to financial imbalances.

in emerging market countries (4.9%).

This is quite dissimilar to the situation in the wake of the global financial crisis where house prices soared in emerging market countries rather than in developed countries.⁴⁾ The house price gap (sales price index minus long-term trend value), a measure of price levels in the global housing markets, turned positive (1.0) during the fourth quarter of 2020 and is currently moving further into positive territory (Figure I-1).

Figure I-1. Global¹⁾ housing price growth rate²⁾ and housing price gap³⁾



Notes: 1) In accordance with BIS standards, developed countries include 10 countries such as the USA and the UK, and emerging market countries include 21 countries such as Korea and China.

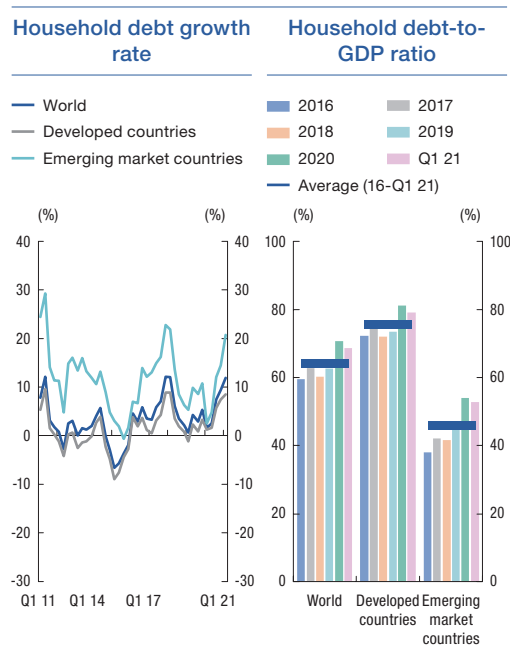
2) Year-on-year growth rate of nominal housing price index (2000=100).

3) Gap between housing price index and its long-term trend.

Source: BIS.

Global household debt (BIS data) has also increased steeply starting in the first half of 2020 to record year-on-year growth of 11.9% during the first quarter of 2021. By country group, the rate of household debt growth in emerging market countries (20.7%) largely outpaced that in developed countries (8.5%). More recently, however, with the global economy back on the path of recovery, the global household debt-to-GDP ratio dropped slightly (Q1 2021: 68.7%) from the level at the end of 2020 (70.6%). This ratio, however, still remains well above the average of previous years (Q1 2016 - Q4 2020: 64.0%) (Figure I-2).

Figure I-2. Global household debt growth rate¹⁾ and ratio to GDP²⁾



Notes: 1) Year-on-year basis.

2) Nominal USD.

Source: BIS.

4) Between the first quarter of 2011 and the fourth quarter of 2013, the quarterly average increase in the house price index (year-on-year increase) was much more significant in emerging market countries (6.8%) than in developed countries (1.6%).

Such growth in house prices and accumulation of household debt suggest that global financial vulnerability has increased significantly. To assess the level of financial imbalances, the analysis began by calculating the global financial vulnerability index (FVI),⁵⁾ which measures both indicators of financial imbalances such as private credit and asset prices and the resilience of financial institutions.

The global FVI rose to 59.1 in the fourth quarter of 2020, an increase of 23.2p from the end of the previous year (35.9). By component indicator, the index was the highest for private credit (69.6), followed by asset prices (58.3), the resilience of financial institutions (48.3), and the external sector (43.1), in this order. Compared to the end of 2019, the FVI for private credit and asset prices rose by 21.5p and 17.0p, respectively, suggesting a sharp increase in financial imbalances. Mounting financial imbalances were also accompanied by a weakening in the resilience of financial institutions (+21.9p) (Figure I-3, Figure I-4).

Figure I-3. Trend of global¹⁾ FVI²⁾

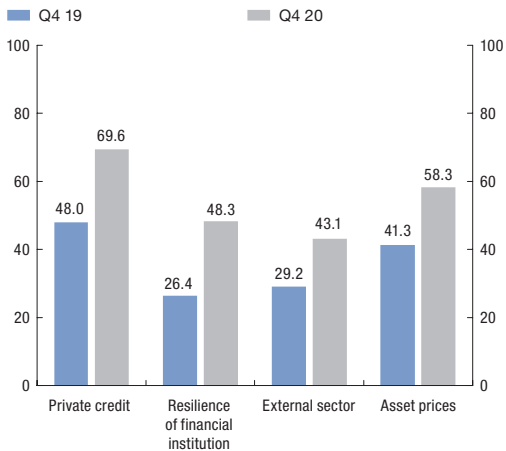


Notes: 1) Including euro area and 14 major countries such as USA, UK, China, and Japan.

2) The index is calculated for each country using 13 indicators in four categories: private credit, asset prices, external sector, and resilience of financial institution, and then the global financial vulnerability index is calculated using the share of GDP in individual countries as a weight.

Sources: Bank of Korea staff calculation, BIS, IMF.

5) The global FVI was calculated using the method proposed by the US Federal Reserve. First, the FVI of each country was calculated using 13 indicators related to private credit (four indicators including the household credit-to-GDP ratio and the corporate credit-to-GDP ratio), asset prices (three indicators including the house price-to-GDP ratio and the stock price-to-GDP ratio), the resilience of financial institutions (three indicators including the capital adequacy ratio), and the external sector (three indicators including the external liabilities-to-GDP ratio and official foreign reserves) after normalizing them. The global FVI was, then, calculated by weighting each country's FVI by its share in global GDP. The higher the value of FVI, the higher the level of financial vulnerability is, 100 being the maximum value. For a detailed explanation of the calculation method, refer to "Mapping Heat in the U.S. Financial System" (2015, Aikman et al.) and "The Anatomy of Financial Vulnerabilities and Crises" (2017, Lee et al.).

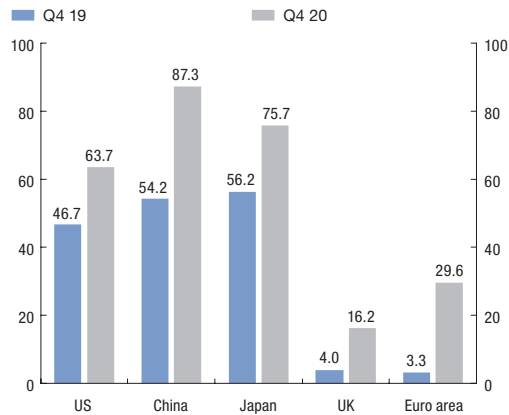
Figure I-4. Global¹⁾ FVI for each sector

Notes: 1) Including euro area and 14 major countries such as the USA, the UK, China, and Japan.
 2) After calculating the index for each country in four sectors, including private credit and asset prices, the global index for each sector is calculated using the share of GDP in individual countries as a weight.

Sources: Bank of Korea staff calculation, BIS, IMF.

During this period, the FVI rose⁶⁾ steeply for most countries, including major countries such as the US (46.7 → 63.7), the UK (4.0 → 16.2), the eurozone (3.3 → 29.6), and China (54.2 → 87.3) (Figure I-5).

Figure I-5. Change in FVI of major countries



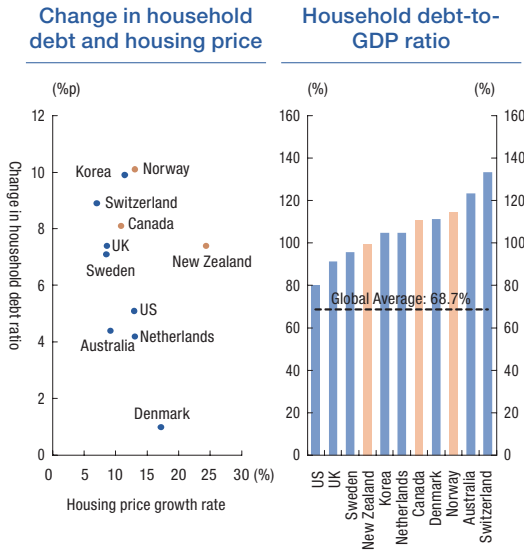
Sources: Bank of Korea staff calculation, BIS, IMF.

The central banks of New Zealand and Norway have recently raised their policy rates for the first time since the start of the COVID-19 crisis, with Canada also taking steps to reduce quantitative easing.⁷⁾ The moves to reduce quantitative easing in these countries with comparatively high household debt-to-GDP ratios and accelerated growth in housing prices, is likely to reflect concerns about growing financial imbalances (Figure I-6).

6) National FVI values were calculated to identify the overall trend in the level of financial vulnerability in individual countries, and should not be used for a direct country-to-country comparison at a specific point in time as they are influenced by whether a country has had the experience of past crises as well as its financial and economic conditions. It should be also noted that this index is not the same as the financial vulnerability index included in the BOK's June 2021 Financial Stability Report, which was calculated using different component indicators, selected to reflect domestic financial stability conditions that are specific to Korea.

7) At the end of October 2021, the Bank of Canada announced an end to its quantitative easing program. New Zealand, which had halted its quantitative easing before that, in late July, raised its policy rates in October (0.25% → 0.5%). Norway also raised its policy rates in September (0% → 0.25%).

Figure I-6. Change¹⁾ in household debt-to-GDP ratio and housing price growth rate²⁾



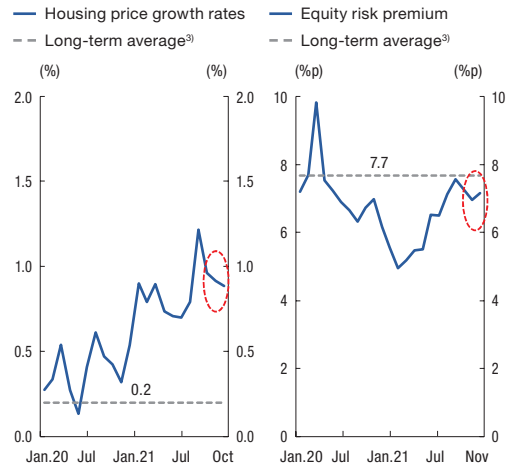
Notes: 1) Changes of the ratios compared to end-2019 for countries whose household debt-to-nominal GDP (USD basis) exceeded 80% in Q1 2021.
 2) Growth rates from end-2019 to Q1 2021.
 Sources: BIS, Korea Real Estate Board.

B. Domestic Conditions

Following the lowering of the Base Rate by the BOK and the steps taken by the government to strengthen macroprudential policies, there have recently been some signs of a reduction in financial imbalances. In the real estate market, growth in housing sales prices have slowed somewhat since September. In the financial markets, the risk premium on stocks (difference between expected return and long-term government bond yields) have edged up since November, pointing to a slight weakening in

the risk tolerance of investors (Figure I-7).

Figure I-7. Housing price growth rates¹⁾ and equity risk premium²⁾



Notes: 1) Month-on-month basis.
 2) Expected equity yield (the inverse of 12-month-forward PER) - Long-term treasury yield (10 year).
 3) Since 2010.
 Sources: Bank of Korea, Korea Real Estate Board, Refinitiv.

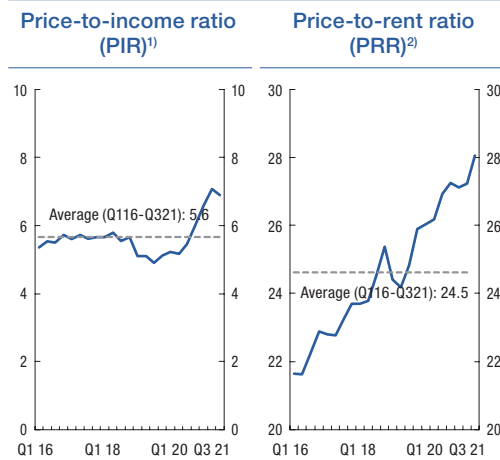
However, compared to the past, there is a substantially larger buildup of financial imbalances in Korea. In the real estate market, the price-to-income ratio (PIR) and the price-to-rent ratio (PRR), indicators comparing the price level of a property to household income and rental yield, respectively, are continuously on the rise and are currently significantly above their long-term averages (since 2010)⁸⁾ (Figure I-8). The Z-score index,⁹⁾ which measures the price level of residential properties by taking into consideration borrowing costs in addition to PIR and PRR, has also rapidly

8) During the second quarter of 2021, the PIR and the PRR increased 0.5p and 0.1p from the previous quarter (6.6, 27.1) to 7.1 and 27.2, respectively.

9) As a tool to assess valuation in housing markets, the IMF (GFSR, October 2018) introduced an index of the relationship in which house prices may be overvalued when loan interest rates are low while the price-to-income ratio and the price-to-rent ratio are high by combining the three metrics into a single indicator. The index was calculated by standardizing (average=0, standard deviation =1) the values of the three indicators between the first quarter of 2011 and the second quarter of 2021 and averaging them.

increased since late 2019 (0.8) to far surpass its long-term average (0 since the first quarter of 2011). By index component, the PIR appeared to be the key driver of the increase in the Z-score index (Figure I-9).

Figure I-8. Price-to-income ratio and price-to-rent ratio

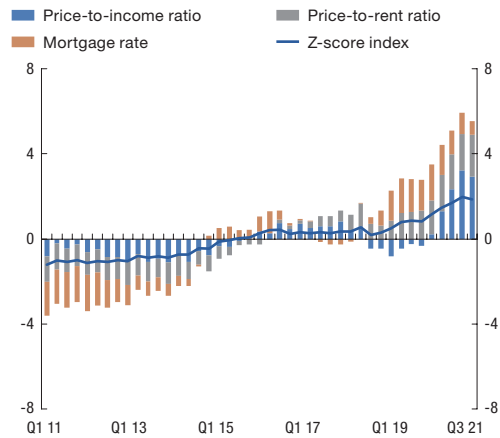


Notes: 1) Housing price / Annual household income.

2) Housing price / Annual rent.

Sources: Bank of Korea staff calculation, KB Kookmin Bank.

Figure I-9. Z-score index and sub-indicators



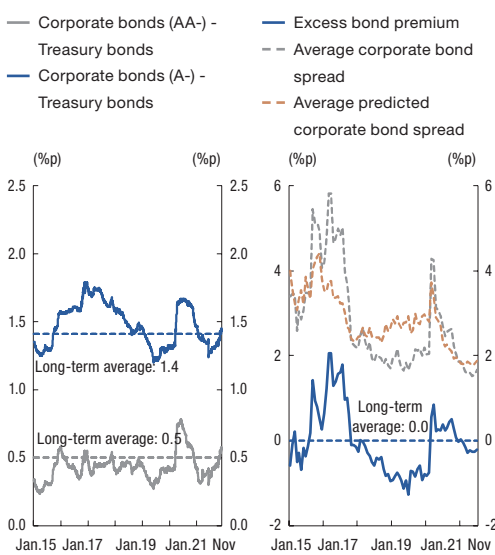
Notes: 1) Standardized index of price-to-income ratio (PIR), price-to-rent ratio (PRR), and the inverse of mortgage rate.

Sources: Bank of Korea staff calculation, KB Kookmin Bank.

Meanwhile, in the stock markets, the risk premium, which has recently ticked up to 7.2%p, is still below the long-term average (7.7%p since 2010). In the corporate bond market, the credit spread has recently rebounded to a level slightly above the long-term average. However, the excess bond premium (EBP) on corporate bonds, which reflects expected credit losses from default by an issuing company, dropped recently below its long-term average, suggesting that the risk appetite of investors is still strong¹⁰⁾(Figure I-10).

10) The credit spread on corporate bonds is defined as the difference in yield between a corporate bond and a government bond of the same remaining maturity. An excess premium is calculated by subtracting the expected spread, which reflects the expected rate of credit loss, from the credit spread. Therefore, the difference between a credit spread and an excess premium can be more or less depending on the expected credit loss rate of a bond issuing company. An increase (decrease) in the excess premium is a condition in which the credit spread increases more than the expected spread, reflecting the expected credit loss rate, increases, which means a weakening (strengthening) in the risk tolerance of investors. Excess premium is used by the US Federal Reserve to assess the level of risk appetite in bond markets. For a more detailed explanation of the method of calculation of excess premium, refer to 'Credit Spread and Business Cycle Fluctuations'(Gilchrist and Zakrajsek, 2012).

Figure I-10. Corporate bond credit spread¹⁾ and excess bond premium²⁾

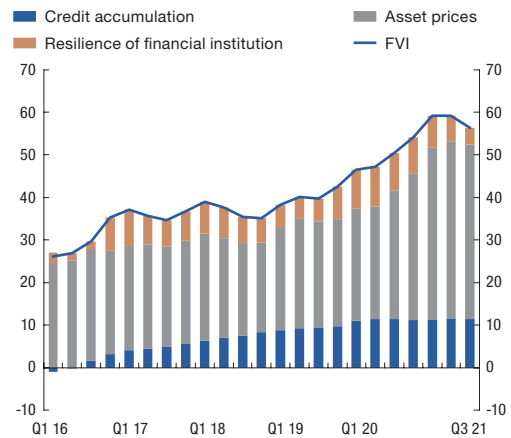


Notes: 1) 3-year tenor basis; long-term average is from Jan. 2010 to Nov. 2021.
 2) Excess bond premium is corporate bond spread net of predicted corporate bond spread, which reflects expected loss; long-term average is from Jan. 2015 to Nov. 2021.
 Sources: Bank of Korea, Korea Financial Investment Association, KOSCOM, Refinitiv.

As a result, the financial vulnerability index (FVI), which considers both financial imbalances and the resilience of financial institutions, has remained continuously high. The FVI has decreased somewhat during the third quarter of this year (Q2 2021: 59.2 → Q3 2021: 56.4)¹¹⁾ on the upturn in the profitability of financial institutions. While the improving resilience of financial institutions was the main contributor to the lowering of the FVI, recent

changes in credit accumulation and asset prices also made some contribution to this result, albeit modest.¹²⁾ However, compared to the long-term average (313 since 2010), the current FVI is still quite high. Real estate prices and household credit are the main two factors behind this elevated level of financial vulnerability¹³⁾(Figure I-11, Figure I-12). Given the current propensity for high-risk, high-reward investing in the asset markets, it is far from certain that the recent drop in FVI will lead to a sustained downward trend.

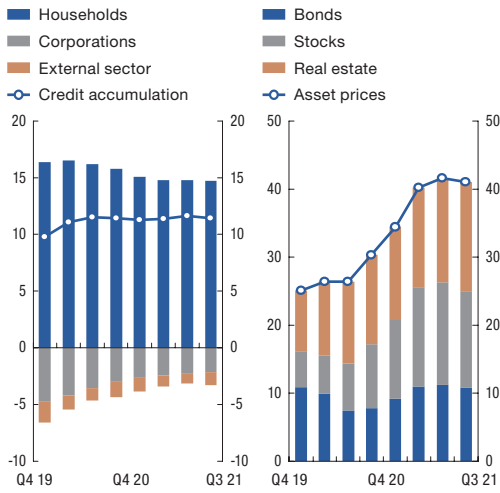
Figure I-11. Trends¹⁾ of FVI



Note: 1) Preliminary figure for Q3 2021.
 Source: Bank of Korea staff calculation.

11) During the third quarter of 2021, commercial banks' return on assets (ROA, annualized rate) rose 0.10%p year-on-year (0.52% → 0.62%), while the ROA of securities companies and credit-specialized financial companies edged up 0.60%p (1.06% → 1.66%) and 0.37%p (1.53% → 1.90%), respectively.
 12) Breaking down when the decrease in the FVI between June 2021 and September 2021 by component indicator, the contribution of credit accumulation was -0.2p (11.6 → 11.4) and that of asset prices and the resilience of financial institutions -0.6p (41.6 → 41.0) and -2.1p (6.0 → 3.9), respectively.
 13) When breaking down the change in the FVI between June 2021 and September 2021 by sectoral indicator, the contribution of real estate prices was +0.9p (15.3 → 16.2) and that of household credit -0.1p (14.8 → 14.7).

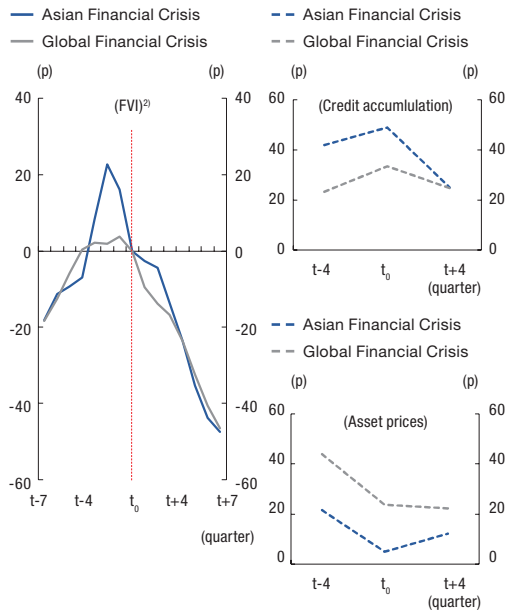
Figure I-12. Trends of credit accumulation index and asset prices index



Source: Bank of Korea staff calculation.

Past experiences show that the FVI tended to rapidly surge in the run-up to a crisis. After a series of spikes and corrections, the index plummeted upon the occurrence of an external shock.¹⁴⁾ By component index, the credit accumulation index continuously increased throughout the run-up to a crisis and sharply dropped at its onset. As for asset prices, a rapid correction took place before the start of the crisis, but its pace slowed down once the crisis began to unfold. Therefore, the possibility of past crises repeating themselves during the correction process of the FVI cannot be ruled out and calls for special vigilance (Figure I-13).

Figure I-13. Change in FVI¹⁾ before and after past crises



Notes: 1) To indicates to as Q4 1997 for the Asian Financial Crisis and Q3 2008 for the Global Financial Crisis.

2) FVI at each period is figure after deducting FVI at t_0 .

Source: Bank of Korea staff calculation.

C. Downside Risk to the Real Economy in a Situation of Growing Domestic and Global Financial Imbalances

In a situation of growing financial imbalances, when economic agents underestimate the risk presented by risky assets, this increases the likelihood of an asset bubble developing. A sudden change in domestic and global conditions can cause the asset bubble to burst by triggering a quick shift in market sentiment from risk tolerance to risk avoidance, which results in a collapse in asset prices and debt deleveraging. Given the current massive buildup of financial balances in major coun-

14) The FVI jumped +34.0p in the run-up to the foreign currency crisis and +9.6p in the run-up to the global financial crisis (compared to the one-year period preceding the peak), after which it dropped back down by 23.7p and 23.6p, respectively, over the one-year post-crisis period.

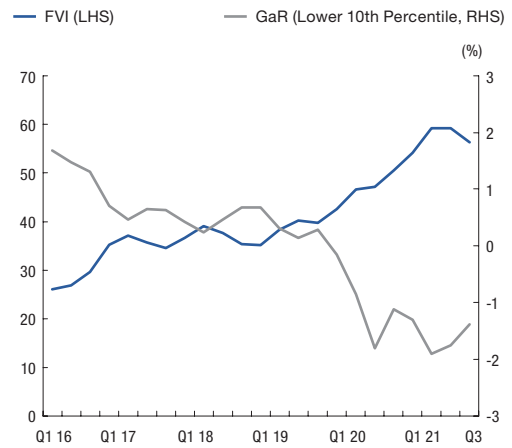
tries, a sudden correction of imbalances could deliver a shock to Korea's domestic markets, accelerating the correction of asset prices and the process of debt deleveraging. Should this happen, it could lead to a decline in household consumption and corporate investment and a drop in exports, increasing the downside risk to the real economy.

In order to gauge the level of downside risk to the real economy in a situation with a large buildup of financial imbalances, a growth-at-risk (GaR) analysis was performed using the FVI for Korea and other countries.¹⁵⁾ An FVI was calculated for countries with close economic ties to Korea such as the US, UK, China, Japan, and the Eurozone.¹⁶⁾

The analysis found that global financial imbalances sharply increase the downside risk to the real economy in Korea. When only the Korean FVI was considered, the GaR (10% worse-case scenario, annualized value) for the fourth quarter of 2021, as predicted during the third quarter, stood at -1.4%, which represents

a slight improvement over the previous quarter (-1.7%), but this level of downside risk is still quite high especially if the base effect of pandemic-hit periods is considered.¹⁷⁾ (Figure I-14).

Figure I-14. GaR¹⁾ and FVI



Note: 1) Real GDP growth rate (annualized) after four quarters predicted at each point in time, reflecting FVI at that time, indicating the lowest growth rate that can appear with 10% probability over the next year.

Source: Bank of Korea staff calculation.

15) GaR (growth-at-risk, maximum expected rate of GDP decline) is defined as the decline in GDP expected from a domestic or external shock based only on the FVI. For details, refer to the June 2021 Financial Stability Report, <Analysis of Financial Stability Issues> 「II. The Impact of Accumulated Financial Imbalances on the Financial System」(page 141). The following quantile regression models, considering only the domestic FVI, on the one hand, and both the domestic FVI and the FVI of major countries, on the other, were used:

Based only on the domestic FVI considered	$\tilde{y}_{t+h}^q = \alpha_h^q + \beta_{y,h}^q y_t + \beta_{F,h}^q FVI_t + \epsilon_{t+h}$
Based on the domestic FVI and the FVI of major countries	$\tilde{y}_{t+h}^q = \alpha_h^q + \beta_{y,h}^q y_t + \beta_{F,h}^q FVI_t + \sum_{i=1}^5 \gamma_{i,F,h}^q W FVI_{i,t} + \sum_{i=1}^5 \lambda_{i,F,h}^q (FVI_t \times W FVI_{i,t}) + \epsilon_{t+h}$

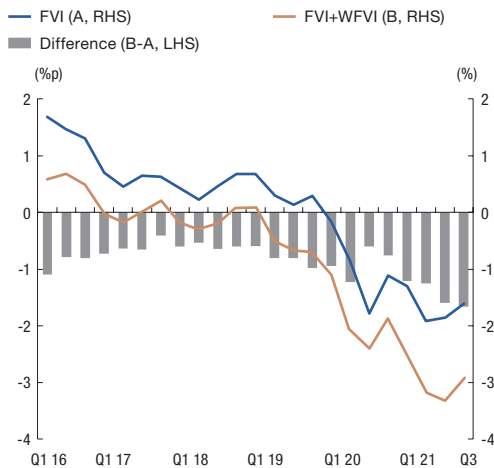
Here, \tilde{y}_{t+h}^q : moving average of real GDP growth from the previous quarter during period,
 y_t : real GDP growth from the previous quarter,
 FVI_t : domestic FVI, $W FVI_{i,t}$: FVI in major countries, : US, UK, Eurozone, China, Japan,
 $\gamma_{i,F,h}^q$: quantile value, $\lambda_{i,F,h}^q$: forecast lag)

16) The combined share of the US, UK, China, Japan, and the Eurozone in global GDP is about 67%. The FVI for these countries was calculated using the same 13 indicators in four sectors, including private credit, asset prices, the resilience of financial institution, and the external sector, as those used for the calculation of the global FVI, described earlier.

17) GaR is a measure of extreme tail risk, calculated based only on the FVI, and is not to be construed as a general economic growth projection.

Next, when the level of downside risk to the real economy was estimated by taking the FVI for major countries into additional consideration, the GaR (10% worst-case scenario, annualized value) for the third quarter of 2021 was -3.0%, significantly larger (-1.6%p) than when only the FVI for Korea was considered (-1.4%).¹⁸⁾ Moreover, the difference between the GaR, calculated considering only domestic financial imbalances, and the GaR, calculated considering also financial imbalances in major countries, appeared to have increased since early in the COVID-19 pandemic. What this suggests is that the buildup of financial imbalances in major countries is having a growing impact on the downside risk facing Korea's domestic economy (Figure I-15).

Figure I-15. GaR¹⁾ when considering global FVI



Note: 1) Real GDP growth rate (annualized) after four quarters predicted at each point in time, reflecting FVI at that time, indicating the lowest growth rate that can appear with 10% probability over the next year.

Source: Bank of Korea staff calculation.

3. Implications

In spite of efforts by the government and the BOK to curb the accumulation of financial imbalances, their level appears to remain high. The accelerated rises in housing prices and household debt have been two main drivers of financial imbalances. The overvaluation of homes relative to income persists in the real estate markets. In the stock markets, the risk appetite of investors continues to be strong.

Financial imbalances, which have emerged as an issue of concern not just in Korea, but in most major countries, call for constant vigilance.

In an environment where domestic and international financial markets are closely interconnected, the buildup of financial imbalances can exacerbate the impact of a global shock on the Korean economy, affecting both domestic demand and exports. The estimation of the level of downside risk to the real economy by considering domestic and global financial imbalances showed that while domestic financial imbalances increased the downside risk to the real economy, the risk level was yet greater when financial imbalances in major countries were taken into account.

In past crises, financial imbalances tended to rapidly build up in the run-up to a crisis, and then, after a series of spikes and corrections, decrease sharply upon an external shock. As a sudden correction of domestic and global financial imbalances can deliver a sizeable

18) Using the results of estimation of the models described above, the total effect of the FVI of major countries on downside risk to the real economy (-1.6%p, $WFVI+FVI \times WFVI$) was broken down to a direct effect ($WFVI$) and an indirect ($FVI \times WFVI$) effect, which were estimated at -1.3%p and -0.3%p, respectively.

shock to the real economy, it is important for policy authorities to step up the monitoring of their increase not just in Korea but worldwide by examining the size and speed of increase as well as changes in fiscal and monetary policies. In tandem, policy efforts to gradually reduce domestic financial imbalances must continue by adjusting their speed to the pace of recovery in the real economy. While maintaining the current stance of strengthening macroprudential policies for the time being, the government should also closely examine issues so far identified as requiring further fine-tuning and take necessary steps for improvement. Meanwhile, financial institutions must increase vigilance against risks by beefing up risk management procedures and building up resilience.

II. Financial and Economic Impacts of Household Debt in Korea

1. Background
 2. Major Risk Propagation Channels of Household Debt and Assessment
 3. Implications
-

1. Background

In Korea, household debt (based on household credit statistics) has more than doubled since the global financial crisis, from 843.2 trillion won in late 2010 to 1,844.9 trillion won in the third quarter of 2021. Compared to major countries, the level of household debt is both higher as well as rising at a faster pace in Korea. As of the end of March 2021, the ratio of household debt to nominal GDP (hereafter the “household debt ratio”) stood at 104.9%, far exceeding the average among the top 30 countries (63.2%) in terms of nominal GDP (2020). Household debt also increased at a much faster rate in Korea (+31.7%p) over the last 10 years than in major countries (+6.9%p). The household debt ratio has mostly continued on an upward trajectory during this period as Korea was spared from the massive deleveraging process accompanied by the

protracted housing market corrections some other countries underwent in the aftermath of the global financial crisis¹⁾ (Figure II-1).

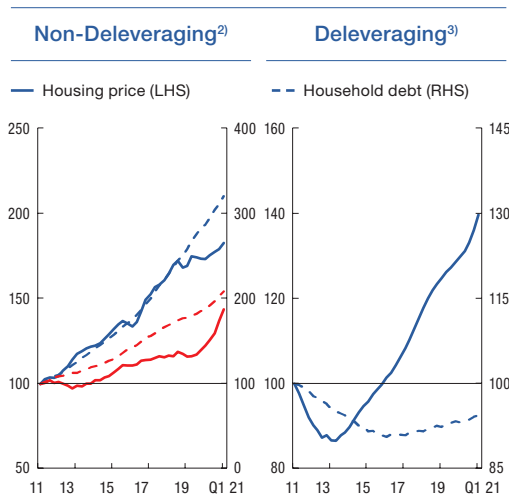
Although debt growth in a growing economy is a natural phenomenon, a disproportionately large buildup of debt relative to the real economy, leading to a debt overhang, is considered a destabilizing factor for the financial system and macroeconomy. If the level of household debt is too high compared to the level of income, an economy becomes more vulnerable to domestic and external shocks such as a sudden drop in housing prices, which are closely connected to household debt, driving deeper recessions and higher rises in the unemployment rate to rise more (IMF, 2012, etc.). Financial crisis episodes related to household debt in history indicate that negative shocks such as the bursting of an asset bubble busts²⁾ or sharp contraction of the credit supply preceded by larger run-ups in household debts led to massive household defaults, triggering a financial crisis (Reinhart and Rogoff, 2009).

In this article, we shed light on the theoretical risk propagation channels through which the household debt overhang can have negative effects on the financial system and macroeconomy and then assess the household debt of Korea by the channels.

1) Amid a rise in the number of households and the concomitant insufficiency in the supply of new apartments, the accommodative financial stance since early in the COVID-19 pandemic, in response to its economic fallout, massively increased the market’s appetite for housing as an investment asset. The rapid growth of household loans for housing purchases, driven by home mortgage loans, appears to be the key driving factor in the recent surge in Korean households’ debt.

2) The Great Depression of 1929 in the US, the global financial crisis of 2008-2009, the household debt crisis in Scandinavian countries in the late 1980’s, and the Colombian household debt crisis in the mid-1990’s was triggered by a collapse in asset prices (Reinhart and Rogoff, 2009).

Figure II-1. Housing prices and household debt,¹⁾ by country group



Notes: 1) Indexed the figures of Q1 2011 to 100.
 2) Simple averages of figures in China, Norway, and Hong Kong; the red lines indicate figures in Korea.
 3) Simple averages of figures in Spain, Ireland, the US, and the Netherlands.
 Sources: OECD, BIS, Korea Real Estate Board.

2. Major Risk Propagation Channels of Household Debt and Assessment

Theoretically, household debt can increase household consumption by easing liquidity constraints. Households can also use debt to smooth consumption across different stages of the lifecycle, which contributes to increasing consumer utility. Insofar as the debt is associated with resource reallocation toward

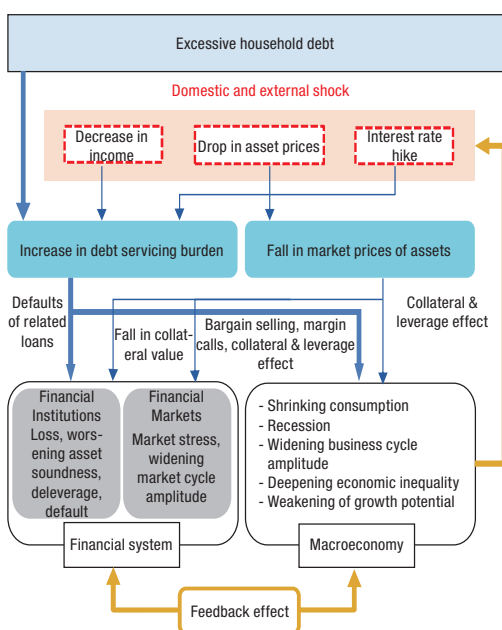
borrowers with a high marginal propensity to consume, household debt growth can play a role in increasing³⁾ aggregate consumption in the overall economy. This is why growth in household debt during the process of economic development is sometimes interpreted as a positive sign in the same way as financial deepening and improvement in households' access to finance (Beck and Levine, 2004, etc.).

However, if household debt rises beyond a certain level,⁴⁾ the negative effects of debt eventually outweigh its benefits, with the excessive debt burden restricting household consumption and slowing down real economic growth.⁵⁾ There are three main pathways through which a household debt overhang can impact the economy and the financial system. First, the increased debt service burden borne by excessively indebted households can lower consumption by reducing their real disposable income. Second, when the household debt is mainly used to finance asset purchases, it is a potentially destabilizing element in the financial system, as it can amplify the business and financial cycle via or the collateral effect and leverage effect,⁶⁾ ultimately triggering financial instability and an economic recession. Particularly when household debt rapidly accumulates, deviating from income levels, through interaction with the upward movement in asset prices, a negative shock causing a sharp drop in income or a sudden nose dive in asset

3) Due to credit or liquidity constraints, borrower households tend to show a higher marginal propensity to consume than households with positive (+) net savings rates. Therefore, debt growth can result in an increase in aggregate consumption in the overall economy (Tobin, 1982; Eggertsson and Krugman, 2012; Auclert, 2017, etc.).
 4) Cecchetti et al. (2011) proposed 85% of GDP as the threshold beyond which household debt growth starts to hinder economic growth (debt overhang), while Arcand et al. (2015) set this threshold to 50% and the World Economic Forum (2011) to 75%.
 5) Theoretical discussions on the negative impacts of private debt on the economy and financial markets have been ongoing based on early studies such as Fisher (1933), Minsky (1977, 1986), and Kindleberger (1978).
 6) The collateral effect and the leverage effect will be discussed in detail later in this article.

prices can seriously undermine the stability and soundness of the financial system. Third, during the process of household debt growth in tandem with a widening gap in accessibility to finance and rising asset prices can worsen inequalities among economic agents (Figure II-2).

Figure II-2. Risk transmission channels of excessive household debt



A. Restriction of Household Consumption

An excessive increase in household debt lifts the debt service burden, setting off a vicious cycle of reducing consumption, which, in turn, leads to a drop in corporate investment and production, further decreasing household income.⁷⁾ Such an increase in leverage fueled by household debt, especially if a large amount of leverage flows into the real estate market, can result in a long-term debt service burden, restricting household consumption for an extended period of time. An empirical study conducted by the IMF (2017) using countries panel data shows that although household debt growth can increase consumption in the short term, the negative effects of long-term accumulation of debt outweigh the short-term benefits in consumption.⁸⁾ Moreover, in a situation where household debt is associated with real estate purchases, real estate taxes are another source of burden for households, which can further reduce their consumption capacity.⁹⁾

Against this background, we estimated the threshold beyond which debt starts to restrict the consumption of Korean households using microdata of household loans.¹⁰⁾¹¹⁾ The DSR

7) According to Fisher's 1933 debt deflation theory, when economic agents are excessively indebted and attempt to repay debt by reducing consumption, this triggers recession and deflation, which, in turn, increases the actual value of debt and further restricts consumption, and the repetition of this vicious cycle can plunge the economy into a long-term recession.

8) Using the data of 80 countries including Korea during a period spanning from 1950 to 2016, the study analyzed the impact of household debt on consumption. The results showed that a 1% increase in the household debt ratio (in year t) led to a drop in the rate of consumption growth by at least 0.14%p starting from t+2.

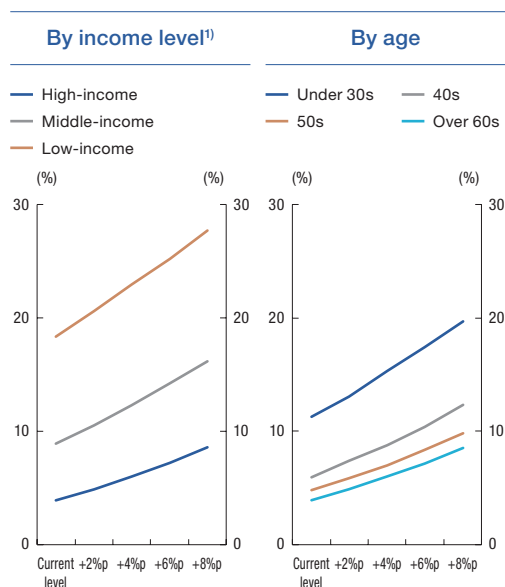
9) In consideration of this fact, in Canada, when calculating the gross debt service ratio (GDS) for home mortgage loans, used as the regulatory DSR indicator, all house-related taxes are taken into account in addition to the loan principle and interest.

10) Refer to "Financial Stability Conditions" (September 2021) (BOK press release, September 24, 2021), <Key Issues> 「Assessment of Household and Corporate Leverage and Implications」.

(debt service ratio) threshold for consumption restriction was estimated at 45.9%, which is significantly above the average DSR at the end of March 2021 (36.1%¹²). Hence, the overall debt service burden of borrowers was not yet at a level that can restrict consumption. While the percentage share of all borrowers with a DSR above this threshold was only 6.3%, that in low income borrowers and young adult borrowers aged 20 to 39 years was as much as 18.4% and 11.3%, respectively.

Assuming that the DSR will rise going forward, we estimated changes in the share of borrowers with a DSR above the threshold by income and age groups. While every 2%p uptick in DSR resulted in an increase of only 1-2%p in the share of borrowers with a DSR above the threshold in each income and age group, when the DSR is assumed to rise sharply (+8%p) due to growth in household debt or higher loan interest rates, the share of borrowers with a DSR above the threshold appeared to increase by 5-9%p in each income group and by 5-8%p in each age group. In the low income group and the young adult group, the share of households with a DSR exceeding the threshold was found to increase particularly sharply to 27.7% and 19.7%, respectively (Figure II-3). Therefore, these groups appear to have comparatively higher probability of a debt overhang restricting consumption through an increase in the debt service burden.

Figure II-3. Shares of borrowers with DSR above critical level



Note: 1) High-income (top 30%), middle-income (30-70%), low-income (bottom 30%).

Source: Bank of Korea.

B. Exacerbation of Financial and Economic Volatility and Destabilizing Effects on the Financial System

When an excessive amount of household debt is channeled into the asset markets, it can exacerbate volatility in the financial markets and the real economy can be exacerbated depending on asset price movements. When asset prices rise (fall), the borrowing capacity of households increases (decreases), and the resulting debt growth (reduction), as it leads to additional asset purchases (sales) or

11) This is the regulatory DSR calculated using data from the Household Debt DB. The actual debt service burden of Korean households may be lower. When calculated using actual amounts of payment toward the loan principal and interest, estimated based on the data of the Household Financial Welfare Survey, the DSR amounted only to 32.7% (2020).

12) In order to maintain the continuity of the time series, the estimation did not take into consideration the recent change regarding the period of maturity used for the calculation of DSR (maturity for unsecured loans: 10 years → 5 years, etc.).

consumption growth (decline), can give a further upward (downward) momentum to the expansionary (recessionary) phase of the economic cycle (collateral effect).

Moreover, household consumption can be influenced by changes in net asset worth. As changes of asset prices cause larger changes in the net asset worth of households financed from external borrowing than the net worth of households financed from their own capital, consumption can be more sensitive to asset price changes, and the business and financial cycles can be more amplified when households are highly leveraged (leverage effect).

Furthermore, excessively indebted households may become vulnerable to adverse domestic and external shocks, in the form of an asset price drop, decrease in income, or a sudden contraction in the credit supply from financial institutions (Cecchetti et al., 2011, etc.). An employment shock such as job losses, leading to a decline in income, can make it difficult for excessively indebted households to service their debt, and if this leads to defaults, it can undermine the soundness of financial institutions. Also, a collapse in asset prices negatively impacts real economic conditions through the collateral and leverage effects described earlier, leading to a further decline in asset prices. When the price of an asset falls below the maximum amount of mortgage credit (collateral value), borrowers face increasing

deleveraging pressure. Once households begin to engage in asset fire-sales to repay their debt, it can trigger negative price spirals, the consequences of which can be extremely damaging for the stability of financial markets and the economy.¹³⁾

(Possibility of Deleveraging led by Asset Price Correction)

In Korea, there is a possibility that a correction of housing prices may be triggered in the presence of a shock, especially if the shock decreases the real income of households. Households may be forced to sell their homes and other real assets to secure liquidity and cover loan expenses. This is because real assets account for a high share of Korean households' assets and the share of high-risk households¹⁴⁾ that are heavily indebted in total borrowers has been on the rise. This could worsen its severity, if the correction of housing prices leads to the liquidation of real estate by "gap investors" or owners of multiple properties, this could worsen its severity¹⁵⁾ (Figure II-4).

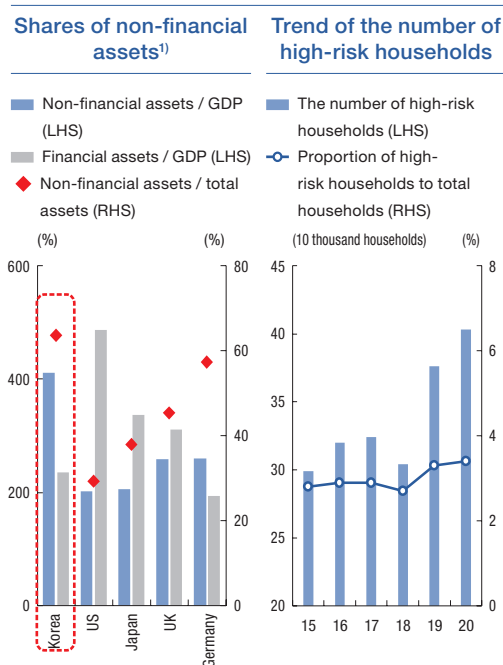
The declines in housing prices accompanied by drops in household income, which increases the credit risk of borrowers, could push financial institutions to tighten their lending standards and possibly also engage in a deleveraging process to reduce loans to high risk households and unsecured loans.¹⁶⁾

13) The stock market also appears to be vulnerable to negative price effects due to widespread margin trading using brokers' credit. For example, in March 2020, the declaration of COVID-19 a worldwide pandemic caused stock prices to tumble in the US, setting off a massive wave of margin calls. Faced with margin calls, overleveraged investors started to liquidate their shares. This accelerated the rate of price decline and put tremendous stress on the overall stock market (Foley et al., 2020).

14) High risk households are defined as households with a DSR > 40% and a DTA (debt-to-asset) ratio > 100%.

15) In the case of gap investors, when jeonse prices fall, they can attempt to take out a loan to return the deposit. But, when this is not an option due to the DSR and other lending rules, they can be forced to sell the property.

Figure II-4. Shares of non-financial assets and trend of the number of high-risk households



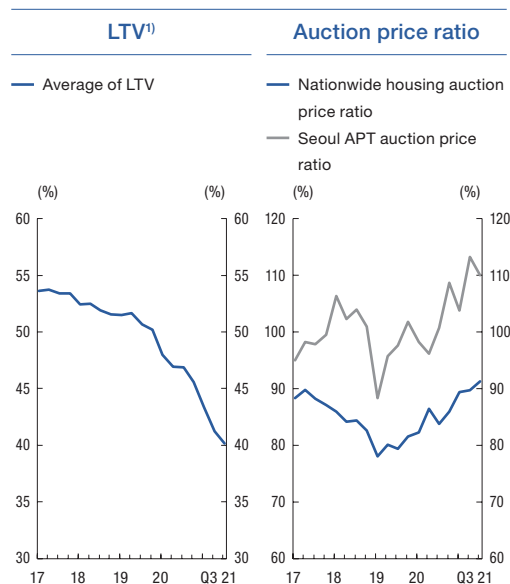
Note: 1) Korea and the US data are end-2020 basis, and data for other countries are end-2019 basis.

Sources: Bank of Korea, OECD, Statistics Korea Survey of Household Finances and Living Conditions.

However, for the time being, the likelihood of a correction in housing markets leading to massive deleveraging does not appear to be high. Amid a solid pace of recovery in the real economy, the LTV ratio of household loans has remained at an extremely low level in Korea (40.1% on average among all domestic banks as of the end of the third quarter of 2021, loan issuance date basis) thanks to a strict regulation of LTV caps.¹⁷⁾ Given the fact that house prices have continuously risen for

several years, the actual collateral capacity of Korean household borrowers is likely to be significantly higher than what the current LTV ratio suggests. Also, the unabated housing demand, particularly for new homes, suggests that a significant correction in the current high bid price ratio at a property auctions is unlikely. Hence, credit losses of financial institutions from a deterioration of mortgage loans are also likely to be limited. Moreover, as a substantial portion of nonperforming mortgage loans is being converted into foreclosure mortgage loans,¹⁸⁾ this is expected to further reduce the deleveraging effect (Figure II-5).

Figure II-5. Trends of LTV and auction price ratio



Note: 1) Domestic bank basis.

Sources: Financial institutions' business reports, CourtAuction.

16) Borrowers of an unsecured loan who saw their income decrease can face the demand to pay back the loan principal in full or in part.

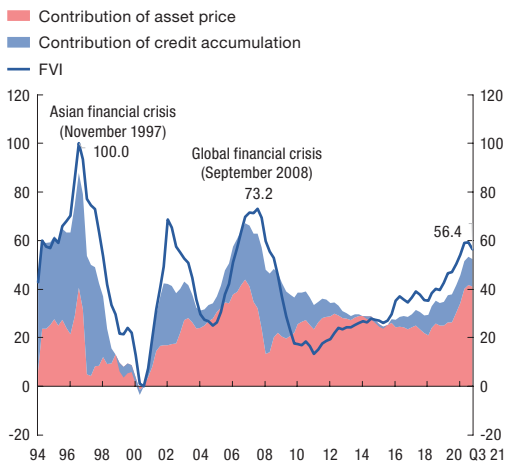
17) In countries where LTV is used as a lending metric (Finland, Denmark, Netherlands, etc.), except in Hong Kong and Singapore, the ceiling is set rather high in the range of 80-100%.

18) Loans to cover the purchase price of a foreclosed property bought at a bank or court auction where the loan is secured by the property being purchased.

(Increased Downside Risks to the Real Economy from the Correction of Financial Imbalances)

In a situation with a large buildup of financial imbalances where household debt growth is compounded by a disproportionate amount of credit flowing into housing markets, an unexpected domestic or external shock can jeopardize the stability of the financial system as well as have negative impacts on the recovery of the real economy. In all past crises, there was an elevated level of financial imbalances in the immediate run-up to the onset of the crisis. When an unexpected shock set off the imbalances correction process, this led to financial instability and economic contraction (Figure II-6).

Figure II-6. Trend of Financial Vulnerability Index¹⁾



Note: 1) Index providing a medium- and long-term picture of the financial stability situation including financial imbalances based on the trends of asset prices and private credit.

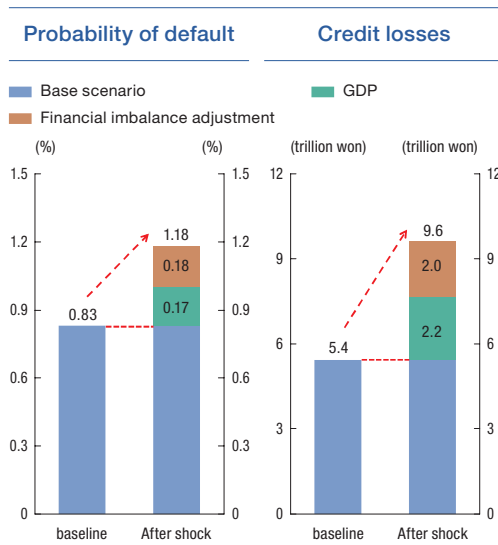
Source: Bank of Korea.

By taking into consideration this past pattern, a stress test was performed under a scenario where a shock is assumed to occur sometime in 2021-2023 during which there was a continuous accumulation of financial imbalances. The results showed that the tail risk in the distribution of projected economic growth would increase from the fourth quarter onward (lower 10 percentile GaR, -2.2%), with house prices falling (-3.5%), suggesting a higher level of downside risks to the real economy. As a result of this, the default rate on household loans is expected to rise from 0.83% (fourth quarter of 2020) to an estimated 1.18%, raising the loan value in default by 4.2 trillion won (growth shock: 2.2 trillion won, financial imbalance correction: 2.0 trillion won) from 5.4 trillion won to 9.6 trillion won¹⁹⁾²⁰⁾ (Figure II-7). However, in spite of the correction of imbalances, the average capital ratios are expected to remain above regulatory minimum requirements across all financial sectors.

19) The default rate on corporate loans is expected to rise from 1.48% to 2.36% after the shock, while credit losses are estimated to jump by 18.8 trillion won, from 8.7 trillion won to 27.5 trillion won.

20) For a more detailed discussion, refers to the June 2021 Financial Stability Report, <Analysis of Financial Stability Issues> 「II. The Impact of Accumulated Financial Imbalances on the Financial System」(page 141).

Figure II-7. Probability of default of household loans and credit losses



Source: Bank of Korea.

C. Unequal Access to Loans Widening Economic Inequality

While an increase in household debt growth that is centered on high income households with high credit ratings can be interpreted as a sign of qualitative improvement in the structure of household debt, this can also indicate that inequality in loan access has increased between income groups. In particular, when there is a significant rise in asset prices, the inequality of access, together with differences in loan purposes, can lead to a growing wealth and income gap between socioeconomic groups.²¹⁾ It has been suggested that a growing gap in income and wealth in a society can hinder efficient investment, ultimately

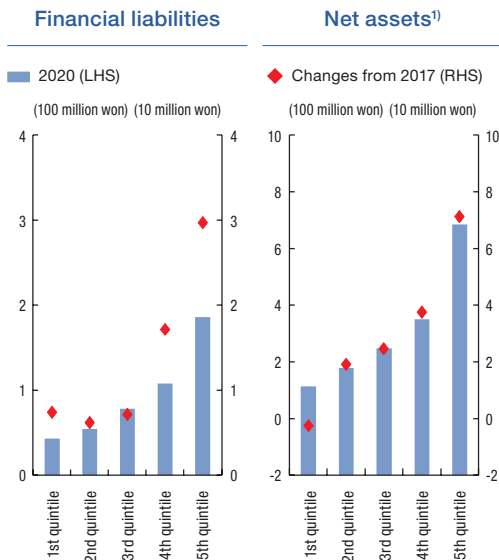
reducing the growth potential of the overall economy (World Bank, 2015, etc.).

In the case of Korea, the heavy concentration of household debt in the real estate market²²⁾ and the rapid rise in real estate prices appear to have made the severity of economic inequality yet worse. This is because amid the continuous tightening of lending rules, borrowers in high income groups with a better access to loans have actively used leverage to further increase their wealth. The examination of changes in the average liabilities and net worth of households by income quintile showed that among households belonging to the first quintile, the average liabilities rose by 7.43 million won since 2017, while their average net worth fell by 2.33 million won. On the other hand, the average liabilities of households in the fifth quintile rose by 29.71 million won, while their net worth increased by 71.15 million won during the same period (Figure II-8).

21) According to "The Distribution Curve of Korean Household Debt by Income Quintile and Macroeconomic Implications" (Park ki-yeong and Kim Su-hyeon, 2018), in 2001-2015, amid a dramatic increase in household debt, driven by high income borrowers, high income households mainly used debt to invest in real assets, while low income households used it for consumption. Such an inequality in loan access and disparity in loan purposes between income groups can cause a widening in net worth gap during periods of housing price growth.

22) For details, refer to <Box 4> 「Background to the Recent Growth of Housing Finance and Implications」(page 65).

Figure II-8. Average financial liabilities and net assets by income quintile



Note: 1) Total assets - financial liabilities.

Source: Statistics Korea Survey of Household Finances and Living Conditions.

3. Implications

Korean households' debt has increased at an accelerated pace since the beginning of the COVID-19 crisis, raising growing concerns about the potentially negative impacts of this trend on the financial markets and the economy.

However, in spite of the recent surge, household debt growth has not yet reached a level high enough to restrict consumption. The structure of household debt, characterized by a high share of high income borrowers with a high credit rating and a low LTV ratio, also appears generally sound. This suggests that even if a correction of financial imbalances occurs in the form of a shock to the real economy or a sharp dip in housing prices, it would

not have an undue impact on the resilience of financial institutions.

Notwithstanding, mindful of the fact that the accumulation of household debt can further exacerbate volatility in the financial markets and the real economy in times of a domestic or global shock and hurt the stability of the overall financial system, consistent efforts must be made to curb the growth of household debt. The effort to put into place a repayment capacity-based lending practice is particularly crucial, and related measures such as the early start of the new DSR rule based on borrowers' DSR rather than the bank-level DSR must be implemented according to plan. Moreover, home mortgage loans and loans from non-bank financial institutions in areas where the housing markets are unregulated or are subject to more lenient rules, causing concerns about a possible balloon effect, must be continuously monitored and, if necessary, the regulatory approach must be changed as appropriate.

Also important is the effort to reduce the flow of household debt into the asset markets since the excessive concentration of money in the asset markets has been a contributing factor to increasing financial imbalances. The effort to curb household debt growth needs to be coupled with a housing market stabilization policy to increase the supply of housing, so as to rein in excessive risk-taking and yield-seeking behavior and leveraged investment demand. By paying heed to the fact that household debt growth fueled by inequality in access to finance can worsen income and wealth inequalities, ways must be explored to change systems in such a way as to supplement the unequal access to finance between income groups.

III. Impacts of the Normalization of Monetary Policy in Major Countries on Foreign Portfolio Investment in the Domestic Securities Markets

1. Background
2. Trends and Characteristics of Foreign Portfolio Investment Flows in the Domestic Securities Markets
3. Analysis of Impacts of the Normalization of Monetary Policy in Major Countries
4. Implications

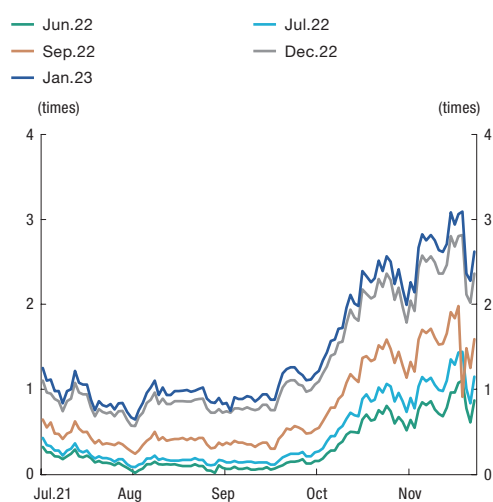
1. Background

Amid growing expectations of real economic recovery, rising concerns about global inflation have increased the likelihood that the normalization¹⁾ of monetary policy by central banks in major countries will happen at a faster pace than initially expected. The US Federal Reserve began tapering its asset purchases already in November 2021 and is now setting the stage for earlier benchmark rate hikes (Figure III-1). The ECB is also expected to nor-

malize its monetary policy with the expiring of PEPP²⁾ as scheduled.

This article examines trends and characteristics of foreign portfolio investment flows in the domestic securities markets since the global financial crisis and attempts to predict the impacts of the normalization of monetary policy in major countries.

Figure III-1. Market forecasts¹⁾ for Fed rate hikes



Note: 1) Daily forecasts for the number of cumulative rate hikes until corresponding months.

Source: Bloomberg.

1) Here, the normalization of monetary policy refers to central banks' tapering net asset purchases, the reduction in central banks' holdings of bonds that have been purchased through asset buying programs to respond to the COVID-19 crisis, and the process of gradually raising policy interest rates, which have been kept at or below zero. After the global financial crisis, the US Federal Reserve normalized its ultra-easy monetary policy in three successive stages. During the first stage, it tapered its net asset purchases, which amounted to USD 85 billion per month, by progressively reducing the amount starting in January 2014 to end the program completely in October of the same year. During the second stage, the benchmark rates were raised starting in December 2015 from 0.00-0.25% to 2.25-2.50% in December 2018. During the third stage, between October 2017 and August 2019, the US Federal Reserve gradually reduced its balance sheets by not rolling over maturing bonds.

2) In March 2020, at the onset of the COVID-19 pandemic, the ECB introduced the Pandemic Emergency Purchase Program (PEPP), worth EUR 750 billion, to buy government and public bonds and corporate bonds in the Eurozone. The program is scheduled to end in March 2022.

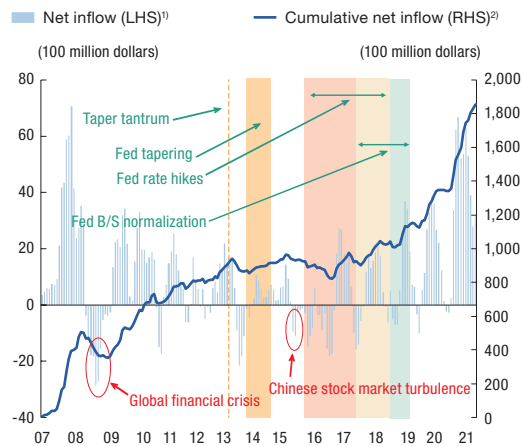
2. Trends and Characteristics of Foreign Portfolio Investment Flows in the Domestic Securities Markets

A. Trends in Foreign Portfolio Investment Flows Since the Global Financial Crisis

After the global financial crisis, as the expansionary monetary stance in major countries³⁾ raised the level of global liquidity, foreign portfolio investment in domestic securities also increased continuously. Between January 2009 and November 2021, foreign portfolio investment in domestic securities recorded a net inflow of USD 193.1 billion. Among most of this amount was accounted for by bonds (USD 148.7 billion, 77%), the stock market also saw a net inflow of USD 44.4 billion (23%) during this period. In the case of the bond market, in spite of the normalization of monetary policy by the US Federal Reserve and rising volatility in the international financial markets, there has been a steady net inflow, driven by public investment by long-term investors such as foreign central banks, sovereign wealth funds, and international fi-

ancial organizations (Figure III-2). However, there were also periods of net outflows such as August to December 2013, during which there was a net outflow from the domestic bond market for five straight months as long-term market interest rates surged in the US following the taper tantrum.

Figure III-2. Trend of foreign portfolio investment in bond market



Notes: 1) 3-month moving average.

2) Cumulative since 2007.

Source: Bank of Korea.

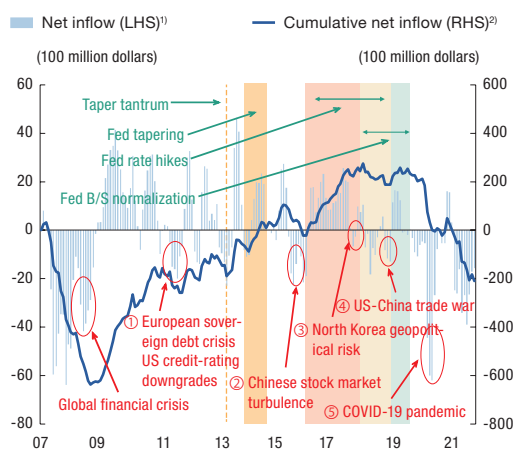
The impact of the normalization of monetary policy in major countries on foreign portfolio investment⁴⁾ in the domestic stock market is also not fully clear. However, unlike in the

3) Prior to the global financial crisis (January 2000-August 2008), the target federal funds rates set by the US Federal Reserve averaged 3.36%. However, after the global financial crisis (January 2009-November 2021), the mean (average) target federal funds rate fell to 0.52% by 2.84%p, remaining mostly below the rate of real GDP growth. The combined total assets of the four major central banks (US Federal Reserve Bank, ECB, Bank of England, Bank of Japan) rose from USD 3.8 trillion at the end of 2007 to USD 26.1 trillion at the end of September 2021.

4) The key decision-making factors determining the flows of private investment by foreign investment and securities firms in the domestic stock market include risk aversion indices (VIX), which show high short-term fluctuations, domestic and global stock prices, and exchange rates, with medium and long-term factors including domestic and global interest rates, and the economic cycle also showing some influence. On the other hand, the flows of public investment by sovereign wealth funds and central banks appear to be mainly determined by medium and long-term factors such as interest rates and the economic cycle. As a result, foreign portfolio investment flows in the domestic stock market present an alternating pattern of a net inflow in normal times and a large net outflow during periods of uncertainty in the international financial markets. Because of this, supply and demand in foreign portfolio investment mostly moved in parallel with domestic stock prices.

bond market, there has been a recurrent pattern in the stock market of a steady net inflow interspersed with episodes of a massive net outflow in times of instability in the international financial markets. Episodes of a massive and sudden outflow of foreign portfolio capital from the domestic stock market since the global financial crisis were caused by risk events such as ① the European fiscal crisis and the downgrading of the US sovereign rating (2011), ② the financial market turmoil set off by the Chinese stock market crash (2015), ③ the spike in North Korea risk (2017), ④ the US-China trade dispute (2018), and ⑤ the COVID-19 pandemic (2020). Therefore, a sudden net outflow of foreign portfolio capital from the domestic stock market appears to have been triggered most often by an increase in the level of risk in the international financial markets or domestic or external geopolitical events, rather than as a direct effect of a change in the monetary policy stance in major countries, such as a hike in benchmark rates by the US Federal Reserve (Figure III-3).

Figure III-3. Trend of foreign portfolio investment in stock market



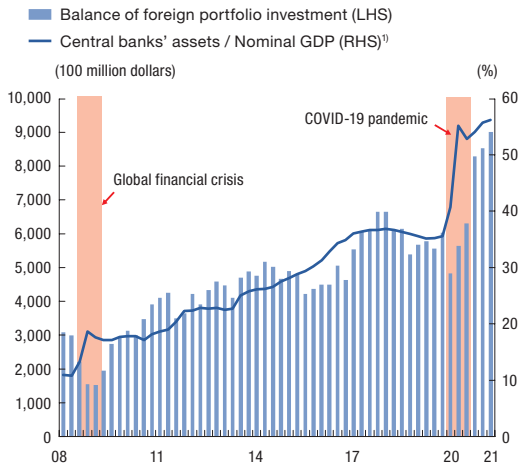
Notes: 1) 3-month moving average.

2) Cumulative since 2007.

Source: Bank of Korea.

In terms of the balance of foreign portfolio investment in domestic securities, the balance of stock investment increased from USD 325.8 billion at the end of 2008 to USD 607.7 billion in November 2021. During the same period, the balance of foreign portfolio investment in domestic bonds rose from USD 64.9 billion to USD 174.5 billion. In periods of massive quantitative easing by central banks in major countries in response to a crisis, resulting in a rapid increase in global liquidity, the balance of foreign portfolio investment in domestic securities tends to surge sharply (Figure III-4).

Figure III-4. B/S of major central banks and the balance of foreign portfolio investment in securities



Note: 1) Calculated the ratio of the sum of assets of the Fed, ECB, BOE, and BOJ over the sum of their countries' nominal GDP to show the monetary policy stances of major countries.

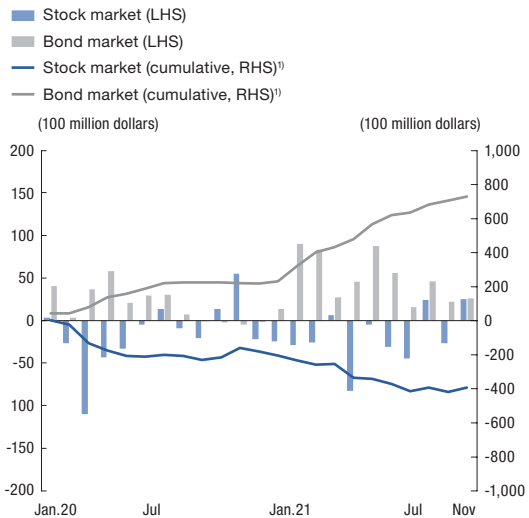
Sources: Bank of Korea, Fed, ECB, BOE, BOJ, IMF.

B. Characteristics of Foreign Portfolio Investment Flows Since the Start of the COVID-19 Pandemic

Since the onset of the COVID-19 pandemic, against the backdrop of massively expansionary monetary policy by central banks in major countries,⁵⁾ foreign portfolio investment in domestic securities showed a net inflow of USD 31.6 billion between March 2020 and November 2021 (Figure III-5). The breakdown of this amount by type of securities shows a huge net outflow from the stock market

(March 2020–November 2021: USD 37.1 billion), while the opposite movement was observed in the bond market which experienced a net inflow (USD 68.6 billion), far exceeding the net outflow from stocks. However, the balance of foreign portfolio investment sharply increased overall, including the balance of stock investment which was lifted by the rising value of shares, in spite of the net outflow of capital.⁶⁾

Figure III-5. Flow of foreign portfolio investment in domestic securities since COVID-19 pandemic



Note: 1) Since January 2020.

Source: Bank of Korea.

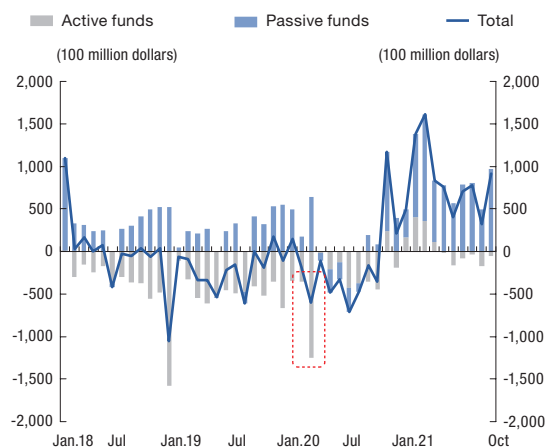
5) COVID-19 response measures such as asset purchases and emergency loans increased the assets of central banks in major countries (US Federal Reserve Bank, ECB, Bank of England, Bank of Japan) by USD 10.1 trillion from the level before the pandemic (USD 15.4 trillion at the end of December 2019 → USD 25.5 trillion at the end of June 2021), which raised their ratio relative to GDP to 56.2% from 35.6.

6) The balance of foreign portfolio investment in domestic bonds rose from USD 106.8 billion at the end of 2019 to USD 174.5 billion at the end of November 2021, an increase of USD 67.7 billion. The balance of foreign portfolio investment in domestic stocks, which surged from USD 497.1 billion at the end of 2019 to an all-time high of USD 796.5 billion on April 14, 2021, stood at USD 607.7 billion at the end of November 2021.

(Foreign Portfolio Investment in the Stock Market)

In the immediate wake of the pandemic, there was a large net outflow of foreign portfolio investment from the domestic stock market, driven by global active funds, which responded particularly sensitively to the changing risk level (Figure III-6). Even though central banks in major countries quickly injected massive amounts of liquidity into the market, the net outflow of foreign portfolio capital persisted⁷⁾ to surpass the size of net outflow in 2008 (USD 35.5 billion) when the global financial crisis was unfolding. Based on past experience, monetary easing in major countries and the resulting increase in global liquidity were expected to cause the net outflow of foreign portfolio investment from the stock market to shift to a net inflow after a time lag. However, the net outflow of foreign portfolio from domestic stocks continued into 2021 to reach USD 21.1 billion (January–November 2021).

Figure III-6. Flow of foreign portfolio investment from global equity funds



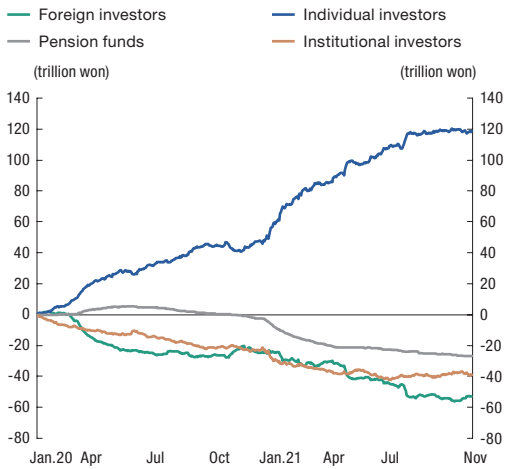
Source: EPFR

This phenomenon could be explained by a sharp rise in the participation of domestic retail investors in the stock market, encouraged by the environment of ample liquidity and low interest rates since the start of the COVID-19 crisis.⁸⁾ As this drove up stock prices to new highs, it created conditions conducive to the massive selling of domestic stocks by foreign investors (Figure III-7).

7) In March 2020 to November 2021, the net outflow of foreign portfolio investment from the domestic stock market was the largest in Korea of all major emerging market countries (net outflow of USD 28.2 billion in Taiwan, USD 9.4 billion in Thailand, USD 7.1 billion in South Africa, USD 5.8 billion in Malaysia, and USD 3.4 billion in Turkey; net inflow of USD 6.7 billion in Brazil, USD 9.4 billion in Saudi Arabia, USD 27.8 billion in India, and USD 120.8 billion in China; based on IIF data).

8) In 2020, the number of retail investors grew by 3 million (6.14 million at the end of 2019 → 9.14 million at the end of 2020, +49%), with their assets increasing by 243 trillion won (419 trillion won at the end of 2019 → 662 trillion won at the end of 2020, +56%) (Korea Securities Depository).

Figure III-7. Net purchases amount, by market participants



Source: Infomax.

Another important contributing factor to this massive movement of capital was the changes in the outlook for the semiconductor market⁹⁾ and corporate earnings forecast by market research firms and global investment banks. Additionally, the investment behavior among a substantial number of long-term investors, including pension funds, in which assets are managed from a long-term perspective by strictly abiding by allocation targets for each asset class, also appears to have played a role in the sustained outflow of foreign portfolio investment from the domestic stock market. In other words, after the allocation toward Korean stocks increased following the surge in share prices in Korea in late 2020, these investors appear to have made adjustments to rebalance their portfolios.

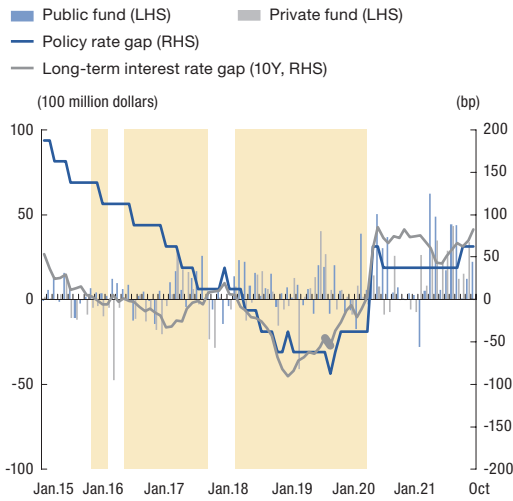
(Foreign Portfolio Investment in the Bond Market)

Despite uncertainty looming over the international financial markets amid the COVID-19 pandemic, foreign portfolio investment in domestic bonds continued to show a large net inflow. The net inflow (USD 12.5 billion) of foreign portfolio investment into the domestic bond market, which had continued steadily before the pandemic (January 2019-February 2020), further grew after the pandemic to USD 13.7 billion in March to December 2020, and then to USD 51.3 billion in January to November 2021. This appears to be due to a combination of factors, including increased yield-chasing under an easy monetary policy environment, Korea's sound economic fundamentals, and comparatively strong arbitrage incentives in the Korean financial markets.

As policy rates were lowered to near zero in major countries under a quantitative easing program of historic proportions to help economies cope with the fallout of the pandemic, yields on Korean bonds became more attractive, resulting in an increase in investment flows to the domestic bond market. In January 2005 to November 2021, the net inflow during periods where domestic interest rates were higher than US interest rates amounted to USD 970 million on monthly average, which is 1.3 times larger than the net inflow in periods where the relationship between domestic and foreign interest rates was reversed (USD 720 million) (Figure III-8).

9) The share of the top two semiconductor firms, Samsung Electronics and SK Hynix, in the total market capitalization of the KOSPI market rose from 29.8% in early 2020 to 32.5% on January 11, 2021, but fell to 26.8% at the end of November 2021.

Figure III-8. Korea-US interest rate gap¹⁾ and foreign portfolio investment in domestic bond market

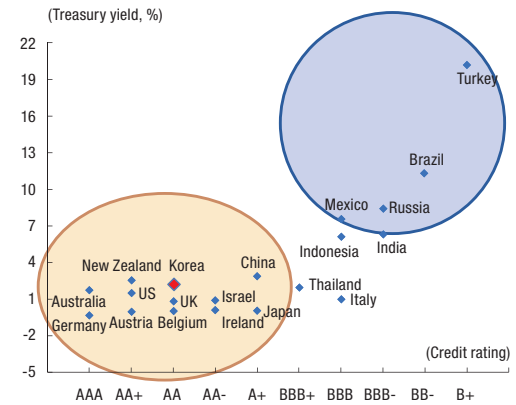


Note: 1) Shaded area indicates negative long-term interest rate gap period.

Sources: Bank of Korea, Bloomberg.

Moreover, due to strong economic fundamentals and a high sovereign credit rating comparable to the level of major developed countries, Korea is perceived as a safer place to invest than most other emerging market countries. Global public investors such as central banks and sovereign wealth funds have a reputation of being long-term investors that value stability as much as return. Public investors, therefore, sharply increased their investment in Korea, attracted by both its external soundness and high return compared to other countries with a similar credit rating (Figure III-9, Figure III-10).

Figure III-9. Credit ratings¹⁾ and treasury yields²⁾³⁾ of major countries



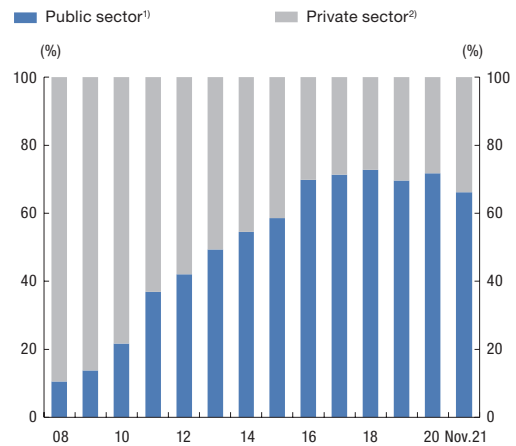
Notes: 1) S&P basis.

2) 10 year treasury yields.

3) End-Nov.21 basis.

Source: Bloomberg.

Figure III-10. Proportion of foreign portfolio investment in bond market (outstanding amount basis)



Notes: 1) Central banks, sovereign wealth funds, international organizations, etc.

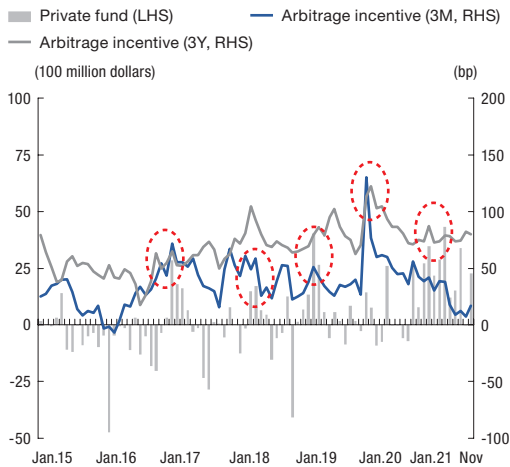
2) Commercial banks, investment companies, securities companies, pension funds, etc.

Note: Bank of Korea.

Meanwhile, early in the COVID-19 pandemic, the huge spike in demand for US dollars caused to swap rates to tumble, resulting in a temporary surge in arbitrage incentives. During this period, there was a substantial

inflow of investment by commercial banks and other short-term investors, contributing to the overall increase in foreign portfolio investment inflows to domestic bonds (Figure III-11).

Figure III-11. Arbitrage incentive and private foreign portfolio investment in bond market



Source: Bank of Korea.

3. Analysis of Impacts of the Normalization of Monetary Policy in Major Countries

Foreigners' investment in domestic securities is likely to be negatively affected by the normalization of monetary policy in major countries as it will slow down the increase in central banks' assets or even reduce them, decrease the risk appetite of global investors, and cause the differential between domestic and

foreign interest rates to shrink. Aside from these changes with direct impacts on foreign portfolio investment, if a level of global liquidity would be lowered and it causes financial and economic turmoil across emerging market countries, there could also be spillover effects on Korea.

A. Possibility of Decreased Foreign Portfolio Investment Inflows to Domestic Securities Markets

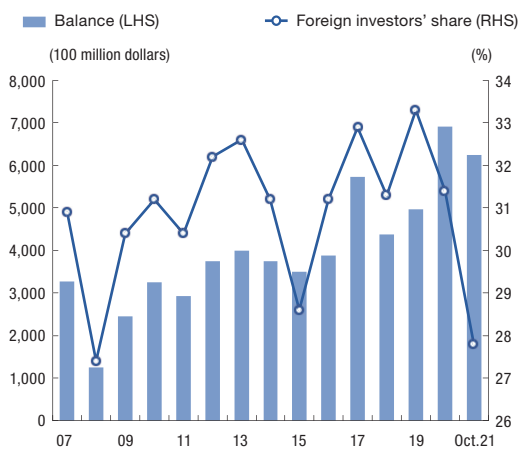
With progress in the normalization of monetary policy in major countries, the resulting decrease in the level of global liquidity and stronger risk aversion are expected to increase pressure for the outflow of foreign capital from the domestic stock market. However, the extent of the negative impact of monetary policy normalization is likely to depend on domestic and global economic conditions as well as the earnings and outlook of domestic firms.¹⁰⁾

For the moment, the normalization of monetary policy in major countries is not expected to result in undue pressure for the outflow of foreign capital from the domestic stock market. During past periods of monetary policy normalization by the US Federal Reserve, with the exception of the taper tantrum, there have been no discernible outflows of capital as a result of the normalization process. Furthermore, the large flight of foreign capital early in the pandemic, which brought down foreigners' share of the domestic stock market to the lowest since the global financial crisis

10) For example, during the past tantrum triggered by statements by the US Federal Reserve (May 2013) mentioning tapering and the subsequent period of actual tapering, the outflows of foreign portfolio investment from the domestic stock market were short-lived. Although global risk aversion was sharply higher in the immediate wake of the taper tantrum, it quickly returned to normal levels, and as the economic recovery improved corporate earnings expectations, foreign capital rapidly flowed back into the domestic stock market.

(27.8%, October 2021), suggests that portfolio rebalancing by some investment entities may have already taken place to a sufficient degree¹¹⁾ (Figure III-12). In addition, some of the impact of monetary policy normalization by the US Federal Reserve appears to have been preemptively reflected in the outflows of capital that occurred during the second half of this year.

Figure III-12. Equity balance held by foreign investors



Sources: Bank of Korea, Financial Supervisory Service.

The inflows of foreign capital into domestic bonds are expected to slow as the normalization of monetary policy by central banks gets underway in major countries. However, the likelihood of an outsized outflow of capital

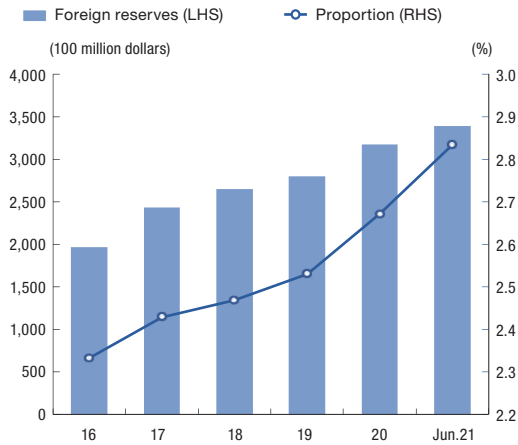
does not appear to be high since public investors make up an important share of foreign portfolio investors in Korea.¹²⁾ The narrowing in the differential between domestic and foreign interest rates could also be rather limited due to domestic interest rate increase, another factor pointing to a low likelihood of large capital outflows.

Furthermore, even if the domestic and foreign interest rate differential is reduced or the relationship between domestic and foreign rates is reversed, past experience suggests that, rather than lead to a net outflow of foreign portfolio capital from the bond market, it may simply reduce the size of inflows and the net inflow trend may continue. This is because public investors tend to have a long-term investment horizon, while for private investors, interest rate differentials are not the sole criterion of investment, as they also consider swap rates to assess arbitrage opportunities.¹³⁾ It is, nevertheless, important to guard against the possibility of a faster-than-expected process of monetary policy normalization by major central banks, leading to a situation similar to the taper tantrum in the past, which could cause central banks in emerging market countries to sell and exit their positions in Korean bonds in an attempt to defend the value of their national currencies and raise funds to supply

- 11) After the massive net selling of domestic stocks by some long-term investors throughout last year, their position shifted to net buying in November 2021, showing clear signs that the process of portfolio rebalancing is inching toward an end.
- 12) The composition of foreign investors in Korea's domestic bonds shows that, while in 2008-2009, commercial banks and investment firms accounted for an overwhelming share of 90%, from 2016 onward, they were outstripped by public investors such as central banks and sovereign wealth funds, now representing as much as 70% of all investors.
- 13) Even if a reduced level of global liquidity pushes interest rates outside Korea higher, shrinking the differential between domestic and foreign interest rates, the drop in swap rates, triggered by uncertainty in the international financial markets, may increase rather than decrease arbitrage incentives for foreign investors.

liquidity in their domestic markets or build up reserves¹⁴⁾ (Figure III-13).

Figure III-13. Proportion of minor currencies¹⁾ among global foreign reserves



Note: 1) Currencies other than major currencies (USD, EUR, JPY, GBP, CNY, AUD, CAD, CHF) in IMF COFER (Currency Composition of Official Foreign Exchange Reserves) including KRW.

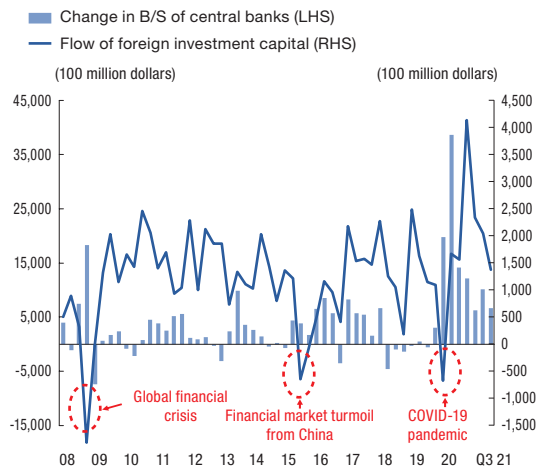
Source: IMF.

B. Impacts from Financial Turmoil in Emerging Market Countries

When the shocks occur to the global financial market, any outflows of money from emerging market securities markets, caused by a

shock in the international financial markets such as the COVID-19 pandemic, tended to be short-lived, even if massive. With speedy responses from central banks in major countries to decisively ease monetary policy, foreign portfolio capital quickly returned to emerging markets¹⁵⁾ (Figure III-14).

Figure III-14. Change in B/S of major central banks¹⁾ and flow of foreign investment capital to emerging market securities markets²⁾



Notes: 1) Fed, ECB, BOE, BOJ.

2) IIF reporting emerging market countries (25 countries).

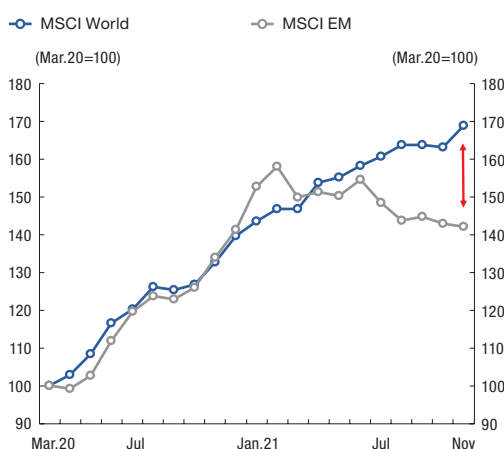
Sources: Fed, ECB, BOE, BOJ, IIF.

14) In the case of the US, foreign investors hold nearly USD 7.2 trillion (as of the second quarters of 2021) worth of government debt, which represents close to 30% of the total outstanding balance of Treasury issues. In March 2020, in the wake of the COVID-19 pandemic, foreign investors net sold USD 420 billion worth of US treasury securities. Over a half of the total net selling came from public investors such as central banks and sovereign wealth funds. The US Federal Reserve reported that emerging market country investors accounted for 55% of net selling of US bonds, noting that particularly massive amounts of US bonds were sold off by central banks of emerging market countries presumably in an effort to shore up their national currency and raise funds to supply liquidity to their domestic markets and build up reserves (US Federal Reserve Financial Stability Report, November 2021). Foreign investors also hold a large share of government debt in Korea, amounting to 17.9% of total government debt and 23.8% of outstanding Monetary Stabilization Bonds (as of the end of October 2021). Therefore, if an unexpected shock to the international financial markets leads to a large net outflow of capital from emerging market country investors from the Korean bond market, this could present a risk for the stability of the domestic financial markets.

15) The calculation of a time-lagged correlation coefficient between growth in the US Federal Reserve's assets and the inflows of investment capital in emerging market securities markets (monthly) since 2008 showed that the largest increase in capital inflows occurred seven months after the increase in the assets of the US Federal Reserve.

Going forward, as central banks in major countries taper the pace of asset purchases, reduce their balance sheets, or raise policy rates, this is likely to cause the inflows of foreign investment capital to emerging market securities markets to sharply drop or even shift to outflows.¹⁶⁾ This is because there has been a significant disparity in the speed of economic recovery between developed countries and emerging market countries since the pandemic, due among other factors to the inequality in the speed of supply of COVID-19 vaccines, major countries' normalization of monetary policy has made developed market securities more attractive to global investors, who may become more sensitive to emerging market risks as a result (Figure III-15).

Figure III-15. Trend of stock market indexes since COVID-19 pandemic



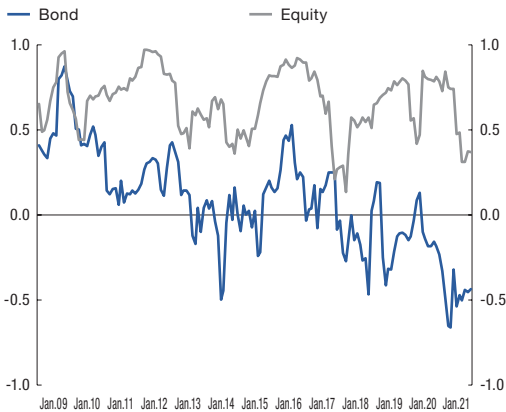
Source: Bloomberg.

If the reduced level of global liquidity leads to an economic slowdown or financial turmoil in emerging market countries, this could have an adverse impact on the flows of foreign portfolio investment in the Korean securities markets. Due to Korea's high external reliance, both its economy and corporate earnings are heavily influenced by changing conditions in emerging market countries.¹⁷⁾ Also, since a substantial number of global investors continue to classify Korea into the emerging market group (i.e. MSCI) when making investment decisions, there tends to be a co-movement in investment capital flows between Korea and emerging market countries. However, this is less the case with the bond market where the correlation between Korea and emerging market countries is lower (correlation coefficient of 0.26 in January 2008 to November 2021). During some periods, including in recent times after the start of the pandemic, there have been even instances in which capital flows in the domestic bond market moved in an opposite direction to flows in emerging market countries. This could be explained by Korea's external soundness and strong economic fundamentals, which clearly set it apart from other emerging market countries (Figure III-16).

16) The IIF (October 2021) forecasts that the net inflow of foreign portfolio capital to the securities markets of 24 emerging market countries (excluding China) will decrease in 2022 by USD 30 billion (15.6%) from the 2021 estimate of USD 192 billion to USD 162 billion. While the net inflow of foreign portfolio investment into the stock markets is expected to increase from USD 6 billion to USD 53 billion, the net inflow of foreign portfolio investment into the bond markets is predicted to decline from USD 185 billion to USD 109 billion.

17) There is a strong correlation in foreign investment capital flows in the stock market between Korea and emerging market countries (correlation coefficient of 0.75 in January 2008 to November 2021).

Figure III-16. Correlation¹⁾ between flow of foreign investment capital in Korea and in EM countries



Note: 1) Correlation of data from 12-month period right before respective month.

Sources: Bank of Korea, IIF.

4. Implications

Even though the US Federal Reserve has already started the tapering process (November 2021) and the normalization of monetary policy is now underway in most major countries, the international financial markets have shown surprisingly few signs of instability, with stock prices continuing on their upward trajectory and uninterrupted inflows of money into global funds. The level of volatility in the flows of foreign portfolio investment in Korea's domestic securities markets has also been generally low. Considering Korea's economic fundamentals and the composition of foreign investors and judging from past experience in times of monetary policy normalization by the US Federal Reserve, which is even further along in the normalization process than other major countries, an outflow of foreign capital of a significant magnitude occurring in the domestic securities markets appears unlikely.

However, it is still important to remain alert to the possibility of a surge in the pressure for the outflow of foreign portfolio investment from the securities markets, caused by a faster-than-expected pace of normalization of monetary policy by central banks in major countries, resulting in a sharp reduction in the level of global liquidity and heightened volatility in the international markets. Therefore, the monitoring of capital flows must be continuously strengthened, based on the analysis of investor characteristics and investment aims of different types of foreign investor. In tandem, a close monitoring and analysis of economic conditions in emerging market countries is also necessary to anticipate the effects of the changing speed of monetary policy normalization in major countries on emerging market economies.

IV. Recent Trends in Interconnectedness in the Financial Sector and Risk Assessment

1. Background
 2. Current Status of Interconnectedness
 3. Background and Impact of Increased Interconnectedness Since the Global Financial Crisis
 4. Assessment of Interconnectedness-related Risk
 5. Assessment and Implications
-

1. Background

Interconnectedness refers to the degree of linkages among financial institutions and sectors in the financial system, created through

transactions between them. As a highly interlinked structure can trigger risk contagion across the financial system by transforming the risk of an individual sector into a systemic risk, interconnectedness is an issue of concern for financial stability.¹⁾ At the end of June 2021, the value of mutual transactions between financial institutions²⁾ (3,090 trillion won) represented 32.7%³⁾ of the financial sector's total assets. The share of mutual transactions, on a decline in the early to mid-2000's, has generally increased from 2010, in other words, since the immediate aftermath of the global financial crisis in 2010⁴⁾ (Figure IV-1). Such an increase in interconnectedness means a greater potential for risk contagion between financial institutions and an isolated shock becoming a systemic crisis, should a domestic or external shock occur during the normalization of monetary policy set to begin in major countries.⁵⁾

This article examines the current status of

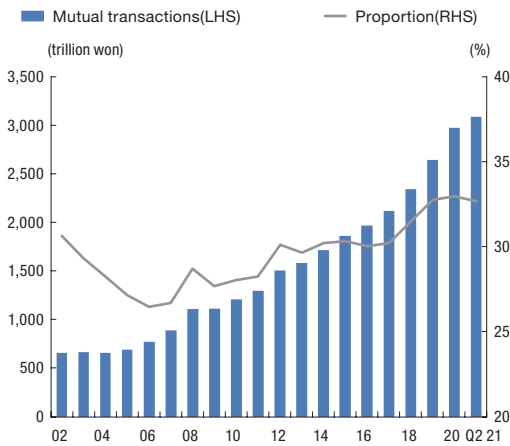
-
- 1) Because of this, the level of interconnectedness (interdependence between financial institutions in terms of assets and liabilities) is used as an indicator in the assessment of financial institutions for their selection and designation as systemically important institutions.
 - 2) Mutual transactions are defined as funding and asset management transactions in the financial sector in which the counterparty is a financial institution. The status of mutual transactions was assessed based on transaction network matrices between 43 transaction sectors for 48 financial products, which were estimated using the financial assets and liabilities table in the flow of funds statistics, by classifying them into transactions between nine financial sectors [banks, insurance companies, community financial institutions (mutual credit cooperatives, mutual savings banks, Korea Postbank), investment funds, trusts (including pension trusts), securities companies, credit-specialized financial companies, foreign bank branches, and other financial institutions (asset securitization companies, federations of mutual credit cooperatives) and five other sectors (households, corporations, government, central bank, and non-residents) in twelve types of products (deposits, bonds, stocks, repos, loans, CP, derivatives, money trusts, insurance and pension products, CD, call money, and other miscellaneous products).
 - 3) As interconnectedness means the degree of interlinkages in the financial sector, created through mutual transactions between financial institutions in assets (or liabilities), in this discussion, the focus is placed on the share of mutual transactions in total assets management (or funding) operations within the financial sector, rather than the absolute value of mutual transactions.
 - 4) The rate of increase in mutual transactions has also accelerated, from 7.8% on annual average in 2003-2009 to 9.3% in 2010-June 2021.
 - 5) The FSB (2021) described the turmoil in the global financial markets in the immediate wake of the COVID-19 crisis as a case of underlying vulnerabilities of the financial system, such as interconnectedness between non-bank financial institutions (NBFIs), liquidity mismatch, and leverage, coming to the surface.

mutual transactions in the financial sector and the background and impact of their rise since the global financial crisis and derives implications by estimating contagion risk between the financial sectors in the event of the failure of an individual sector.

2. Current Status of Interconnectedness

Although banks continue to be the key drivers of interconnectedness in the financial sector, their role has diminished since 2010 as interlinkages increased more noticeably among NBFIs such as trusts and securities institutions⁶⁾ (hereafter “securities companies”). By sector, domestic banks accounted for the highest share of 21.8% in the financial sector’s total mutual transactions⁷⁾ at the end of June 2021, followed by investment funds (14.0%), securities companies (13.9%), and trusts (13.2%), in this order. However, since 2010, while the shares of institutions in the financial investment sector⁸⁾ such as trusts, securities companies, and investment funds increased by 5.0%p, 4.3%p, and 1.9%p, respectively, those of deposit-taking institutions such as banks and community financial institutions fell by 4.9%p and 4.7%p (Figure IV-2).

Figure IV-1. Size of mutual transactions and proportion of assets¹⁾ in the financial sector



Note: 1) By flow of funds statistics, based on assets of financial corporations (excluding central banks).

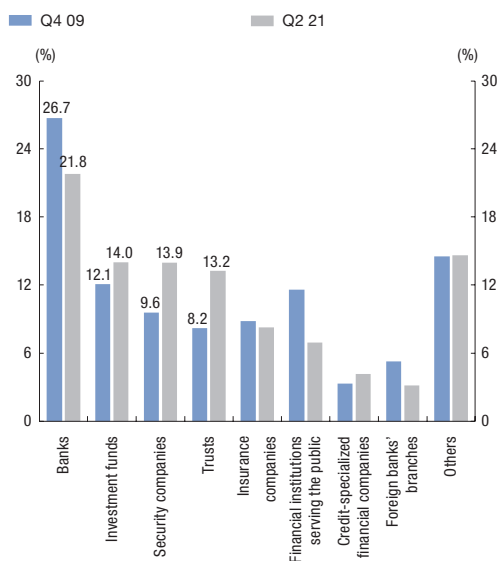
Source: Bank of Korea.

6) Although “securities institutions” is a class of institutions which includes securities companies and securities finance companies, given that securities companies’ assets represent the bulk of securities institutions’ assets (90.8%), “securities companies” were used as the umbrella term herein for the sake of ease of understanding.

7) As the value of mutual transactions of individual financial sectors and their share in the overall financial sector’s mutual transactions are calculated by adding up intersectoral and intrasectoral funding and asset management transactions, the simple sum of the value of mutual transactions of all sectors is not equal to the total value of mutual transactions for the overall financial sector (3,090 trillion won) due to the value of inter-sectoral transactions between any given pair of sectors being counted twice. On the other hand, the value or share of mutual transactions by product type is calculated based only on intersectoral transactions. Because of this, the sum of the value of mutual transactions of individual sectors by product type is equal to the total value of mutual transactions for the overall financial sector in the corresponding product category.

8) Under the Financial Investment Services and Capital Markets Act, “financial investment business” refers to the investment trading business, investment brokerage business, collective investment business, trust business, investment advisory business, and discretionary investment business. In this article, the term “financial investment sector” means securities companies, investment funds, and trusts.

Figure IV-2. Changes in the proportion¹⁾ of mutual transactions in the financial sector by industry

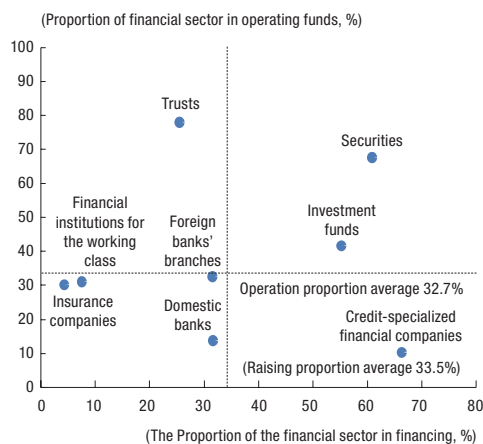


Note: 1) Criteria for the sum of financing and operation of each business right and mutual transactions within the business right.
Source: Bank of Korea.

In terms of the share of a sector's total funding and asset management operations, mutual transactions represented the highest share of total funding operations among credit-specialized financial companies (66.2%) of all sectors, followed by securities companies (60.8%) and investment funds (55.2%). The share of mutual transactions in asset management operations was the highest among trusts (78.0%), followed by securities companies (67.6%), and investment funds (41.6%), indicating that the degree of interdependence was comparatively high among credit-specialized financial companies and financial investment institutions (Figure IV-3). Credit-specialized financial companies raised funds mainly from

the financial sector by issuing bonds and CP and used most of the raised funds to lend to households and businesses. Securities companies and investment funds raised funds from the financial sector by selling repos and issuing derivative-linked securities and by selling shares of private equity funds, respectively, which were then invested mostly in financial bonds and CP.⁹⁾ Trusts raised funds primarily from households and companies and invested them in the financial sector, in assets such as deposits, investment funds, and financial bonds. Meanwhile, in the case of banks, due to a high share of funds brokered from the real sector, the share of mutual transactions in total funding and asset management operations stood only at 31.7% and 13.8%, respectively, below the corresponding averages for the overall financial sector (33.5%, 32.7%).

Figure IV-3. Raising of funds by industry: Proportion¹⁾ of mutual transactions in operating of funds

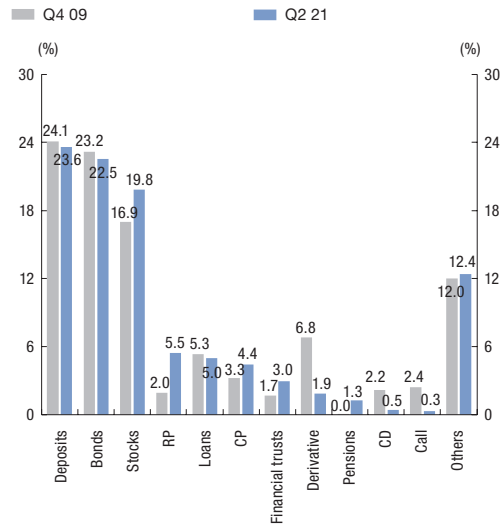


Note: 1) June 2021 basis; dotted line means total financial average.
Source: Bank of Korea.

9) In the case of securities companies, as they manage investors deposits such as brokerage account deposits and various margin deposits, as well as maintain deposits to hedge risks associated with derivative-linked securities and deposits for settlement purposes, deposit transactions also accounted for a substantial share of 27.4% in their total mutual transactions.

Next, by product type (as of the end of June 2021), deposits accounted for the highest share of 23.6% in total mutual transactions, followed by bonds (22.5%), stocks (19.8%), and repos (5.5%), in this order. Since 2010, the shares of marketable products such as repos and stocks¹⁰⁾ have increased while the shares of CDs and deposits have dropped (Figure IV-4). The shares of repos, stocks, and CP in total mutual transactions edged up 3.5%p, 2.9%p, and 1.2%p, respectively, from the end of 2009, and the shares of derivatives,¹¹⁾ CDs, and deposits fell by 5.0%p, 1.7%p, and 0.5%p during the same period.

Figure IV-4. Changes¹⁾ in the proportion of mutual transactions in the financial sector by product



Note: 1) Year-on-year basis.

Source: Bank of Korea.

The composition of products in inter-sectoral transactions¹²⁾ showed high shares of deposits and bonds for mutual transactions between the banking and non-banking sectors and high shares of stocks and deposits for mutual transactions between NBFIs (Figure IV-5). Bonds represent an important share (58.5%) of total interbank transactions due to the large holdings of special bank bonds among commercial banks.¹³⁾ In transactions between banks and NBFIs, which consist mostly of

10) Investment fund shares (shares of capital contribution to a collective investment vehicle) and derivative-linked securities (ELS, etc.) issued by securities companies were the two main product types, accounting for 65.9% and 13.5% of the total mutual transactions in stocks (613 trillion won at the end of June 2021), respectively.

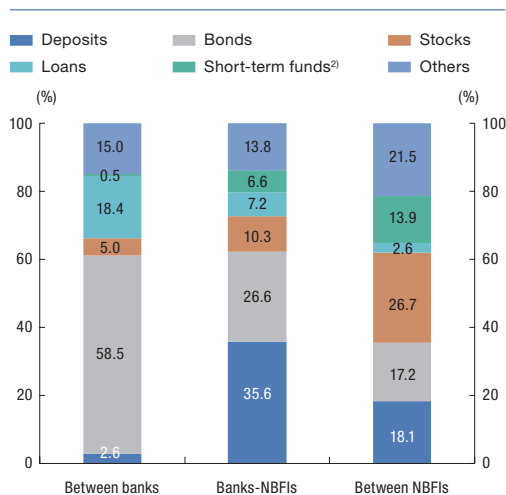
11) While foreign currency swap transactions between banks and foreign bank branches account for a significant portion of derivatives transactions between financial institutions, their share in total funding and asset management transactions has decreased since the global financial crisis amid the improvement of liquidity conditions in the foreign currency money market and the tightening of regulations on large global banks.

12) By counterparty sector, mutual transactions between NBFIs increased by 9.0%p since 2010 to 59.6% (as of the end of June 2021), while mutual transactions between banks and NBFIs (35.6%) and between banks (4.8%) decreased by 6.7%p and 2.4%p, respectively, during the same period.

13) At the end of June 2021, 71% of all bond holdings of the banking sector consisted of bonds issued special banks such as Korea Development Bank with a relatively small retail deposit base.

purchases of banking products by NBFIs as part of asset management operations, deposits (35.6%) and bonds (26.6%) were the top two products accounting for the highest shares. Between NBFIs, stocks (26.7%) made up an important share of total mutual transactions due to active investment in private equity funds by insurance companies and the recent inclusion of trust products in derivative-linked securities,¹⁴⁾ followed by deposits¹⁵⁾ (18.1%), bonds (17.2%), short-term money market instruments (13.9%), in this order.¹⁶⁾

Figure IV-5. Proportion¹⁾ of mutual transactions between financial sectors by product



Notes: 1) June 2021 basis.

2) RP, CP, Call and CD basis.

Source: Bank of Korea.

3. Background and Impact of Increased Interconnectedness Since the Global Financial Crisis

A. Background to Increasing Interconnectedness

The rise in the interconnectedness of the financial sector since the global financial crisis is caused by a complex interplay of factors including the weakening in its intermediary function for the corporate sector, the rapid expansion of the financial investment industry, and the boom in arbitrage trading and asset-backed securitization against the backdrop of a growing decoupling between the financial and real sectors and an increase in yield-chasing among economic agents under a prolonged low-growth and low-interest-rate environment.

(Weakening in the financial sector's intermediary function for the corporate sector)

After the early to mid-2010's, although there has been ample liquidity in the financial system under a generally low-interest-rate environment, much of it has not made its way into the corporate sector due to a prolonged slump in corporate activity,¹⁷⁾ which has low-

14) Derivative-linked securities are generally classified as stocks as many of them are structured products whose value is derived from price movements of a stock or stock index (ELS).

15) At the end of June 2021, two main types of deposits in deposit transactions between NBFIs (333 trillion won) were reserves deposited by mutual credit cooperatives with their federations (55.3%) and investor deposits securities companies deposited with securities finance companies (22.2%).

16) Since 2010, the shares of bonds, short-term money market instruments, and stocks in mutual transactions between NBFIs increased by 4.2%p, 3.4%p, and 2.3%p, while the shares of deposits and derivatives decreased by 9.4%p and 4.3%p, respectively.

17) Since the global financial crisis, corporate profitability has steadily worsened (median ROA: 4.7% in 2010 → 1.9% in 2020). For details, refer to the June 2021 Financial Stability Report, <Analysis of Financial Stability Issues> 「IV. The Rise of Vulnerable Firms with Low Interest Coverage Ratios in Korea: Background and Implications」(page 165).

ered liquidity demand, and stricter financial regulations.¹⁸⁾ This has resulted in large reflux of liquidity to the financial sector, increasing mutual transactions between financial institutions.¹⁹⁾ At the end of June 2021, the corporate sector's share in financial institutions' total asset management operations fell by 7.7%p to 27.8% from the end of 2009 (35.5%), while the share of the financial sector edged up by 5.0%p during the same period. Starting in the mid-2010's, peer financial institutions replaced corporations as the biggest counterparties of financial institutions' asset management transactions (Table IV-1, Figure IV-6). The share of transactions with the corporate sector shrank across most financial sectors, including banks and community financial institutions.

Table IV-1. Size¹⁾ of financing and operation by transaction sector in the financial sector

(trillion won, %, %p)

Transaction sectors	End-2009		End-Q2 2021		Increase in operation (b-a)
	Raising of funds	Operating of funds (a)	Raising of funds	Operating of funds (b)	
Financial corporations	1,115 (27.7)	1,115 (27.7)	3,090 (33.5)	3,090 (32.7)	+1,975 (+5.0)
Corporations	579 (14.4)	1,430 (35.5)	1,333 (14.4)	2,625 (27.8)	+1,195 (-7.7)
Households	1,656 (41.1)	851 (21.1)	3,613 (39.2)	2,055 (21.7)	+1,204 (+0.6)
Others ²⁾	676 (16.8)	632 (15.8)	1,194 (12.9)	1,679 (17.8)	+1,047 (+2.0)
Total	4,025 (100.0)	4,028 (100.0)	9,230 (100.0)	9,448 (100.0)	+5,420 (-)

Notes: 1) Figures inside () are proportions.

2) Government, central banks, non-resident basis.

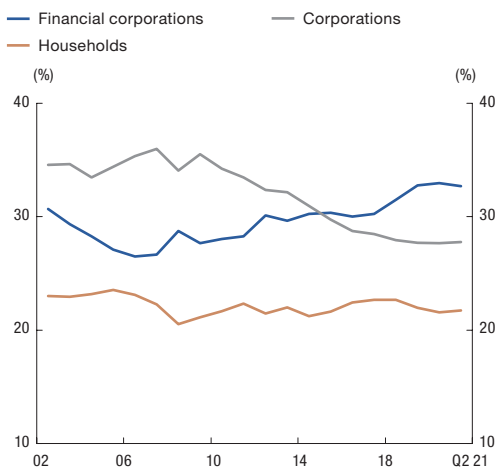
Source: Bank of Korea.

However, since the COVID-19 crisis, corporate loans have increased significantly due in part to financial relief measures for SMEs, which has also slightly pushed up the share of the corporate sector in the financial sector's asset management operations (27.1% at the end of March 2020 → 27.8% at the end of June 2021), with the share of mutual transactions inching down (33.0% → 32.7%) slightly during the same period.

18) Following the introduction of the Basel III capital rules, banks have been more reticent to lend to companies as under the new rules, higher risk weights are applied to corporate loans than to household loans. As a result, the rate of increase in banks' corporate loans slowed in 2010 to June 2021 (8.5% on annual average) from the level in 2003-2009 (5.6%).

19) During the period in the early to mid-2000's when the share of mutual transactions in the financial sector's total transactions declined (30.7% at the end of 2002 → 26.5% at the end of 2006), the shares of other sectors such as the government (+1.6%p) and the central bank (+1.0%p) edged up slightly in addition to that of the corporate sector (+0.7%p).

Figure IV-6. Proportion¹⁾ of fund management by transaction sector in the financial sector



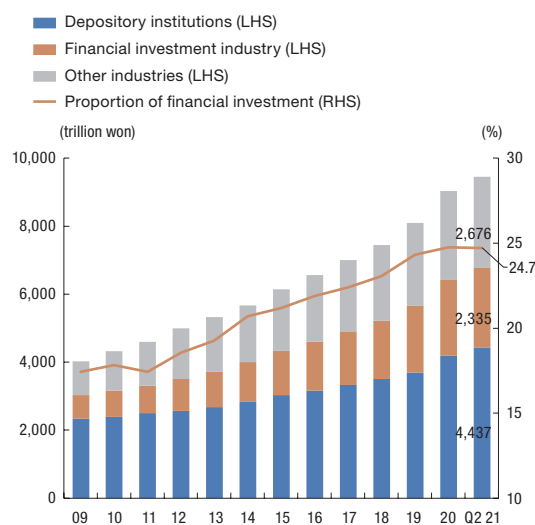
Note: 1) Proportion of total financial industry's asset.
Source: Bank of Korea.

(Rapid Growth of the Financial Investment Sector)

Amid an intensified hunt for yield under a prolonged low-interest-rate environment, money has rapidly flowed into dividend-type financial products, a phenomenon also facilitated by the government policy to foster the development of related industries.²⁰⁾ As a result of this, the financial investment sector, which is more heavily reliant on mutual transactions than other sectors, has experienced a growth spurt, with their assets expanding²¹⁾ faster than those of deposit-taking institutions. The assets of the financial investment

sector (flow of funds statistics basis) have grown at an annual average rate of 11.0% since 2010, which has increased its share in the financial sector by 7.3%p (17.4% at the end of 2009 → 24.7% at the end of June 2021), while the share of deposit-taking institutions, recording a significantly lower annual average rate of growth of 5.8% during the same period, has decreased by 10.6%p (57.6% → 47.0%) (Figure IV-7).

Figure IV-7. Proportion¹⁾ of financial investment in financial assets



Note: 1) Proportion of financial assets in the financial sector by flow of funds statistics.
Source: Bank of Korea.

The financial investment sector used the large inflow of cash to increase mutual transactions with other non-bank institutions, buying and selling primarily repos and other marketable

20) The introduction of the “comprehensive financial investment business entities system” (October 2013) and other measures to foster large investment banks have helped the growth of the securities industry, while the trust industry and the collective investment industry have benefited from the amendment to the Trust Act (July 2012) allowing more diverse offerings of trust products and easing the restrictions on hedge funds (July 2011).

21) At the end of June 2021, mutual transactions accounted for 47.2% and 61.8% of the financial investment sector's total funding and asset management transactions, largely exceeding the corresponding shares among deposit-taking institutions (26.2% and 19.2%).

products.²²⁾ By counterparty, the value of its mutual transactions with trusts, securities companies, and credit-specialized financial companies has risen by 6.2%p, 5.6%p, and 3.2%p, respectively since 2010 (Table IV-2).

Table IV-2. The proportion¹⁾ of mutual transactions in the financial investment sector by relative sector.

Counterpart industry	(% , %p)		
	End-2009 (a)	End-June 2021 (b)	Proportion change (b-a)
Domestic banks	35.1	30.6	-4.5
Financial institutions serving the public	17.2	3.4	-13.8
Foreign banks' branches	2.8	3.1	+0.2
Trusts	3.7	9.9	+6.2
Investment funds	5.7	8.3	+2.5
Security companies	6.6	12.2	+5.6
Insurance companies	10.4	12.0	+1.6
Credit-specialized financial companies	3.4	6.5	+3.2
Others	15.1	14.1	-1.0
Total	100.0	100.0	-

Note: 1) The proportion of securities companies, investment funds, and trusts by relative business in mutual transactions for financing and operation.

Source: Bank of Korea.

(Boom in arbitrage trading and asset-backed securitization)

The boom in arbitrage trading and asset-backed securitization, which straddle multiple financial sectors and markets, has contributed to a further acceleration in the growth of mutual transactions. The bond lending market has grown dramatically (11 trillion won at the end of 2009 → 96 trillion won at the end of June 2021) due to leveraged trading by securities companies and some investment funds in which they exchange CP against government bonds in the bond lending market and then sell repos using the acquired government bonds as collateral or otherwise change the length of maturity or liquidity profile of debt securities.²³⁾²⁴⁾ The asset-backed securitization market has also gained in size with the start of sales of asset-backed commercial paper (ABCP) having bank time deposits as underlying assets by securities companies to trusts and investment funds²⁵⁾ (Figure IV-8).

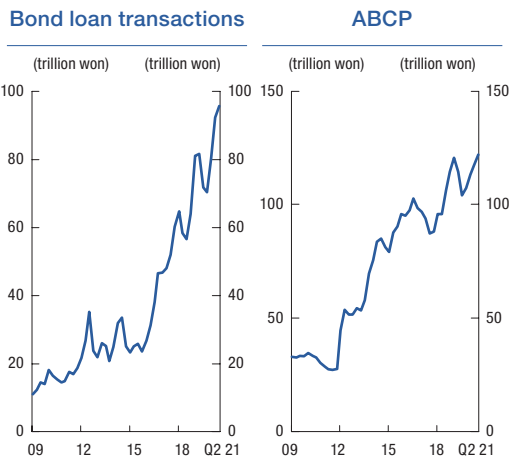
22) By product type, the shares of repos and CP in total intersectoral mutual transactions have increased by 6.0%p and 0.8%p, respectively, since 2010, while the shares of deposits and CDs have shrunk by 4.3%p and 1.2%p. The share of transactions with trusts in total funding-related mutual transactions of securities companies jumped 18.8%p on the increase in the trading of repos and derivative-linked securities, while the share of transactions with credit-specialized financial companies in their total asset management-related mutual transactions rose by 4.8% on the inclusion of credit-specialized financial company bonds among derivative-linked securities. The share of transactions with insurance companies in investment funds' funding-related mutual transactions edged up by 7.3%p due to the sales of alternative investment funds, while the share of transactions with credit-specialized financial companies in their asset management-related transactions increased 11.8%p, lifted by investment in credit-specialized financial company bonds and CP.

23) This trading technique, aimed at profiting from the spread between the CP yield and the RP interest rate, involves the process of buying CP and exchanging it against government bonds, which are, then, sold under a repo agreement, and buying more CP using the proceeds, which accumulate leverage.

24) In addition to RP-based arbitrage demand, the growth of the bond lending market is also driven by short sale demand in anticipation of rising interest rates.

25) Between the end of 2009 and the end of June 2021, the outstanding balance of ABCP increased at an annual average rate of 12.1%, from 33 trillion won to 122 trillion won.

Figure IV-8. Trends of bond loan transactions and ABCP balances



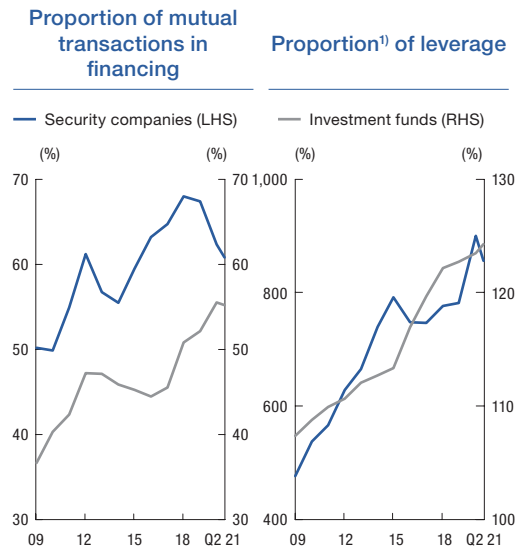
Sources: Bank of Korea, Korea Financial Investment Association.

B. Effects

As securities companies and investment funds increasingly engage in mutual transactions with other NBFIs, the growing share of marketable products in their funding has lifted their leverage ratio (Figure IV-9). The leverage ratio of securities companies²⁶⁾ nearly doubled from 476.7% at the end of 2009 to 856.2% at the end of June 2021 due to the rise in borrowings. The leverage ratio of investment funds jumped from 16.9% to 124.3% (based on private equity funds) during the same peri-

od due to higher sales of repos (0 trillion won at the end of 2009 → 49 trillion won at the end of June 2021).²⁷⁾

Figure IV-9. Funding of securities firms¹⁾ and investment funds.



Note: 1) Securities firms have total assets/ownership capital, and investment funds are based on the total operating assets/net assets of private equity funds.

Sources: Bank of Korea, financial institutions' business reports, Korea Financial Investment Association.

Moreover, credit-specialized financial companies and securities companies with a higher degree of reliance on wholesale borrowings²⁸⁾ saw their funding reliance on the financial investment sector rise,²⁹⁾ one of the conse-

26) Based on total assets reported on the balance sheets of securities companies and not on flow of funds statistics data for securities institutions (including securities finance companies).

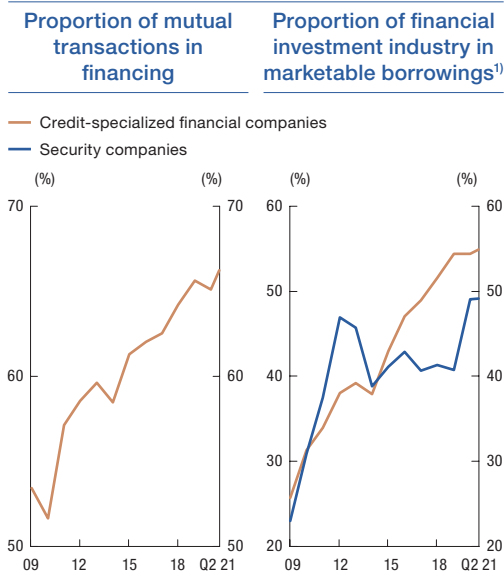
27) Private equity funds are allowed to borrow up to 400% of their net assets through cash borrowings, pledging of collateral, or sales of derivative products. The recent rise in their leverage ratio appears to be due mainly to the growth of bond hedge funds using repos as investment vehicles and borrowings through the trading of TRS (total return swaps) with securities companies (Financial Services Commission, February 2020).

28) At the end of June 2021, the share of wholesale borrowings (financial bonds, repos, CP, CDs, call money) relative to the total liabilities of credit-specialized financial companies and securities companies stood at 70.4% and 30.1%, respectively, largely exceeding the corresponding share among other types of financial institutions (17.5%).

29) The share of transactions with the financial investment industry in the wholesale borrowings of credit-specialized financial companies and securities companies increased by 29.2%p and 26.1% to 54.9% and 49.1%, respectively, at the end of June 2021.

quences of which is less funding stability as their ability to borrow becomes increasingly subject to fluctuations in market conditions (Figure IV-10). In times of market instability, caused, for example, by the potential deterioration of portfolio assets of products with no lock-in period (MMF, MMT), triggering a wave of redemption requests from investors or a sudden surge in securities companies' liquidity demand due to contingent liabilities or ELS-related margin calls, conditions for funding through the financial investment sector can rapidly worsen.

Figure IV-10. Fund-raising of credit-specialized financial companies and security companies



Note: 1) Financial bonds and short-term funds (RPs, CP, CDs, call money) basis.

Source: Bank of Korea.

4. Assessment of Interconnectedness-related Risk

A. Assessment Method

The size of interconnectedness risk is estimated by the size of losses that are transferred from a troubled sector to other sectors. To overcome the limitations of existing risk indicators,³⁰⁾ interconnected risk was assessed using the methodology of the ECB (2019)³¹⁾ by estimating the rate of losses at default for different asset classes and the probability of risk contagion and chain-reaction bankruptcies³²⁾ and building an index using these estimates.

Interconnectedness risk is divided into two large categories: primary risk from the first bankruptcy and indirect risk from chain-reaction bankruptcies. Primary risk is the risk that is directly transferred from a bankrupt sector to its counterparties, which can be, in turn, broken down into credit risk and liquidity risk. Credit risk means potential losses incurred by counterparties on assets in which they have invested in the bankrupt sector, which is calculated by taking into consideration the loss given default (LGD)³³⁾ of each asset class.³⁴⁾

Here, a_{ij} is the assets of the i th sector held in the j th sector and l_{ij} is the LGD.

30) DebtRank is the size of credit risk arising from the bankruptcy of a financial sector (institution) expressed as a share of the overall financial sector's total assets under management. As DebtRank is calculated based on total exposure without considering the LGD of individual financial products, it tends to overestimate the risk. For details, refer to Battiston et al (2012).

31) For a summary description of the methodology, refer to <Appendix> 'Estimation Method of Interconnectedness Risk', and for a more detailed description, see CoMap: Mapping Contagion in the Euro Banking Sector (2019).

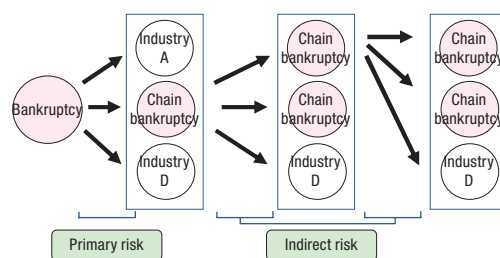
32) In the <Analysis of Financial Stability Issues> section of the December 2017 Financial Stability Report ('III. Analysis of Interconnectedness among Financial Sectors to Reflect the Risk Transmission Channels', page 113), the BOK performed a simulation of the transfer of primary risk between financial sectors by considering the LGD of each asset class. In this analysis, in addition to primary risk from the first bankruptcy, indirect risk from chain-reaction bankruptcies is also considered for a more dynamic assessment.

Liquidity risk refers to potential losses on disposition of assets a counterparty may incur from fire sales of assets in order to repay short-term liabilities owed to the bankrupt sector. If the size of short-term liabilities other sectors owe to the bankrupt sector exceeds the value of their total highly liquid assets (cash, settlement deposits, and government bonds), they are most often forced to proceed to fire sales of illiquid assets to raise funds. Losses on disposition incurred from fire sales were calculated by applying appropriate discount rates for each asset class.³⁵⁾

Here, α_i is the share of loans called back, r_i is the discount rate on fire-sold assets, L_i : highly liquid assets of the i th sector, A_i : i th sector's assets invested in other financial sectors (excluding highly liquid assets).

The indirect risk from chain-reaction bankruptcies refers to credit and liquidity risks for other sectors arising from chain-reaction bankruptcies within an individual sector, triggered by the primary risk from the first bankruptcy.³⁶⁾ Indirect risk is calculated by repeating the transfer of risk until there is no more occurrence of chain-reaction bankruptcies (Figure IV-11).

Figure IV-11. Path of primary and indirect risk transition due to bankruptcy



33)

Loss Given Default (LGD)¹⁾

Deposits	Loans	Call Money, Repos	CD-CP	Bonds	Stocks	Derivatives	Trusts	Insurance, Pensions
10% ²⁾	35%	0%	10% ²⁾	45%	75%	5% ³⁾	35%	35%

Notes: 1) Based on the LGD of corresponding asset classes under the Basel III international ratings-based approach (credit risk) and the rebate rates applied to the value of securities in the securities lending market.

2) A conservative discount rate of 10% was applied by considering the securities lending rebate rates on Korean won deposits (5%), CDs (7%) and CP (5% for A1-rated CP issued by financial institutions, 20% for other A1-rated CP).

3) Given that most derivatives traded in Korea are IRS or CRS, the rebate rate of 5%, which is currently applied to foreign sovereign debt securities in the securities lending market, was used.

34) The credit risk of individual financial sectors was calculated by multiplying the value of assets they hold in the bankrupt sector by the LGD of corresponding asset classes.

35) The following discount rates were applied to each of the asset classes by referring to "Calculation of RWA for credit risk" (2019) published by BCBS:

Discount Rates at the Disposition of Assets by Class

Loans	Call money, CD, Repos	CP	Bonds	Stocks	Derivatives	Trusts	Insurance, Pensions
15%	5%	5%	1~8% ¹⁾	25%	25%	25%	15%

Note: 1) Discount rates of 1-8% applied depending on the length of maturity.

36) Chain-reaction bankruptcies were assumed to occur ① when a sector experiences a complete erosion of capital due to credit and liquidity risks resulting from the bankruptcy of a counterparty sector or ② when it is unable to raise funds to pay back short-term liabilities owed to the bankrupt sector through the disposition of assets.

The value of interconnectedness risk thus calculated can be divided into the value of contagion and the value of contagion losses, which were converted into two separate indices: a contagion index (CI) and vulnerability index (VI), respectively. Interconnectedness risk at the level of contagion means losses resulting from the bankruptcy of a sector to the overall financial sector, and the CI measures the aggregate losses that may be caused by the bankruptcy of this sector as a share of the total capital of the rest of the sectors. If the CI is 5%, this means that the aggregate losses from direct and indirect risks arising from the bankruptcy of a sector are 5% of the total capital of other financial sectors.

$$\begin{aligned} &\text{Contagion index (CI)} \\ &\quad \text{Aggregate capital losses caused by bank-} \\ &\quad \text{ruptcy} \\ = &\frac{\quad}{\text{Total capital of the overall financial sector -} \\ &\quad \text{Total capital of the bankrupt sector}} \times 100 \end{aligned}$$

Interconnectedness risk at the level of contagion losses refers to losses incurred by individual sectors as a result of another sector's bankruptcy. The VI measuring this risk is defined as the ratio of the average capital losses caused by a bankruptcy of another sector relative to the capital of individual sectors. If the VI is 5%, this means an individual sector experiences 5% capital loss on average if another sector goes bankrupt.

$$\begin{aligned} &\text{Vulnerability index (VI)} \\ &\quad \text{Average capital losses caused by the bank-} \\ &\quad \text{ruptcy of another sector} \\ = &\frac{\quad}{\text{Capital}} \times 100 \end{aligned}$$

B. Results

At the end of June 2021, the size of interconnected risk at the level of contagion appeared to have increased from the end of 2009, with the CI (financial sector-wide average) rising by 1.4%p, from 5.5% to 6.9%.³⁷⁾ By sector, contagion risk was the highest for investment funds with a CI of 28.1%, followed by banks (11.5%) and securities companies (4.4%), in this order (Figure IV-12). The CI of banks was comparatively low as a higher share of deposits which have a lower LGD and lower dependence on transactions with any single sector reduced the possibility of chain-reaction bankruptcies.

The rise in the financial sector's CI since 2010 has been caused mainly by the surge in the CI of investment funds (+9.6%p). As investment funds' mutual transactions with other NBFIs have increased, the risk of this sector causing chain-reaction bankruptcies has commensurately grown. The bankruptcy of an investment fund³⁸⁾ appeared to trigger chain-reaction bankruptcies among insurance companies and credit-specialized financial institutions, caused by massive investment losses in the case of the former³⁹⁾ and the fail-

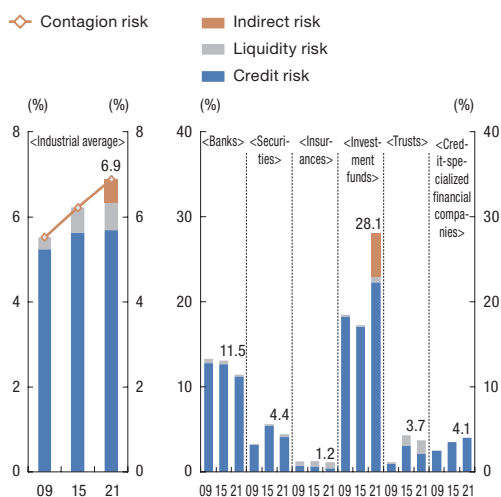
37) This means that the amount of losses caused directly and indirectly by the bankruptcy of an individual sector is 6.9% of the capital of other sectors on average.

38) The bankruptcy of an investment fund or a trust is defined as the deterioration of all assets under management by an investment fund or a trust.

39) The share of assets held in investment funds in total assets under management by insurance companies increased from 8.1% at the end of 2009 to 13.9% at the end of June 2021. It should be noted that the LGD set for investment funds (stocks) was the highest (75%) of all asset classes traded between financial institutions.

ure to pay back funds raised from investment funds⁴⁰⁾ in the case of the latter.

Figure IV-12. Trends¹⁾ of contagion riska

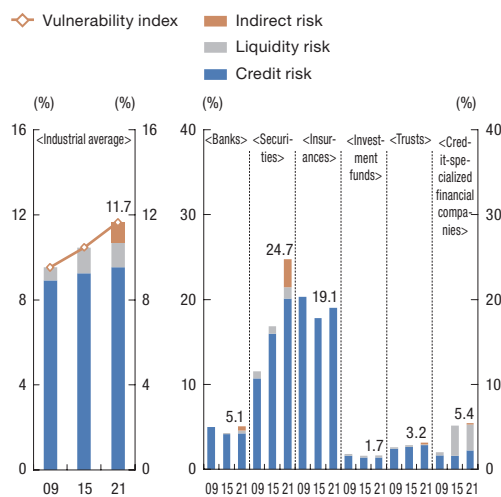


Note: 1) 2009 and 2015 are year-end, 2021 is end-Q2 basis.
Source: Bank of Korea.

At the end of June 2021, interconnectedness risk at the level of contagion losses also appeared to have increased from the level at the end of 2009, with the VI (financial sector-wide average) rising by 2.1%p, from 9.5% to 11.7%.⁴¹⁾ By sector, contagion loss risk was the highest for securities companies with a VI of 24.7%, followed by insurance companies (19.1%) and credit-specialized financial institutions (5.4%), in this order (Figure IV-13).

The rise in the financial sector's VI since 2010 is mainly due to the sharply higher VI of securities companies (+13.2%p). As securities companies have increased leverage through mutual transactions, this has raised the levels of their primary and indirect risks.⁴²⁾ On the other hand, investment funds and trusts showed a relatively low VI of 1.7% and 3.2%, respectively, in spite of the high share of mutual transactions. This is because most assets in these two sectors are dividend-type financial products and any losses from an external shock are losses on investor assets and not losses on financial institutions' own capital.⁴³⁾

Figure IV-13. Trends¹⁾ of vulnerability index



Note: 1) 2009 and 2015 are year-end, 2021 is end-Q2 basis.
Source: Bank of Korea.

40) The share of investment funds in the total funding of credit-specialized financial companies jumped from 7.1% at the end of 2009 to 19.3% at the end of June 2021.
41) This means that a bankruptcy in another sector can cause losses that amount to 11.7% of a sector's capital on average.
42) The estimated level of risk borne by securities companies based on the results of a simulation conducted in June 2021, in the event of the bankruptcy of one or more investment funds, causing chain-reaction bankruptcies among insurance companies and credit-specialized financial companies.
43) BOE (2017) stressed that a key characteristic of investment funds, which has importantly contributed to their growth, is the dispersion and sharing of risk arising from a market shock across the assets of multiple investors, thereby avoiding risking the capital of a single investment entity.

5. Assessment and Implications

The increase in the interconnectedness between financial institutions since the global crisis appears to be due to the weakening in their role as the suppliers of capital to the real sector, which has led to a reflux of liquidity into the financial sector and more particularly into the financial investment sector. Amid the drive for profits among financial institutions, there has been an especially sharp rise in the interconnectedness of NBFIs through mutual transactions in marketable products. The increase in leverage trading in some sectors, consisting in changing the maturity and liquidity profile of assets, and a significant surge in the volume of mutual transactions between sectors that are comparatively more vulnerable to market shocks suggest an accumulation of potential risks to the financial system. Such an environment requires special vigilance since in the event of a domestic or global shock, ever-tighter interconnectedness can make an isolated crisis in a troubled sector spread across the overall financial sector more easily.⁴⁴⁾

Hence, it is important to carefully inspect the financial system for vulnerabilities in anticipation of a spike in volatility in the domestic and international financial markets and other forms of domestic or external shocks that may occur during the process of monetary policy normalization in major countries. The monitoring of funds flows and significant changes in business practices in sectors with a high share of wholesale borrowings or an elevated level of leverage need to be strengthened. Moreover, the current macroprudential management system centered on the banking sector must be expanded into a comprehensive financial sector-wide system so that more relaxed regulations in the non-banking sector⁴⁵⁾ cease to serve as incentives for NBFIs to engage in excessive levels of mutual transactions.⁴⁶⁾ Meanwhile, financial institutions must play an increased role as funding intermediaries for the production sector, while at the same time improving their risk management capacity, such as carrying out regular stress tests for liquidity shocks and not only for capital adequacy.

44) The simulation of risk contagion from a failing financial sector showed that after the spread of primary shock to sectors that are its direct transaction partners, chain-reaction bankruptcies are triggered in other sectors as an indirect consequence, increasing the CI and the VI from the levels at the end of 2009, particularly in the non-banking sector. The rapid spread of the ELS-related liquidity shock in the immediate wake of the COVID-19 crisis from securities companies to credit-specialized financial companies is also largely explained by the structure of interconnectedness between these sectors.

45) For example, while short-term funding has sharply declined in the banking sector since 2010 (151 trillion won at the end of 2009 → 37 trillion won at the end of June 2021) due to the loan-deposit ratio requirement and the introduction of liquidity ratio rules (LCR, NSFR), it has surged in the securities and investment fund sectors, which are subject to more relaxed liquidity rules, during the same period (63 trillion won → 226 trillion won).

46) The financial authority is currently in the process of implementing policy instruments announced in the “Measures to Strengthen Macroprudential Management in the Non-banking Sector” (January 2019) for identifying systemic risk factors in the non-banking sector and introducing related macroprudential rules.

Appendix.

Estimation Method of Interconnectedness Risk

First, a balance sheet between financial sectors is constructed using the model proposed by Espinosa-Vega and Sole (2010).

$$\sum_j x_{ij} + a_i = c_i + d_i + b_i + \sum_j x_{ji}$$

Here, x_{ij} : assets held by the i^{th} sector in the j^{th} sector, a_i : other assets of the i^{th} sector, c_i : capital, d_i : deposits, b_i : funding from NBFIs, x_{ji} : assets held by the j^{th} sector in the i^{th} sector, which are liabilities owed to the j^{th} sector.

Using this balance sheet, the size of credit and liquidity risks arising from the bankruptcy of a sector that are transferred to other sectors is estimated. Credit risk being losses on assets invested in the bankrupt sector, its size was calculated as below by taking into consideration the LGD (λ_{ij}) on the assets:

$$\begin{aligned} \sum_{j \in z-y} x_{ij} + \left[a_i + \sum_{j \in y} (1 - \lambda_{ij}) x_{ij} \right] \\ = \left[c_i - \underbrace{\sum_{j \in y} \lambda_{ij} x_{ij}}_{\text{Credit risk}} \right] + d_i + b_i + \sum_j x_{ji} \end{aligned}$$

Here, z is the overall financial sector and y the bankrupt sector.

Liquidity risk is the risk occurring during the process of calling back credit by the bankrupt sector (j) from its counterparty (i), in the form of losses on disposition of assets incurred by the counterparty (i) from fire sales of its assets to make up for the drop in liquidity resulting

from the payback of credit. When the bankrupt sector (j) calls back credit ($\rho_i x_{ji}$, ρ_i is the share of credit called back), sector (i) starts by selling highly liquid assets (γ_i) and to cover any shortfall, proceeds with fire sales of assets (excluding highly liquid assets) invested in other sectors. The level of losses from fire sales of assets θ_i is calculated by applying discount rates of corresponding asset classes as follows:

$$\begin{aligned} \sum_j x_{ij} + a_i \\ - \left[\min \left\{ \frac{1}{1 - \delta_i} \max \left\{ 0, \sum_{j \in y} \rho_i x_{ji} - \gamma_i \right\}, \theta_i \right\} \right] \\ = \left[c_i - \underbrace{\delta_i \min \left\{ \frac{1}{1 - \delta_i} \max \left\{ 0, \sum_{j \in y} \rho_i x_{ji} - \gamma_i \right\}, \theta_i \right\}}_{\text{Liquidity risk}} \right] \\ + d_i + \left[b_i + \min \left\{ \gamma_i, \sum_{j \in y} \rho_i x_{ji} \right\} \right] \\ + \left[\sum_{j \in z-y} x_{ij} + \sum_{j \in y} (1 - \rho_i) x_{ji} \right] \end{aligned}$$

Here, δ_i is the discount rate on fire-sold assets

Bankruptcy contagion occurs when (i) the capital of a financial institution is completely eroded or (ii) it cannot resolve the shortage of liquidity through the disposition of assets due to the credit or liquidity risk calculated earlier. The following formulae are used to determine bankruptcies from a complete capital erosion or the shortage of liquidity:

(i) Bankruptcy due to a complete erosion of capital

$$\begin{aligned} c_i < \underbrace{\sum_{j \in y} \lambda_{ij} x_{ij}}_{\text{Credit risk}} \\ + \delta_i \min \left\{ \frac{1}{1 - \delta_i} \max \left\{ 0, \sum_{j \in y} \rho_i x_{ji} - \gamma_i \right\}, \theta_i \right\} \\ \text{Liquidity risk} \end{aligned}$$

(ii) Bankruptcy due to the shortage of liquidity

$$\gamma_i + \theta_i (1 - \delta_i) < \sum_{j \in y} \rho_i x_{ji}$$

δ_i : discount rate on the fire-sold assets of the i^{th} sector

γ_i : Highly liquid assets of the i^{th} sector

θ_i : Assets (excluding highly liquid assets) of the i^{th} sector invested in other financial sectors

When bankruptcy contagion occurs, credit and liquidity risks arising from bankruptcies in each successive sector are added to the calculation to determine bankruptcies in other sectors. The final sizes of credit and liquidity risks are calculated by repeating this process until there is no more contagion between sectors.

Contributing Departments & Authors by Section

Section	Author
Planning & Coordinating	Financial Stability Dep. Gu Do Park
[Executive Summary]	Financial Stability Dep. Young In Na, Eun Young Oh
[Financial Stability Situation by Sector]	
I. Credit Markets	
1. Credit Leverage	Financial Stability Dep. Jahye KIM, Eun Chong Jeon
2. Household Credit Box 1	Ki Young Jung, Moon Soosung Euna Cho, Dong Gil Min, Joonsun Hong
3. Corporate Credit Box 2 Box 3	Dohoon Pyoun, Kyungyeon Jeong Dohoon Pyoun, Kyungyeon Jeong Jungmin Park, Gakjoon Yoo
II. Asset Markets	
1. Bond Markets	Financial Markets Dep. Jo In Woo , You Tae Gyeong
2. Stock Markets	Kim Jongwon, Sung Yo Kim
3. Real Estate Markets Box 4	Financial Stability Dep. Jungmin Park, Sangwoo Kim, Eun Young Oh Sangwoo Kim, Young In Na, Eun Young Oh
III. Financial Institutions	
1. Banks	Financial Stability Dep. Lee Jung Yeoun, Seo Rim Jung, Dong Gil Min
2. Non-Bank Financial Institutions Box 5	International Dep. PARK Hye Jin, Park Ye Won Financial Stability Dep. Shim Won, Yoonah Baek, Min Ji Woo, Se Han Kwon Shim Won, Yoonah Baek, Min Ji Woo
3. Interconnectedness	Cho, Jae Hyun, Dong Jae Lee
IV. Capital Flows	International Dep. KIM, Dong Whee, Wonkyu Si, Lee Jinwoo

Section	Author
[Resilience of Financial System]	
I. Financial Institutions	
1. Banks	Financial Stability Dep. Lee Jung Yeoun, Seo Rim Jung, Joonsun Hong
Box 6	Lee Dokyung, Shin Ha Neul
2. Non-Bank Financial Institutions	Shim Won, Yoonah Baek, Min Ji Woo, Se Han Kwon
Box 7	Yang Jungu, Eun Kyung Lee, Dong Jae Lee
II. External Payment Capacity	International Dep. PARK Hye Jin, Park Ye Won, Kang Shin Young, Lee Soohyung
III. Financial Market Infrastructures	Payment & Settlement Systems Dep. Se Ho Ha, Su Yeon Park
Box 8	Financial Stability Dep. Jeayoon Kim, Jeon Eunkyung
[Overall Assessment]	Financial Stability Dep. Young In Na, Eun Young Oh
[Analysis of Financial Stability Issues]	
I. Assessment of Recent Domestic and External Financial Imbalances and Implications	Financial Stability Dep. Kilsung Song, Gakjoon Yoo, Park, Jaehyun, Eun Kyung Lee, Kyusik Kim
II. Financial and Economic Impacts of Household Debt in Korea	Yongpil Moon, Jahye KIM, Yoo Hyun Joo
III. Impacts of the Normalization of Monetary Policy in Major Countries on Foreign Portfolio Investment in the Domestic Securities Markets	International Dep. KIM, Dong Whee, Wonkyu Si
IV. Recent Trends in Interconnectedness in the Financial Sector and Risk Assessment	Financial Stability Dep. Cho, Jae Hyun, Park, Jaehyun, Kyusik Kim, Dong Jae Lee
English Editor	International Affairs Dep. Derek Bruinooge

Financial Stability Report

Publisher Lee, Juyeol
Editor Lee, Jeong Wook
Published by Bank of Korea
67, Sejong-daero, Jung-Gu, Seoul, 04514, Korea
www.bok.or.kr
Published on March 22, 2022
Printed by Jeil Printech Co., Ltd.

This material is posted on the website of Bank of Korea (<http://www.bok.or.kr/eng> > Financial Stability > Financial Stability Report)

Please contact Financial Stability Analysis Team, Financial Stability Department, Bank of Korea (Tel: +82-2-750-6886, Email: finstabl@bok.or.kr)

This is a translation of the original version in Korean, which is the sole authoritative text

Copyright © BANK OF KOREA. All Rights Reserved
ISSN 1975-7042

